

**AN EXPLORATORY STUDY OF THE
RELATIONSHIPS AMONG ENVIRONMENTAL
CHARACTERISTICS, ORGANIZATION STRUCTURE
AND ACCOUNTING-BASED PERFORMANCE
EVALUATION/REWARD SYSTEMS[†]**

Chee W. Chow*
Kamal Haddad**
Howard Toole***

Designing effective management controls requires evidence on how alternate performance evaluation and reward systems affect performance. In collecting and evaluating such evidence, it is important to recognize that operationalizing an evaluation/reward systems requires decisions regarding three elements: a performance measure, a performance standard, and a performance-based reward. Prior studies on effective management control systems tended to focus on only a few variables at a time. Thus, they have limited ability to reveal how the broad set of organizational variables interact in affecting the design and effects of performance evaluation/reward systems. This study simultaneously considers a broader set of organizational characteristics and performance

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* Chee W. Chow is a Vern Odmark Professor of Accountancy in the College of Business Administration at California State University, San Diego, San Diego, CA.

* Kamal Haddad is a Professor of Finance in the College of Business Administration at California State University, San Diego, San Diego, CA.

* Howard Toole is a Professor of Accounting in the College of Business Administration at California State University, San Diego, San Diego, CA.

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evaluation/reward systems variables, thereby permitting the interactions and interrelationships among such variables to be directly assessed.

This study has found that firms' design of accounting-based performance evaluation/reward systems is contingent on their environmental uncertainty and degree of external competition. Firms have considerable latitude in adjusting their performance evaluation/reward systems to these environmental variables, as such systems have multiple facets that can act as complements or substitutes for one another. Our results also indicate that the "fit" between a firm's performance evaluation/reward system and its environment significantly affect its overall performance. Thus, the results of this study provide further support for the claims of prior research that effective management control requires attention to both internal and external factors and the congruence between them.

Designing effective accounting and management controls requires evidence on how alternate performance evaluation and reward systems affect performance. In collecting and evaluating such evidence, it is important to recognize that operationalizing an evaluation/reward system requires decisions regarding three elements: the performance measure(s), performance standard(s), and the relation between reward and performance. A large body of empirical research has examined how organizations' environmental factors and internal attributes affect the nature and effects of their performance evaluation/reward systems. However, these studies have tended to focus on a few variables at a time. As a result, they have limited ability to reveal how the broad set of organizational variables interact in affecting the design and effects of performance evaluation/reward systems. Another limitation of these prior studies is that they have only examined aggregate characteristics (e.g., quantitative vs. subjective) of such systems.

The current study advances over prior related research by simultaneously considering a broad set of both organizational characteristics and accounting-based performance evaluation/ reward system variables. Thus, compared to prior studies, it has a greater ability to discover interactions

and interrelationships that exist among these variables. Another advance over prior studies is that it focuses on the features of an accounting-based performance evaluation/reward system at a more detailed level.¹

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Three aspects of associations amongst accounting-based performance evaluation/reward systems, organizational characteristics and firm-wide performance are analyzed cross-sectionally. The first aspect is differences among the accounting-based performance evaluation/reward systems of firms classified as either low or high technology or service. The second is associations within and between organizational characteristics and such systems. The third aspect is how accounting-based performance evaluation/reward systems independently, and interactively with organizational characteristics, correlate with firm-wide performance.

Survey results from a sample of 76 manufacturing and service firms revealed numerous significant interrelationships among their environmental and organizational characteristics and aspects of their accounting-based performance evaluation/reward systems. The results also indicated that the "fit" among these variables significantly affected firm performance.

The remainder of this paper is organized as follows. The next section provides a review of the related prior literatures as the basis for guiding the design of the current study. Then the method is described, followed by the findings of association tests. The final section provides a summary and discussion.

LITERATURE REVIEW

A major part of extant empirical research on performance evaluation/reward systems can be classified into four categories. Each category is based on a somewhat distinct set of literature from organizational behavior, psychology, sociology, and economics. We label these categories performance evaluation style, expectancy and agency theory, agency theory, and contingency theory.

Reviews of the research in each category provide support for four basic observations. First, there is a contingent relationship between performance evaluation/reward systems and organizational characteristics (e.g., uncertainty, organizational size, decentralization, strategy) (Govindarajan and Anthony, 1984; Govindarajan and Gupta, 1984; Merchant, 1981, 1984; Abernethy and Stoelwinder, 1991). Second, performance evaluation/reward systems both independently, and interactively with other organizational characteristics (e.g., uncertainty, organizational size, decentralization) affect performance (Govindarajan and Anthony, 1984; Govindarajan and Gupta, 1985; Merchant, 1981, 1984). Third, the performance evaluation/reward system combines with characteristics of the individuals being evaluated (e.g., risk and effort preferences, skill) to affect performance (Chow, 1983; Waller and Chow, 1985). Fourth, the evaluator's style of use of a performance evaluation/reward system (e.g., the importance placed on meeting the budget) depends on how he/she is evaluated, other aspects of the management control system (e.g., participative budgeting) and characteristics of the organization (e.g., uncertainty) (Hopwood, 1972, 1974; Otley, 1978; Brownell, 1982; Hirst,

1983). Taken together, the extant empirical research indicates that there is no one best performance evaluation/reward system; rather, it is contingent on a variety of factors both internal and external to the organization and at different levels of aggregation (e.g., individual vs. organization).

Other empirical research has examined the overall use or importance of accounting-based information and control systems for planning, motivating, communicating, coordinating and evaluating. Some organizational characteristics found to be associated with these information and control systems are uncertainty (Gordon and Narayanan, 1984; Chenhall and Morris, 1986), technology (Bruns and Waterhouse, 1975; Jones, 1985b; Rockness and Shields, 1984), competition (Khandwalla, 1972), and organizational size (Jones, 1985a; Rockness and Shields, 1988). Other studies have addressed the choice of organizational structure (Khandwalla, 1977; Hall, 1982; Ford and Slocum, 1977), which is the internal pattern of organizational relationships that govern authority and responsibility for decisions and actions. Two primary structures are decentralization -- the locus on the vertical hierarchy of responsibility for decision making -- and formalization -- the degree to which procedures for decisions and actions are pre-specified. Prior accounting research has found that the use/importance of accounting-based control systems is contingent on both of these organizational structure variables (Merchant, 1981; Bruns and Waterhouse, 1975).

Taken as a whole, the prior studies have provided useful insights into the relations among environmental characteristics, organizational structure, and the design of accounting-based performance evaluation/reward systems. They suggest that firms' design of accounting-based performance evaluation/reward systems is contingent on certain environmental variables and internal attributes of the organization. Another implication of the prior research is that organizational performance is contingent on the fit among the performance evaluation/ reward system characteristics, the

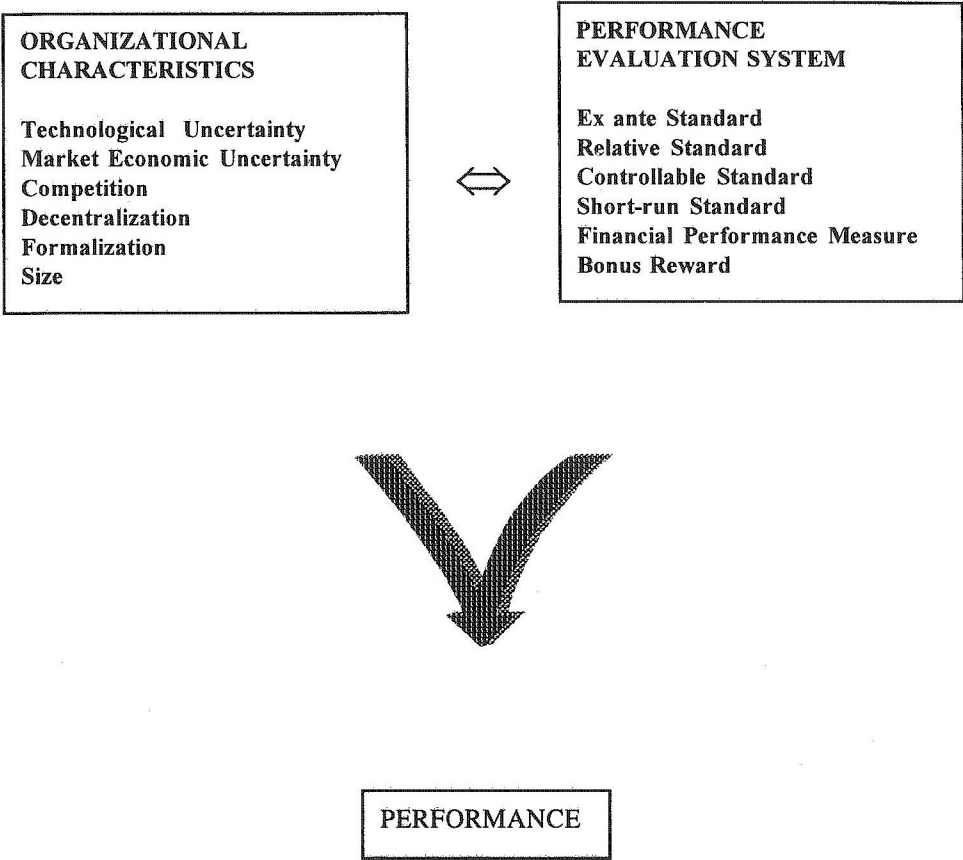
organization's environmental characteristics, and internal attributes. These insights provide the overall framework for guiding our study (Figure 1). However, besides only including a small subset of these variables at a time-- thus being unable to explore interrelationships among the broad set of variables included in different studies -- few of the prior studies have empirically tested the effects of different organizational characteristics-control systems mixes on organizational performance.

The framework suggested by the extant literature can be used to formulate numerous univariate predictions regarding the design and effects of accounting-based performance evaluation/reward systems. Indeed, the formulation and testing of such predictions tends to be the focus of much of extant research in the area. Rather than adopt this approach, our aim is to discover the pattern of interrelationships among the broad set of variables. Thus, instead of formulating specific hypotheses for testing, we collect data on the set of variables, and use association tests to uncover the significant relationships that exist among them. Our expectation is that the findings can help to sharpen future research by suggesting sets of variables that need to be included and considered simultaneously.

Despite our taking an exploratory -- as opposed to hypothesis testing -- approach, our selection of variables for inclusion still is guided by the framework. As such, some illustration of the linkages among its components would be useful. Below, we provide several examples of how the framework, in conjunction with prior research findings, can generate predictions regarding correlations among pairs of variables.

A prediction suggested by the framework and prior findings is that rewards will be more contingent on accounting measures as an organization's size increases. This is because the coordination, monitoring

FIGURE 1
Conceptual Framework



and communication problems increase concurrently with size. It is relatively easy for the manager of a small firm to monitor and control subordinates' behavior, thus there is no need to impose risk on the latter through performance-contingent compensation. In contrast, the senior managers of Fortune 1000 firms are much more removed from first-line employees, or even from their profit/investment center managers. Further, there are very significant and complex coordination problems within the firms. Performance contingent compensation can be an efficient and effective control in such large firms. In essence, within such large firms, the joint costs of control, compensation and the residual agency costs are minimized by employing a control mix which emphasizes performance-contingent compensation.

Another prediction is that as a firm's uncertainty increases, there is more opportunity for a manager to exploit his/her private information. For example, a manager could shirk and claim that poor performance was due to factors beyond his/her control. Performance-contingent compensation can be an efficient and effective control for mitigating this agency problem because it provides a manager with incentives not to shirk and to anticipate and react to factors that are outside of his/her control.

A positive correlation also can be expected between competition and performance-contingent rewards. As competition increases, the need for the firm's operations to be more effective and efficient also increases, since only the most economical producers survive. Performance-contingent rewards provide effort-averse managers with motivation to be more effective and efficient.

Prior research further supports a link between technology and controls, including performance-based rewards. The primary argument is that as technology becomes more routine, repetitive, certain, simple and independent, there is less of a control problem. Thus, we would expect to observe more performance contingent rewards in firms with more technological uncertainty.

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EMPIRICAL METHOD

We examine the associations among accounting-based performance evaluation/reward systems for top management, organizational characteristics, and performance at the firm-wide level of analysis. This is a major departure from most prior studies' focus on operating department or business unit managers. The focus at the firm level and on top management was motivated in part by the relative lack of studies at this level. It was also aimed at increasing the variance in the independent and dependent variables (observations related to subunits of an organization are likely to be subject to many common influences, such as firm policy).

SAMPLE

To ensure significant variation in the firm characteristics of interest, we focused on three industries: low technology manufacturing, high technology manufacturing, and service. The sample was further limited to firms headquartered in California. This geographical limitation was aimed at increasing the relative salience of industry effects compared to other factors (Foster, 1986). We identified from the Standard and Poors' Register of Corporations, Directors and Executives all of the firms

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headquartered in California with at least 100 employees, and which were in selected SIC code classifications. Three broad industry classes were defined based on four-digit SIC codes, and a firm could only be included if all of its SIC codes were within one of these industry classes. These industry groupings were based on the industry grouping analyses of the U.S. Congressional Committee (1982) study on high technology industries for the entire U.S. and Galbraith (1985) for the state of California. The codes for high technology were 3671 through 3699 (electronics) and 3811 through 3832 (instruments and optics). For low technology, they were 2111 through 2661 (textiles, clothes, lumber products), and for service they were 7011 through 7399 (hotels, laundries, advertising, employment agencies, bank services).

A total of 279 firms met all of the sampling criteria. During summer 1991, a letter and questionnaire were sent to the Chief Financial Officer of each of these firms and one week later he/she was telephoned and asked to participate. The survey was completed over the phone, and the telephone interviews were conducted by one of the researchers. Seventy-six firms agreed to participate. The numbers (and response rates) by industry were: 30 (28%) high technology firms, 27 (26%) low technology firms, and 19 (28%) service firms. These firms had a mean level of sales of \$56,091,781 and 606 employees.

RESPONDENT CHARACTERISTICS

The respondents were distributed across job titles as follows: President (9), Chief Financial Officer/Vice President-Finance (45), and Controller (22). Their average length of employment with their firms was 8.1 years, and their average time in their present position was 5.1 years. The respondents' mean self-rated knowledge of factors related to their company (1="very minimal"; 7="very extensive") was 5.22 for external economic and technological environment, 5.17 for industry conditions and trends, 5.95 for internal organization and structure, and 5.96 for internal policies

and procedures. Thus, overall, the respondents seemed to possess sufficient knowledge about their firms' conditions to respond to the questionnaire.

DESCRIPTIONS OF INDEPENDENT AND DEPENDENT VARIABLES

The data collected from each firm included six measures of the performance evaluation system for top management, six organizational characteristics, and organizational performance. Descriptions of these measures follow.

Performance Evaluation System was measured by the responses to three multipart questions. There was a two-stage hierarchy to the questions. The first stage focused on bonus-based rewards and financial performance measures. The second stage focused on performance standards. The performance standard measures were all conditional on a firm having a financial performance measure-based bonus system. If a firm did not have such a system (19 did not), then they were excluded from the measurement of performance standards.

Bonus-based Rewards were measured by responses to a question about the percentage of top management compensation from five sources: fixed salary; bonus pay (paid within one year of award or deferred past one year); other incentive pay where the amount realized depends on the market price of the firm's stock (e.g., stock options) and which can be converted into cash within the year of award; and other incentive pay convertible beyond one year after receiving the award. The responses to the last two categories were very small -- means of 1% and 2%, respectively -- and therefore were not used in subsequent analysis. The measure of bonus reward used was the sum of bonus pay paid within the

year of award and paid after one year of award (mean=16.58%). The mean of fixed salary was 80.50%.

Financial Performance Measure was derived from responses to a question on the percentage weight given to each of three classes of performance measure when determining top management's total pay package for the year (excluding fringe benefits and retirement). The three classes of measures are financial (e.g., sales, profits, costs, ROI, EPS), quantified non-financial (e.g., market share, growth rate, quality, productivity), and non-quantifiable (e.g., creativity, leadership, attitude, maturity, decisiveness, expertise). The percentage response to the financial alternative was used as the index of financial performance measure.

Performance Standards Four performance standards were measured by summing responses to a question with seven response alternatives. The question asked, for those firms with a bonus pay plan for top management, how much weight is typically placed on seven ways of viewing financial performance measures. The respondents were asked to allocate 100% among these seven alternatives: comparing performance to a pre-set performance standard either for the year or over a several year period, comparing performance to that of a peer group either for the year or a several year period, comparing actual performance to an assessment of what it could have been under the circumstances either for the year or over a several year period, and other. The sum of the responses to the first two alternatives was used as the weight being placed on ex ante standards, the sum of the responses to the second pair of alternatives was used as the weight being placed on relative performance standards, and the sum of the responses to the third pair of alternatives was used as the weight being placed on controllable standards. The last alternative, other, was measured with just one item. A measure of the use of short-run performance standards was derived by summing the three response alternatives in which the standard was for the current year.

Technological Uncertainty Prior organizational studies that have used technology to explain organizational structure and/or performance have used a variety of definitions and measurements (Ford and Slocum, 1977; Gerwin, 1979; Hall, 1982; Khandwalla, 1977; Rousseau, 1979). The most common representations of technology include automation, routineness, complexity, technological change, task uncertainty, knowledge of the input-output transformation process, and product standardization. These representations can be considered to relate to technological uncertainty. Low technological uncertainty is associated with high levels of automation, routineness and standardization, and low levels of complexity, technological change and task uncertainty.

Based on the prior studies, we measured technological uncertainty with responses to four questions on seven-point scales. The questions asked about the stability/dynamism of the technology environment facing a company (1="very stable/slow change"; 7="very dynamic/rapid change"), the predictability of the technology facing the company (1="very predictable", 7="very unpredictable"), and the frequency of major technological advances in the industry and in the firm (1="seldom"; 7="frequently"). The reliability (Cronbach alpha) of the summed scale was 0.88.

Market Environmental Uncertainty was measured using a method similar to that of Gordon and Narayanan (1984). Five questions were used, each with a seven-point, verbally anchored scale. The questions asked the number of new products/services marketed in the last three years by the industry and by the company (1="none" and 7="a large number"), how stable/dynamic is the external economic environment (1="very stable" and 7="very dynamic"), how predictable is the external environment (1="very predictable" and 7="very unpredictable"), and the respondent's characterization of the market for his/her industry's products over the last three years (1="rapidly decreasing", 4="no change", and 7="rapidly

increasing"). Answers to these five scales were summed. The reliability of this measure was 0.69.

Competition. Similar to Khandwalla (1972) and Jones (1985b), competition was measured by answers to nine questions on seven-point scales with adjective anchors. The nine questions asked about the intensity of competition faced by the firm with respect to material input, manufacturing manpower, R&D manpower, managerial manpower, output prices, production technology, product variety, product quality, and technological sophistication of products. The anchors were: 1="of negligible intensity", and 7="extremely intense". Responses to the nine questions were summed. The reliability of this measure was 0.82.

Decentralization was measured by summing responses to a question concerning the extent to which the authority for each of six decisions is delegated by top management to lower levels of management. The six decisions are development of new products or services, hiring and firing of managerial personnel, selection of large investments, budget allocations, pricing decisions, and reward structure for managerial personnel. The response scale ranged from 1="minimal delegation" to 7="extensive delegation". The reliability of the scale was 0.72.

Formalization focused on the extent to which procedures for decisions and actions are pre-specified for top management. It was measured by summing responses to a question concerning the extent of formalization for each of five decisions and actions: job descriptions, operating procedures, performance evaluation, strategic planning, and annual operating budgeting. The responses were on a seven-point scale, anchored by 1= "very, very informal" and 7="very, very formal". The reliability of the summed scale was 0.82.

Organizational Size. While contingency theory research clearly indicates that organizational size is a potent explainer of variation in organizational structures such as controls, there is controversy surrounding its dimensions

and measurement (Kimberly, 1976; Ford and Slocum, 1977; Hall, 1982). Because of this indeterminacy, we employed the two most frequently used size measures: sales and total number of employees. The standardized (z) scores of these two variables were summed and used. The reliability of this measure as assessed by the correlation between the two variables was 0.78 ($p < .001$).

Performance. There is little agreement on how to define and measure organizational performance (Kanter, 1981). Lack of agreement exists concerning for whom the performance measurement is intended (e.g., managers, owners, society), what to measure (e.g., market share, earnings, employee satisfaction, innovation), how to measure (e.g., subjective vs. objective) and who should perform the measurement (e.g., subordinates, superiors, outsiders). This lack of agreement has led all of the organizational studies reviewed earlier to measure performance with a variety of subjective scales by either a superior or a subordinate. Following this approach, performance in this study was measured by answers to three questions, each of which had a 7-point response scale. One question asked about the rate of change in the firm's market share (1="rapidly decreasing", 4="no change", and 7="rapidly increasing"). The other two questions asked about the firm's financial performance over the past three years. One asked about absolute performance (1="very poor", 4="average", 7="very good"); the other asked about performance in comparison to major competitors (1="way below average", 4="average", 7="among the best"). The answers to these three questions were standardized and summed. The reliability of this measure was 0.73.

Table 1 contains descriptive statistics for each of the measured variables for each of the three industry classifications. Table 2 contains a Pearson intercorrelation matrix for all of the measured variables.

Table 1
Descriptive Statistics for Industry Classifications

<i>Measured Variable</i>	Theoretical Range		Service (N=19)		Low Tech (N=27)		High Tech (N=30)	
	Low	High	Mean	S.D.	Mean	S.D.	Mean	S.D.
<i>Organizational Characteristics</i>								
Sales (x100)	0	+inf.	\$85,180	\$126,758	\$39,500	\$53,719	\$52,192	\$64,555
Employees	0	+inf.	720.44	968.91	504.04	611.31	628.83	753.53
Size(Z)	-inf.	+inf.	0.50	2.62	-0.32	1.44	0.01	1.72
Competition	9	63	31.42	12.17	38.27	8.21	42.26	5.57
Market Uncertainty	5	35	21.84	5.98	22.42	6.02	24.07	4.87
Technological Uncertainty	4	28	14.74	6.68	12.19	4.82	17.74	6.19
Decentralization	6	42	17.75	6.35	13.41	6.70	15.58	6.12
Formalization	5	-35	19.74	5.92	19.93	6.77	19.73	6.31
<i>Performance Evaluation System</i>								
Ex ante StandarControllable Standard	0%	100%	45.63%	42.35%	65.31%	35.09%	84.00%	26.58%
Controllable Standard	0%	100%	23.63%	27.55%	18.44%	22.34%	6.40%	13.58%
Relative Standard	0%	100%	18.25%	24.96%	10.00%	12.65%	5.60%	11.93%
Short-run Standard	0%	100%	82.75%	35.04%	75.75%	35.14%	87.80%	33.11%
Financial Measure	0%	100%	56.90%	32.01%	59.00%	24.92%	63.70%	29.56%
Bonus Based Compensation	0%	100%	18.26%	17.48%	13.26%	10.69%	18.50%	8.99%
<i>Performance of Company</i>								
Market Share Change	1	7	4.53	1.02	4.00	1.32	4.50	0.73
Financial Performance (absolute)	1	7	4.63	1.71	4.26	1.79	4.87	1.50
Financial Performance (relative)	1	7	5.00	1.89	4.54	1.39	4.89	1.73
Performance (Z)	-inf.	+inf.	0.29	2.70	-0.67	2.57	1.37	2.07

Table 2
Pearson Correlations Among Measured Variables

	Short-run Standard	Ex ante Standard	Controllable Standard	Relative Standard	Financial Measure	Bonus Reward	Size(Z)	Decentral- ization	Formal- ization	Tech. Uncertainty	Market Uncertainty	Competition
Ex ante Standard	0.40 ^a											
Controllable Standard	0.14	-0.64 ^c										
Relative Standard	-0.02	-0.58 ^a	-0.39 ^a									
Financial Measure	0.20	0.30 ^b	-0.11	-0.13								
Bonus Reward	0.01	0.25 ^c	-0.20	-0.16	0.10							
Size (Z)	-0.50	0.03	-0.11	0.01	-0.05	0.19 ^c						
Decentralization	-0.06	0.13	-0.25 ^c	0.05	0.06	-0.01	0.47 ^a					
Formalization	-0.96	0.20 ^c	- .020	0.05	-0.02	-0.09	0.08	0.32 ^b				
Tech. Uncertainty	0.29 ^c	0.47 ^a	- .022 ^c	-0.36 ^a	0.18	0.25 ^c	0.15	0.36 ^b	0.09			
Market Uncertainty	-0.05	0.18	-0.16	- .017	-0.04	0.17	v0.30 ^b	0.19	0.12	0.57 ^a		
Competition	0.23 ^c	0.57 ^a	-0.38 ^c	-0.21	0.16	0.43	-0.03	0.07	0.17	0.37 ^a	0.37 ^a	
Performance	0.30	0.21	-0.03	-0.02	0.03	0.44 ^a	0.17	0.02	0.03	0.19 ^a	0.12	0.17

Note: c p<0.05
b p<0.01
a p<0.001

Table 1 shows that the sample firms had moderate levels of technological uncertainty (\bar{x} =14.90), market uncertainty (\bar{x} =22.90), and competition (\bar{x} =37.95). The structure of the firms was moderately decentralized (\bar{x} =15.37) and moderately formalized (\bar{x} =22.20).

The firms' performance evaluation systems were as follows. A short-run (current period), compared to a long-run (several period), standard was given a lot of weight in evaluating the performance of top management (\bar{x} =83.00%). The ex ante standard was given more weight in evaluating performance (\bar{x} =67.98%) than either a controllable standard (\bar{x} =14.61%) or a relative standard (\bar{x} =10.37%). A financial performance measure was more important in measuring performance (\bar{x} =60.37%) relative to a quantifiable non-financial (\bar{x} =14.22%) or non-quantifiable (\bar{x} =25.42%) performance measure. Bonus-based compensation was a mean of 15.58% of their total (non-fringe benefit) compensation.

Only two of the organizational characteristics significantly varied with industry ($p>0.10$). Technological uncertainty was higher for the high technology firms (\bar{x} =17.14) than for low technology firms (\bar{x} =12.19), with service firms in between (\bar{x} =14.74) ($F=6.08$, $p<.004$). Competition also varied by industry, with high technology firms having the most, followed by low technology firms, with service having the lowest level of competition (\bar{x} =42.26, 38.26, 31.42, respectively) ($F=8.76$, $p=.0004$).

Two of the performance evaluation system variables varied significantly by industry. The controllable standard was of most importance to the service firms (\bar{x} =23.63%), of next most importance to the low technology firms (\bar{x} =18.44%) and least important to the high technology firms (\bar{x} =6.40%) ($F=3.73$, $p=0.03$). The ex ante standard also varied by industry, with high technology firms putting the most weight on it, followed by the low technology firms, with service firms using it the least (\bar{x} =84.00%, 65.31%, 45.63%) ($F=6.29$, $p<0.004$). Finally, performance did not vary significantly by industry classification ($p>0.10$).

ASSOCIATION TESTS

Associations Within Performance Evaluation Systems

The performance standard variables are conditional on the existence of a financial performance measure and performance-based bonus reward. Seven firms reported that they did not have such rewards, two firms did not put any weight on financial measures of performance and all nine are excluded from further analysis. A Mann-Whitney U -test² for each of the other performance evaluation variables, organizational characteristics and performance indicated no significant ($p > 0.10$) differences between these firms and the others.

The firms' use of performance standards either exposed a manager to risk by the use of an ex ante standard, or insulated him/her from the effects of risk through the use of either a controllable standard or relative standard. The correlations between ex ante standard and the two risk adjusted standards were negative (respectively, $r = -.64$, $-.58$, both $p < .001$), while the correlation between the two risk adjusted standards was $.39$ ($p < .001$). The two negative correlations are due both to ipsative scale construction (allocation of a fixed number of points among alternatives requires negative correlations) and by logical economic necessity (use of one or the other).

As firms put more weight on the ex ante standard, they also tended to use a short-run standard ($r = -.40$, $p < .001$) with a financial performance measure ($r = .30$, $p < .01$) and more bonus-based rewards ($r = .25$, $p < .05$). When firms used either risk-adjusted standard, they did not tend to use a short-run standard, a financial performance measure or bonus-based rewards ($p > 0.10$).

"[R]esults suggest that firms' design of accounting-based performance evaluation reward systems are contingent on their environmental uncertainty and degree of external competition"

Associations between Performance Evaluation System and Organizational Characteristics

Inspection of the correlations between these two classes of variables (Table 2) indicated that 11 of 36 correlations are significant at equal to or less than the 0.05 level. Two variables, technological uncertainty and competition, are involved in nine of these eleven correlations and they are positively correlated ($r=0.37, p<0.001$). As technological uncertainty and competition increase, firms use standards that are short-run (respectively, $r=.29, .23, p<.05$), ex ante or risk exposing ($r= -.38, p<0.01$). They also use more bonus-based rewards ($r=0.25, p<0.05$; $r=0.43, p<0.001$). And as technological uncertainty increases, firms rely less on relative performance standards ($r= -0.36, p<0.1$), hence exposing top management to greater risk. Firms that were more decentralized were less likely to use a controllable standard for evaluating top management ($r=0.25, p<0.05$), which serves to motivate top management to make sure that lower management is carrying out its responsibilities appropriately. Finally, and consistent with Merchant (1981, 1984), larger firms were more likely to use bonus-based rewards ($r=0.19, p<0.05$).

Association among Performance Evaluation Systems, Organizational Characteristics and Performance

Performance was associated with the use of a short-run performance standard ($r=0.30$, $p<0.05$), a bonus-based reward ($r=0.44$, $p<0.001$) and technological uncertainty ($r=0.19$, $p<0.05$) (Table 2).

Two levels of tests for an interaction between the performance evaluation system and organizational characteristics were performed. A macro test was done by a models comparison procedure based on regressing the six performance evaluation variables, the six organizational characteristic variables and the 36 cross-product interactions on performance. Each of the interactive variables was constructed by multiplying together one standardized performance evaluation system variable and one standardized organizational characteristic variable. Standardization was done so that the heterogeneous measurement scales of the variables would not affect the results. Also, each variable was scaled so that a larger scale value indicated "more" of it being present. This scaling also makes interpretation of betas more straightforward, since contingency theory predicts that when two variables of the nature of those measured here combine, either in a high/high or low/low fashion, a match or fit results and performance improves, while a mismatch results in a decrease in performance. Thus, a positive beta indicates that a match increased performance.

A potential problem with such a regression analysis is multicollinearity. Inspection of the 36 by 36 correlation matrix identified several probable instances of bivariate multicollinearity. Further, when the regression was run, the SPSS program identified 27 of the 48 variables as being essentially redundant, based on the tolerance criteria, with the other 21 variables. These 21 other variables were deleted from the analysis. The remaining 27 variables included all six organizational characteristics and

excluded the relative and ex ante standards from the performance evaluation system.

"[O]ur results are consistent with the 'fit' between a firm's performance evaluation/reward system and its environment having a significant effect on its overall performance."

A models comparison was performed by testing the significance of the reduction in R-squared when the interaction variables were excluded from the full model. The full model had an unadjusted R-squared of 0.91 and an adjusted R-squared of 0.67 ($F=3.77$, $p=0.009$). When the interaction variables were deleted, the decrease in unadjusted R-squared was 0.60, which was significant ($F=3.68$, $p=0.02$). This result indicated that the interaction between the two classes of variables explains a significant amount of the variation in performance. Ten of the 21 interaction terms that remained in the regression model were significant ($p \leq 0.05$), and six of the ten had positive betas.

To establish which specific pairings of organizational characteristics and performance evaluation system variables interact to affect performance, 36 regressions were run. Each regression used a different pairing of the six organizational characteristics and performance evaluation system variables, and their cross-product interaction. The result was that five of the 36 interaction terms were at least marginally significant and four of the five betas had positive signs: decentralization by short-run standard ($p=0.09$), size by short-run standard ($p=0.006$), market economic uncertainty by ex

ante standard ($p=0.09$), and market economic uncertainty by financial performance measure ($p=0.07$). The interaction with the negatively-signed beta was that between competition and relative performance standard ($p=0.05$).

Thus, overall, the results of the macro and micro tests provided evidence of a significant interactive effect of performance evaluation system and organizational characteristics on performance.

SUMMARY AND DISCUSSION

Firms' performance evaluation/reward systems have multiple facets that can act as complements or substitutes for one another (e.g., managers' risk exposure can be reduced either by offering a higher proportion of fixed pay, or by shielding their performance measures from the effects of noncontrollable factors). The results of this exploratory study has suggested that the firms sampled use performance evaluation systems that include short-run, ex-ante, controllable or relative standards with a financial performance measure and a bonus reward. In addition, as technological uncertainty and competition increased, firms preferred a short-run standard (ex-ante or relative) and bonus rewards. However, firms that were more decentralized were less likely to use relative standards for top management, and larger firms were more likely to use bonus-based rewards. These results suggest that firms' design of accounting-based performance evaluation reward systems are contingent on their environmental uncertainty and degree of external competition.

Our results also showed performance to be a function of short-run standards, bonus-based rewards and technological uncertainty, and positively related to interactions among organizational characteristics such as decentralization, size, market uncertainty and financial performance standards. In general, our results are consistent with the "fit" between a

firm's performance evaluation/reward system and its environment having a significant effect on its overall performance. These findings are consistent with contingency theory studies (Govindarajan, 1984; Govindarajan and Gupta, 1985; Merchant, 1981, 1984) that modeled empirically the associations amongst organizational characteristics (e.g., uncertainty, technology, competition, decentralization), performance evaluation systems (performance standards/budgets, rewards) and performance.

Thus, this study provides further support for the claims of prior research that effective management control requires attention to both internal and external factors and the congruence between them. It also provides a more comprehensive mapping of the contingencies and interrelationships among these variables than prior research. However, the uncovering of systematic relationships is only a prelude to theory building, and much work remains to be done in this direction. Even at a purely empirical level, this study still has numerous aspects that can be further refined. Among the desirable refinements are an increased sample size, the use of firms from a greater variety of industries, the inclusion of more consequence variables (e.g., employee job tension, satisfaction, slack creation, communication truthfulness), and extending data collection to more levels and functional areas of each firm. Further insights also will result from explicitly eliciting the reasons behind firms' use or non-use of an accounting-based performance evaluation/reward system and other related management controls.

NOTES

1. Increasingly, firms are moving towards a combination of accounting- and non-accounting based performance measures (e.g., first-pass quality, throughput time). Nevertheless, accounting-based measures remain a key set of performance variables, especially at higher hierarchical levels.
2. This nonparametric test was used to reduce the impact of outliers and because of its less restrictive distribution assumptions (such as normality), especially since our measurement scales have limited scales and categories.

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