

# Environmental uncertainty, corporate strategy, performance measurement and the creation of economic value

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**ENVIRONMENTAL UNCERTAINTY,  
CORPORATE STRATEGY,  
PERFORMANCE MEASUREMENT and  
the CREATION OF ECONOMIC VALUE**

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## **Abstract**

Evidence from practice indicates that firms frequently alter their performance measurement systems in order to accommodate effectively to dynamic circumstances and to changing corporate strategies. One common element in this development is an increasing uncertainty on the part of corporate managers about the usefulness of accounting information for performance evaluation. The idea is spreading that performance evaluation systems, in order to become effective, should include not only accounting information, but also non-financial and qualitative information as well. Publications on the 'Performance Pyramid' (McNair, Lynch & Cross, 1990) and on the 'Balanced Scorecard' (Kaplan & Norton, 1993) do indicate that changes are being made in this respect.

Despite much debate on the issue of performance measures, almost no empirical evidence exists about the effectiveness of accounting, non-accounting and qualitative information for management control purposes. This paper presents an empirical study among 54 publicly listed companies in The Netherlands. In this study we made an attempt to classify different performance measurement systems as they are being used by corporate controllers to measure the performance of their most important production units' managers. The classification is based on the degree to which the actual performance measurement system is based on (accounting) measures of output, on quantitative measures or on measures of qualitative aspects of the business unit manager's performance. Tests indicate that the classification makes a valid and meaningful distinction between the different classes of performance measurement systems.

Based on this classification, a study has been conducted to assess the relationship between the use of certain performance measurement systems, the environment of the firm, the strategy adopted and the economic value created in the years 1995 and 1996. The choice of performance measurement systems appears to be dependent on market strategy, product innovation and industry (production versus service). We found that the creation of economic value is dependent on the combination of market dynamism and the strategy adopted by the firm. Interestingly, management control systems in themselves do not appear to create economic value. Moreover, more intensive use of operational measures tend to decrease economic value. This result casts some doubts on the usefulness of the Balanced Scorecard for controlling business unit performance in larger Dutch corporations.

## Introduction

The impetus for this study comes from an increasing number of publications indicating that companies are rethinking how to measure the performance of their businesses. In 1991, Robert Eccles predicted in his Harvard Business Review article *'The Performance Measurement Manifesto'* that in the five years to follow a performance measurement revolution would take place in corporations (Eccles, 1991). This revolution would replace accounting-driven performance systems by systems paying attention to financial as well as to non-financial, quantitative and qualitative performance indicators. This development has been motivated by dissatisfaction with accounting performance measures and by the rise of management attendance towards new competitive issues.

The first reason is not new: as far back as 1951, Ralph Cordiner, the CEO of General Electric, had a high level task force improve the key corporate performance measures. They came up with measures like profitability, market share, productivity, employee attitudes, public responsibility and the balance between short- and long-term goals (Eccles, 1991). More than 35 years later Tom Peters expresses his discomfort with financial performance measures as follows: *"Our fixation with financial measures leads us to downplay or ignore less tangible non-financial measures ... Yet these are increasingly the real drivers of corporate success over the middle to long term ..."* (Peters, 1987; Singleton-Green, 1993).

The second reason has been stimulated by new manufacturing practices like Total Quality Management (TQM) and Just-In-Time (JIT) and the greater attention for customer satisfaction (in terms of quality, speed of delivery and service) (Bromwich & Bhimani, 1989; Wilson, 1991; Yoshikawa, Innes, Mitchell, & Tanaka, 1993). Case evidence shows that some successful European and American companies use not only financially oriented, but also improvement focussed and balanced systems of performance measurement (Euske, Lebas, & McNair, 1993; Nanni, Dixon, & Vollman, 1992). Recent surveys indicate that during the years 1988-1994 customer satisfaction is getting even more important in evaluating process improvements than financial performance (Ernst & Young survey cited by Ittner & Lareker, 1998b; Lingle & Schiemann, 1996; Stivers, Covin, Hall, & Smalt, 1998). At the same time, it becomes clear that in most companies, the quality of non-financial information does not match its importance (Lingle & Schiemann, 1996), while the relation between non-financial measures and performance remains frequently unclear (Rees & Sutcliffe, 1994; Schiff & Hoffman, 1996; Udpa, 1997).

Some theoretical models have been developed to capture the complex interplay of financial and non-financial information. Lynch & Cross proposed a structural framework, called the *'performance pyramid'*, incorporating three objectives at the business unit level: customer satisfaction,

flexibility and productivity. The framework shows how to relate these objectives to operational measures of performance at the business unit level and strategic objectives at the corporate level (Lynch & Cross, 1991; Lynch & Cross, 1995; McNair, Lynch, & Cross, 1990).

A similar approach is followed by Kaplan and Norton in designing the '*balanced scorecard*' in which four distinct perspectives of performance are brought together: financial, customer, internal, and innovation & learning (Kaplan & Norton, 1992, 1993, 1996a, 1996b). The balanced scorecard provides yet another framework aiming at balancing short- and long-term objectives, financial and non-financial measures, leading and lagging indicators and external and internal performance indicators. Although both frameworks pretend to assist managers in developing effective and 'balanced' performance measurements systems, each of these frameworks only provides a structure which is basically 'empty'. As Suneel Udpa (1997) put it: "... *Since the book (by Kaplan and Norton) does not develop a model or a set of measurement principles in designing a Balanced Scorecard, managers hoping to apply the Balanced Scorecard to their corporate organizations will face practical problems in selecting meaningful performance measures ...*" Recent surveys show that, although additional non-financial performance measures may be considered important, it appears difficult to measure and use them effectively (Stivers et al., 1998) and to reconcile them meaningfully with the reported financial measure of performance (Drury, 1995).

This paper tries to reach some conclusions on corporate controllers balance between financial and non-financial measures in assessing their business units' performance. In our study, we follow a contingency approach, expecting to find different sets of performance measures matching different circumstances. In the next section we will give a literature review on the applicability of accounting measures of performance. Based on this literature review three hypothesis will be developed. In section three the research methodology will be explained. In the fourth section the results are presented, these will be discussed in the fifth and final section of this paper. Some possible directions for future research are also suggested.

### **Financial and non-financial measures of performance**

Accounting measures are widely used to assess the performance of individuals and organizational entities. This may be due to the following four common advantages of accounting measures (Emmanuel, Otley, & Merchant, 1990; Merchant, 1985a, 1998). Accounting measures reflect one of the *crucial objectives* of the firm, e.g. profitability and long-term financial strength of the organization.<sup>1</sup> Accounting measures of performance are stated in a single monetary dimension, permitting corporate management to *compare performance* of different organizational units and of different product/market combinations.<sup>2</sup> Accounting measures are focused on results, allowing

corporate management to assess and control even the *most complex organizational activities*. These 'result measures' allow business unit management some discretion as to how the results will be realized, mostly also leading to higher motivation of business unit personnel while stimulating creativity and flexibility. Accounting measures are mostly *objective* and *precise* measures of performance as they are mostly collected by a structured system of financial bookkeeping. Since this system is already in place because of financial reporting obligations, the additional *costs* of using this information also for performance measurement purposes are *relatively low*.

Since the publication of Argyris' study of the behavioral implications of budgetary control systems in four US firms in 1952, evidence of the adverse implications of the use of accounting information has been growing. Accounting measures *do not provide a clear picture of causal relations* between inputs and efforts on the one hand and performance and results on the other. This makes accounting figures not very useful for business unit managers in managing their daily operations (Argyris, 1952). It also makes goal setting and performance assessment precarious. Accounting measures stress mostly *short term results*, leading to excessive short term orientation of managers (often referred to as '*management myopia*') (Demirag & Tylecote, 1996; Demirag, 1998; Merchant, 1998). It becomes increasingly clear that accounting measures can easily be *manipulated* by business unit managers (Merchant, 1990; Merchant & Rockness, 1994).

Recent studies suggest that a combination of financial and non-financial measures performs best in predicting financial performance in the short and longer term (Behn & Riley, 1999; 6 Bryant, Jones, & Widener, 2000; Rees & Sutcliffe, 1994; Schefczyk, 1993). Moreover, permitted that this combination of performance measures is properly defined, eg., giving a comprehensive, reliable and strategy-aligned measure of performance, this set of performance measures may lead to more effective performance management and control (Malina & Selto, 2000). For performance evaluation purposes, managers seem to use more financial information while assessing a department's performance and relatively more non-financial information for the evaluation of the manager's performance (Schiff & Hoffman, 1996).

One of the most important explanatory variables appears to be *customer satisfaction*, which in turn may be influenced by non-financial performance measures like quality, delivery time and service. The relation between these performance measures, customer satisfaction and financial performance is however far from clear. Some empirical studies contend that higher customer satisfaction leads to higher profits and economic returns (Anderson, Fornell, & Lehmann, 1994; Dresner & Xu, 1995). Anderson (1994) also found a considerable 'carryover effect,' which means that past customer satisfaction leads to higher expectations and thus in itself to higher financial performance in the future. Dresner and Xu (1995) however add that perform-

ance improvements do not only lead indirectly via customer satisfaction to higher financial performance, but also directly by higher costs and higher selling prices. The ultimate effect on financial performance may therefore not be always clear (see also Ittner & Larcker, 1998a). Customer satisfaction in a US retail bank branch has some predictive ability for future accounting performance, mostly by attracting new customers. This relationship appears to be non-linear: accounting performance improves after a threshold in customer satisfaction has been reached, while fairly large improvements in customer satisfaction were needed to improve accounting performance (Ittner & Larcker, 1998a). Similar results are found in a sample of airlines, stressing the importance of improving service quality within the range of a customer defined 'zone of tolerance', limited by a minimum level of 'adequate' and a maximum level of 'desired' service level (Ziethaml, Berry, & Parasuraman, 1996). This may also depend on whether goods or services are produced: improving both customer satisfaction as well as productivity seems more problematic in the service industry than in the manufacturing sector (Anderson, Fornell, & Rust, 1997). These studies suggest that the use of financial and non-financial performance measures may lead to improved performance under certain contingent conditions.

### **Contingent conditions for effective performance measurement**

Most empirical studies suggest that the particular combination of financial and non-financial performance measures is partly the result of the influence of contingent factors, of which most notable are task characteristics, the corporate strategy and environmental conditions. We will look at each one in turn.

#### **Task characteristics**

McKinnon & Bruns (1992; 1992) provide evidence from a survey under 123 managers, showing that non-financial measures are extensively used. For a quick update on the affairs of their department, managers use relatively more non-financial information, while for a periodic evaluation relatively more financial information is taken into account. Financial managers tend to use relatively more financial than non-financial information than other managers. Case evidence indicates that the use of financial information is contingent upon functional specialization and upon time frame. Business unit managers rely for operational decisions mostly on non-financial information. Sales, marketing and purchasing managers tend to use relatively more financial information than production managers do. All managers, and particularly those at higher management levels, report more use of financial information when the time frame of decisions lengthens, for instance when monthly, quarterly or yearly results are examined.

Financial measures of income and return on capital are given more weight as overall measures of effectiveness and managerial performance (Bruns & McKinnon, 1993). Interdependencies



among operating units within an organization increase the use of aggregate (organization-wide) performance measures in evaluating business unit managers' performance (Bushman, Indjejikian, & Smith, 1995).

### **Environmental uncertainty**

Gordon & Narayanan (1984) show that management accounting systems include more external and non-financial data when managers perceive more environmental uncertainty. Broadening the scope of the MAS seems to be a strategy to cope with (perceived) uncertainty. Chenhall and Morris (1986) add that more environmental uncertainty is associated with both broad scope and timely information, while its impact on management accounting information is partly indirect by its influence on decentralization of the organizational structure. Mia and Chenhall (1994) studied the effect of broad scope MAS information on managerial performance. Their study shows that usage of broader scope MAS information was associated with enhanced performance for (more uncertain) marketing activities but not for (less uncertain) production activities. Performance related bonus payment systems for sales personnel in a US major retailer appear to lead to higher performance improvement in markets which are more competitive and upscale than in other markets (Banker, Lee, Potter, & Srinivasan, 1996). A cross-sectional study on a sample of more than 500 department stores showed that in a metropolitan environment low employee satisfaction leads to high employee turnover, which in turn has a negative effect on customer satisfaction and hence on financial performance. The links between employee satisfaction, employee turnover and customer satisfaction turn out not to be significant in non-metropolitan stores. The difference may be attributed to differences in level of competitiveness and/or differences in buying behavior between urban and rural customers (Banker, Konstans, & Mashruwala, 2000).

### **Strategy**

Research among 58 SBU managers reveals that, independent from strategy, short-run criteria always play a role in determining the business unit manager's bonus. However, putting greater emphasis on long-run criteria as well as subjective approaches for determining the SBU managers' bonus contribute to greater effectiveness when a high risk strategy of market penetration and product innovation is applied but hampers it in the case of low risk strategy (Govindarajan & Gupta, 1985). Govindarajan and Fisher demonstrate that effective business units have matching strategies and control systems. Effective low-cost business units are output controlled and share resources with other departments, while effective differentiating business units appear to be behavior controlled and also seem to share resources with other departments (Govindarajan & Fisher, 1990). Van der Stede et.al (2000) found that firm implementing quality initiatives use more non-financial and subjective measures without reducing their reli

ance on financial indicators. Only the combination of quality initiatives and subjective measures appears to lead to enhanced performance, while the combination of quality initiatives and non-financial measures leads to lower performance. This unanticipated result is also found by Ittner and Larcker (1995).

## Hypotheses

Based on the empirical evidence presented so far, we expect to find a dependency between use of performance measures, strategy and environmental uncertainty influencing organizational performance. The contribution of this paper is twofold: it aims at measuring the use of performance measures differently, using a newly developed measure to incorporate more different dimensions of performance measurement. Secondly, in this paper we evaluate business unit performance measurement against *organizational performance*, e.g., economic performance of the organization. We therefore take the perspective of the corporate controller. It can be argued that effective control of business units is particularly dependent on enhancing the effectiveness of the organization as a whole and not on optimizing subunit performance alone.

In this study we want to find answers to the following research questions:

1. What is the relative weight corporate controllers place on different performance measures for the evaluation of their most important production units?
2. How do differences in environmental uncertainty and different strategies affect the combination of performance measures corporate controllers use for evaluating their business units?
3. Which combinations of performance measures are used by organizations that successfully increase their economic value?

In the following paragraph we will outline our questionnaire survey instrument and the sample firms we approached in our study.

## The survey study

In December 1995, after extensive pretesting, the survey was sent to corporate controllers (or financial managers) of all 167 Dutch public firms<sup>3</sup> listed on the Amsterdam stock exchange.

Nearly 40 % returned the survey, the last responses were received in February 1996. From this response, 82% was usable for analysis. In our analysis, almost one third of the listed companies from the Amsterdam Stock Exchange was included (see panel A of Table 1). Panel B in Table 1 shows the distribution of our sample across the economic sectors in The Netherlands, indicating that all sectors are represented in the current sample. Analysis of the nonresponse does not give reason to expect that the composition of the sample is systematically biased (panel C of Table 1).

**Table 1: Analysis of Response and Nonresponse**

| <b>Panel A: Response</b>                      |        |            |
|---|--------|------------|
| Questionnaires                                | Number | Percentage |
| Questionnaires sent (to all listed companies) | 167    | 100%       |
| Questionnaires received                       | 65     | 39%        |
| Questionnaires used in analysis               | 54     | 32%        |

  

| <b>Panel B: Distribution of sample firms to Economic Sector</b> |                        |  |
|---|------------------------|--|
| Economic Sector   | Number of sample firms | Percentage of all listed firms in sector <sup>a)</sup> |
| Consumer Goods  | 6                      | 22%  |
| Capital Goods   | 4                      | 16%  |
| Basic Industry  | 10                     | 42%  |
| Construction Industry   | 3                      | 25%  |
| Transport and Communications                                    | 4                      | 50%  |
| Non-Financial Service Industry                                  | 12                     | 50%  |
| Trade   | 10                     | 29%  |
| Banks & other Financial Institutions                            | 2                      | 18%  |
| Insurance Companies   | 1                      | 25%  |
| Mineral and Mining Industry                                     | 1                      | 50%  |

  

| <b>Panel C: Analysis of Nonresponse</b>           |  |
|---|--|
| Reason provided                                   | Percentage of non-response sample (n=26) |
| Too busy to respond                               | 62%                                      |
| Too many surveys received                         | 8%                                       |
| Information required is too sensitive to disclose | 4%                                       |
| No interest in the subject                        | 15%                                      |
| Illness and holidays                              | 11%                                      |

<sup>a)</sup>: All Dutch firms that are publicly listed at the Amsterdam Stock Exchange on Jan. 1, 1996.

## Measurement of variables

### Environmental dynamism

The factor environmental dynamism was assessed using an adapted version of an environmental rate-of-change instrument developed by Miles and Snow (a similar approach can be found in Gordon & Narayanan, 1984; Khandwalla, 1972; Khandwalla, 1979; 1978). This instrument asks respondents to rate the level of change on a scale from 1 (highly stable/infrequent change) to 4 (highly volatile/constant change) on each of nine aspects of their environment, like consumers' buying behavior, competitors' actions, developments in technology, shareholders' demands and societal developments (see Appendix A).<sup>4</sup> Factor analysis confirmed the existence of three principal factors which we call *market dynamism* (combining

the scores on buying patterns of customers, distributors' attitudes, suppliers' attitudes, and competitors' strategies), *technological dynamism* (developments in technology and changes in production systems) and *societal dynamism* (changes in government behavior and in societal developments). Eigenvalues are 2.9, 1.2 and 1.5 respectively (see Table 2).

**Table 2: Factor Analysis of Environmental Dynamism Questions**

| Performance Measures                                  | Factor 1:<br>Market dynamism | Factor 2:<br>Societal dynamism | Factor 3:<br>Technological dynamism |
|---|------------------------------|--------------------------------|-------------------------------------|
| Clients' and customers' buying behavior               | <b>.706</b>                  | .155                           | -.080                               |
| Distributors' actions                                 | <b>.610</b>                  | .013                           | .284                                |
| Suppliers' actions                                    | <b>.656</b>                  | -.495                          | .267                                |
| Government's actions and policies                     | .250                         | <b>.801</b>                    | .065                                |
| Societal developments                                 | .068                         | <b>.811</b>                    | .273                                |
| Developments in technology of products and production | .026                         | .088                           | <b>.936</b>                         |
| Changes in your own production systems                | .068                         | .119                           | <b>.855</b>                         |
| Eigenvalue  | 2.631                        | 1.578                          | 1.445                               |
| Percentage of total variance explained                | 29.2%                        | 17.5%                          | 16.0%                               |

Scores on each of these scales were added to produce rate-of-change scales. Cronbach's alphas for these scales are 0.69, 0.75 and 0.78. All of the scales were considered usable in the analysis, as the lower limit of acceptability for the Cronbach's alpha measure is generally assumed to be around 0.50 to 0.60 (Nunnally, 1967).

### Strategy

The company's strategy was measured on two dimensions, namely *market strategy* and *product strategy*.

Market strategy, or portfolio strategy, relates to the decisions managers make in order to balance the trade-off between market share growth on the one hand and short-term earnings or cash flow on the other (Henderson, 1970). We treat this variable along a continuum, ranging from 'increasing market share' (a *build strategy*, mostly leading to low short-term profitability and low or even negative cash flows) to 'maximization of short-term earnings or cash flow' (a *harvest strategy*, resulting in declining market share) and 'divestiture of products and businesses' (a *divestment strategy*). We used the instrument developed by Gupta and Govindarajan (1984) to measure market strategy.

Product strategy defines how competitive advantage can be acquired or maintained. We made a distinction according to Porter (1985) between a strategy of product innovation and a strategy of low cost production (see also Demirag, 1995). At the company level, we measured the firm's *product strategy* by the percentage of sales corresponding to product innovation and related to low cost production.

Both dimensions are expected to operate independently from each other. For instance, a market strategy of market share growth can be realized by either competing on innovative and unique product values or by competing on low cost (and low priced) products. Statistical tests of the sample firms' scores on our scales for market strategy and product strategy confirms this expectation; both factors turn out not to be related to each other (Pearson correlation: 0.10,  $p=0.509$ ).

### **Performance measurement**

Over time, performance measurement instruments developed in the literature enlarge the scope of different performance measurement indicators by including more quantitative and qualitative measures of performance (Brownell, 1982, 1986; Hirst, 1983; Hopwood, 1972; Otley, 1978).

A list of 18 specific performance measures has been developed, including financial, non-financial and 'soft measures' of performance (refer to appendix B for a detailed listing of the performance measures used in this study). The measures were randomly ordered in the list so that specific performance measures categories could not easily be detected by respondents. Factor analysis confirmed the existence of three separate groups of performance measures (refer to Table 3). We label them *Accounting Measures of Performance (AMP)* (eigenvalue 2.8), *Quantitative Measures of Performance (QMP)* (eigenvalue 4.4) and *Soft Measures of Performance (SMP)* (eigenvalue 1.8).

**Table 3: Factor Analysis of Performance Measure Questions**

| Performance Measures  | <u>Factor 1:</u><br>Quantitative<br>measures | <u>Factor 2:</u><br>Accounting<br>measures | <u>Factor 3:</u><br>Soft meas-<br>ures |
|---|--|--|--|
| Production efficiency                                       | <b>0.719</b>                                 | 0.192                                      | -0.221                                 |
| Time to develop new products and production systems         | <b>0.664</b>                                 | -0.025                                     | -0.021                                 |
| Adherence to corporate guideliness in solving BU's problems | <b>0.662</b>                                 | -0.257                                     | -0.124                                 |
| The quality of products or services                         | <b>0.659</b>                                 | 0.086                                      | -0.280                                 |
| Adherence to prespecified production schedules              | <b>0.655</b>                                 | 0.282                                      | 0.132                                  |
| Changes in realized net profit                              | -0.058                                       | <b>0.715</b>                               | -0.050                                 |
| Adherence to total cost budget                              | -0.061                                       | <b>0.673</b>                               | 0.110                                  |
| Net profit, including corporate overhead allocations        | 0.294  | <b>0.606</b>                               | 0.003                                  |
| Adherence to the budget line items                          | 0.112  | <b>0.602</b>                               | 0.270                                  |
| Net profit, excluding corporate overhead allocations        | 0.045  | <b>0.455</b>                               | -0.363                                 |
| Return on Sales   | 0.124  | <b>0.536</b>                               | -0.023                                 |
| Quality of BU manager's relations with his subordinates     | 0.205  | 0.287                                      | <b>0.848</b>                           |
| The amount of BU manager's efforts                          | 0.090  | 0.566                                      | <b>0.576</b>                           |
| Eigenvalue  | 4.347  | 2.744                                      | 1.746                                  |
| Percentage of total variance explained                      | 24.2%  | 15.2%                                      | 9.7%                                   |

Total scores on each of these groups are calculated averaging the item scores. Cronbach's alphas of AMP, QMP and SMP are 0.61, 0.79 and 0.74. Accounting measures of performance are measures of results stated in financial or accounting terms. Quantitative measures of performance relate to specific quantifiable dimensions of organizational conduct, mostly related to the production process (or actions) and sometimes to results. Soft measures of performance relate to less quantifiable dimensions of managerial conduct, like the BU manager's capacity to motivate his people and the BU manager's relations with his subordinates. These three categories coincide to some extent with Merchant's classification of control methods into *results control*, *action controls* and *personel controls* (Emmanuel et al., 1990; Merchant, 1985a, 1998) and Ouchi's clustering of management control systems into *output control*, *behavior control* and *clan control* (Ouchi, 1980, 1975).<sup>5</sup>

### **Organizational Performance**

The performance of business units can be measured in a number of ways. Some subjective measures of performance can be applied, asking business unit managers to rate their own performance and/or having the business unit managers' performance assessed by one or more superiors. A frequently used instrument for the assessment performance is Mahony's instrument (Mahoney, 1963, 1965) which allows a rating on eight different managerial dimensions. As stated we will not use an assessment of business unit performance, but a measure of organizational performance. Since we analyze the appropriateness of performance measures on corporate level, it can be expected that corporate management control and evalu

ate their business units in function of their contribution to the performance of the entire organization. As a leading indicator of corporate success we use the economic rate of return for three reasons. Most importantly, economic rate of return is a more objective performance measure than Mahony's measure or other self-assessed performance measures. Secondly, it assesses corporate success independently from the three categories of organizational performance measures included in this study, preventing circular reasoning. And finally, Dutch companies increasingly consider creating economic value for the shareholders an important corporate objective (Bood, 1994).

Economic value added is calculated as economic rate of return, dividing the change in stock price over the year, including re-invested dividends, by the beginning stock price. The economic data were obtained from the Datastream database. The survey was held from December 1995 until February 1996 and relates to the then existing situation. We matched the survey data with a two-year economic value, created between December 31, 1994 and December 31, 1996. The choice for a two-year window was made for two reasons: we expect companies to need more than a year to generate results based on (new) performance measures. Moreover, the performance measures managers indicate to be important may be new to the organization. This means that another year is needed before the impact of this choice materializes in the company's economic performance.

## **Results**

Descriptive statistics show that Dutch corporate controllers perceive each of the performance measure categories relevant for evaluating the manager of their most important production unit (refer to Table 4).

Table 4: Descriptive statistics of variables used in analysis

| Variables                               | Theoretical range | Actual range    | Mean  | Standard deviation |
|---|-------------------|-----------------|-------|--------------------|
| <b>Perceived Environmental Dynamism</b> |                   |                 |       |                    |
| Dynamism                                | 9 – 36            | 12 – 30         | 22.69 | 3.69               |
| Market dynamism                         | 4 – 16            | 6 – 14          | 10.11 | 2.08               |
| Technological dynamism                  | 2 – 8             | 4 – 8           | 5.33  | 1.22               |
| Societal dynamism                       | 2 – 8             | 2 – 8           | 5.07  | 1.35               |
| <b>Strategy</b>                         |                   |                 |       |                    |
| Market strategy (build/harvest)         | -200 – 100        | -80 – 100       | 14.48 | 43.40              |
| Product strategy (innovation)           | 0 – 100           | 0 – 100         | 38.67 | 27.74              |
| <b>Performance Measures</b>             |                   |                 |       |                    |
| Operational measures of performance     | 1 – 5             | 1.40 – 5.00     | 3.57  | 0.64               |
| Accounting measures of performance      | 1 – 5             | 1.83 – 5.00     | 3.67  | 0.56               |
| Soft measures of performance            | 1 – 5             | 1.00 – 4.50     | 3.23  | 0.89               |
| <b>Corporate Performance</b>            |                   |                 |       |                    |
| Economic rate of return 31 Dec.'94-'96  |                   | -31.89 – 175.38 | 58.20 | 50.42              |

If the weight placed on accounting performance measures is measured as a percentage of the total weight placed on all three performance measures, the minimum relative weight on accounting performance measures in our sample is 20% while the maximum relative weight is 63% (see Table 5, Panel A).

Table 5: Performance Measurement Practice<sup>a)</sup>

| <b>Panel A: Total sample (n=52)</b>               |  |                                       |                                 |
|---|--|---------------------------------------|---------------------------------|
| Measures of Performance                           | Minimum                                  | Maximum                               | Mean <sup>b)</sup> (s.d.)       |
| Accounting Performance Measures                   | .20                                      | .63                                   | .34 (.05)                       |
| Quantitative Performance Measures                 | .22                                      | .48                                   | .33 (.04)                       |
| Soft Measures of Performance                      | .16                                      | .43                                   | .32 (.04)                       |
| <b>Panel B: Production and Service Industries</b> |  |                                       |                                 |
| Measures of Performance                           | Production Industry <sup>c)</sup> (n=16) | Service Industry <sup>d)</sup> (n=23) | t-test (p-value <sup>e)</sup> ) |
| Accounting Performance Measures                   | .41                                      | .44                                   | -2.094 (p=.043)                 |
| Quantitative Performance Measures                 | .37                                      | .34                                   | 2.012 (p=.052)                  |
| Soft Measures of Performance                      | .21                                      | .21                                   | .204 (p=.840)                   |

a): Scores are calculated as mean percentage in each industry of the importance attached to each performance measure category as a fraction of the importance of all performance measures

b): Mean is identical to median scores

c): The production industry includes consumer goods, capital goods, basic goods and construction industry.

d): The service sector includes transport & communications, non-financial services, trade, banks & financial services and insurance.

e): Two-tailed significance tests



Panel B of Table 5 indicates that production companies tend to put relatively more emphasis on quantitative performance measures and less emphasis on accounting performance measures than service companies do. This result suggests that differences in task characteristics do make a difference, not only among different functions within one company as suggested by Bruns & McKinnon (Bruns & McKinnon, 1993; S.M. McKinnon & W.J. Bruns, 1992) but also between types of primary production functions among companies. This finding suggests that management of production firms make relatively more use of quantitative measures of performance. This can be due to the fact that production firms generally have more information available about production activities than service companies have. Most productive activities in service firms are performed by professional specialists, most performance is generated in close connection with customers and it may be difficult for management to unequivocally assess operational activities' effectiveness.

Table 6 displays Pearson Correlations between all variables. This table confirms our expectation that the two strategy related variables 'market strategy' and 'product innovation' are unrelated: a company may use these two strategies independently from each other to strengthen its competitive position. It also becomes evident that market dynamism and technological dynamism are two different and unrelated factors. Both appear to be unrelated to the strategy variables. However, strategies of product innovation seem to be related to higher economic returns. On the other hand, high dynamic markets are related to lower economic rates of return. This result is to be expected: high levels of competition do not allow companies to maintain a significant competitive advantage for a prolonged period, while investors may value firms in competitive markets lower because of the relatively high risks these corporations confront.

**Table 6: Pearson Correlations**

|                                     | 1.     | 2.      | 3.   | 4.     | 5.     | 6.    | 7.    | 8.    | 9.   | 10. |
|-------------------------------------|--------|---------|------|--------|--------|-------|-------|-------|------|-----|
| 1. Dynamism                         | 1      |         |      |        |        |       |       |       |      |     |
| 2. Market dynamism                  | .784** | 1       |      |        |        |       |       |       |      |     |
| 3. Technological dynamism           | .625** | .213    | 1    |        |        |       |       |       |      |     |
| 4. Societal dynamism                | .627** | .226    | .227 | 1      |        |       |       |       |      |     |
| 5. Market strategy                  | .184   | -.049   | .195 | .372** | 1      |       |       |       |      |     |
| 6. Product innovation               | .109   | -.011   | .195 | .089   | .101   | 1     |       |       |      |     |
| 7. Operational performance measures | .070   | -.019   | .184 | .009   | .089   | .053  | 1     |       |      |     |
| 8. Accounting performance measures  | -.113  | -.147   | .161 | -.127  | .248   | .089  | .154  | 1     |      |     |
| 9. Soft performance measures        | -.041  | -.228   | .162 | .098   | .378** | .159  | .341* | .324* | 1    |     |
| 10. Economic performance            | -.177  | -.520** | .152 | .148   | .248   | .362* | -.055 | .217  | .257 | 1   |

\*\* : Correlation is significant at the 0.01 level (2-tailed)

\* : Correlation is significant at the 0.05 level (2-tailed)

Table 6 also shows a positive univariate relation between operational and accounting performance measures on the one hand and soft measure of performance on the other. This finding suggests that soft measures are used to reinforce the quantitative and accounting measures in getting a more 'complete' picture of performance. This result is similar to Merchant's findings (Merchant, 1985b). It seems that the use of soft performance is significantly related to build strategies. It can be argued that interpersonal relations a business unit manager maintains with his people and the manager's abilities to motivate his workforce may be of great importance in situations where the company is expected to increase market share and to absorb effectively the risks of intense market competition. To find an answer to the second hypotheses, three multiple regression functions were formulated. Based on the earlier finding that type of industry may influence the choice of performance measures used, we include in the regression functions next to environmental and strategic factors also a dummy variable, representing the difference between production and service firms (refer to Table 7).

**Table 7: Choice of Performance Measures under different Environmental and Strategic Conditions**

| Dependent variables              | Operational Performance Measures <sup>a)</sup> |          | Accounting Performance Measures <sup>b)</sup> |          | Soft Performance Measures <sup>c)</sup> |          |
|----------------------------------|--|----------|---|----------|---|----------|
| Independent variables            | Stand. $\beta$ <sup>d)</sup>                   | t        | Stand. $\beta$ <sup>d)</sup>                  | t        | Stand. $\beta$ <sup>d)</sup>            | t        |
| Constant                         | --- ***  | 3.876    | --- ***                                       | 6.801    | --- ***                                 | 3.999    |
| Market Dynamism                  | .026   | .150     | -.214   | -1.308   | -.135                                   | -.895    |
| Technological Dynamism           | .092   | .527     | .127  | .776     | .085                                    | .561     |
| Societal Dynamism                | .079   | .423     | -.213   | -1.225   | .200                                    | 1.242    |
| Market strategy                  | .201   | 1.077    | .291*   | 1.667    | .409**                                  | 2.538    |
| Product innovation               | .210   | 1.224    | .140  | .873     | .332**                                  | 2.243    |
| Production/Service <sup>e)</sup> | -.360**  | -1.997   | .203  | 1.205    | -.298*                                  | -1.918   |
|                                  | $F=1.058$                                      | $p=.408$ | $F=2.019$                                     | $p=.092$ | $F=3.264$                               | $p=.013$ |
|                                  | $R^2=16.6\%$                                   |          | $R^2=27.5\%$                                  |          | $R^2=38.0\%$                            |          |
|                                  | Adj $R^2=-0.9\%$                               |          | Adj $R^2=13.9\%$                              |          | Adj $R^2=26.3\%$                        |          |

a): n=43

b): n=43

c): n=41

d): \*\*\* $p<.01$ ; \*\* $p<.05$ ; \* $p<.10$  (two-tailed)

e): dummy variable: 0 = production, 1 = service

Market strategy appears to be the most influential factor explaining the choice of accounting and soft measures of performance. This relationship partially reinforces Govindarajan & Gupta's (1985) and Van der Stede's (2000) findings: build strategies indeed appear to be related to more use of soft measures of performance. The difference with the two other studies lies in the importance of accounting measures of performance: they do not remain stable, but also become more important under a build strategy. An explanation of the difference may be that this study takes the perspective of the corporate controller, while the other studies focus on the business unit manager's position. It can be argued that the corporate controller takes, as a necessary result of his organizational position, a more financial perspective on each production unit's contribution to the overall economic performance of the company.

This difference in perspective may also play a role in the finding that none of the environmental dynamism factors is related to the choice of performance measures. More environmental dynamism does not coincide with a broader set of performance measures, as was predicted in other studies (Chenhall & Morris, 1986; Gordon & Narayanan, 1984; Mia & Chenhall, 1994). One reason may be that environmental conditions do not influence as significantly the performance of production units within organizations, as they may do to the performance of sales and procurement functions. It may very well be that other organizational functions 'buffer' the distortions in the environment from the primary production function.

This may also explain the reason why the nature of the production function plays a significant role in the choice of performance measures: table 7 confirms the earlier finding that production companies use more operational measures of performance. At the same time we come to the surprising finding that production firms use more soft measures of performance. The total importance placed on the complete set of performance measures is not statistically different between the two sub-samples ( $t\text{-value}=.714, p=.479$ ). We may therefore conclude that service companies put less emphasis on both operational and soft measures of performance, which in combination leads to a higher relative importance of accounting performance measures in evaluating the service managers' performance (see also table 5, Panel B).

Finally, we try to determine how the combination of environmental factors, strategy factors and performance measurement choice are related to the economic performance of the firm. In preliminary analyses we concluded that the difference between production and service firms was not statistically significant in any model we used. The corresponding dummy variable is therefore excluded in the models of table 8.

**Table 8: Regressions with Economic Return over 1995 and 1996 as dependent variable <sup>a)</sup>**

| Independent variables     | Model 1         |          | Model 2                            |          | Model 3                            |          | Model 4                            |          |
|---------------------------|-----------------|----------|------------------------------------|----------|------------------------------------|----------|------------------------------------|----------|
|                           | Stand. $\beta$  | t        | Stand. $\beta$                     | t        | Stand. $\beta$                     | t        | Stand. $\beta$                     | t        |
| Constant                  | ---             | .282     | ---                                | .525     | ---                                | 2.170    | ---                                | 3.483    |
| Operational perf.measures | -.207           | -1.232   | -.344**                            | -2.098   | -.290**                            | -2.121   |                                    |          |
| Accounting perf.measures  | .144            | .832     | .112                               | .647     | .106                               | .717     |                                    |          |
| Soft performance measures | .272            | 1.489    | .275                               | 1.510    | .041                               | .254     |                                    |          |
| Market strategy           |                 |          | .191                               | 1.205    | .048                               | .341     |                                    |          |
| Product innovation        |                 |          | .347**                             | 2.246    | .378***                            | 2.907    |                                    |          |
| Market dynamism           |                 |          |                                    |          | -.646***                           | -4.429   | -.617***                           | -4.662   |
| Technol. Dynamism         |                 |          |                                    |          | .009                               | .068     | .161                               | 1.241    |
| Societal dynamism         |                 |          |                                    |          | .424**                             | 2.732    | .286**                             | 2.127    |
|                           | $F=1.618$       | $p=.202$ | $F=3.066$                          | $p=.024$ | $F=5.260$                          | $p=.001$ | $F=8.018$                          | $p=.000$ |
|                           | $R^2=11.6\%$    |          | $R^2=33.8\%$                       |          | $R^2=61.8\%$                       |          | $R^2=38.8\%$                       |          |
|                           | Adj $R^2=4.4\%$ |          | Adj $R^2=22.8\%$                   |          | Adj $R^2=50.1\%$                   |          | Adj $R^2=33.9\%$                   |          |
|                           | ---             |          | $F$ Change <sup>b)</sup> = 7.21*** |          | $F$ Change <sup>c)</sup> = 9.77*** |          | $F$ Change <sup>d)</sup> = 4.81*** |          |

a). n=49; \*\*\*p<.01; \*\*p<.05; \*p<.10 (two-tailed)

b). comparing model 2 with model 1

c). comparing model 3 with model 2

d). comparing model 3 with model 4

From Table 8 we conclude that the choice of performance measures *alone* does not predict the sample firms' economic performance very well. The prediction improves considerable when strategy factors are introduced: as we already have seen from the correlation matrix, product innovation is related to higher economic returns. In this second model, also the factor 'operational performance measures' becomes statistically significant, but with adverse sign. The more importance is attached to operational performance measures, the lower the economic performance of the firm becomes. In the third model, we introduce also the environmental factors. This model explains most of the dependent variable ( $F=5.260$ ,  $p=.001$  and  $Adj.R^2=50.1\%$ ) and all signs are in the expected direction: product innovation and societal dynamism lead to higher economic returns, while market dynamism and the use of operational performance measures lead to lower economic returns. The most efficient model is model 4, where only the environmental factors are used to predict economic performance.

Striking is the position of the operational performance measures factors in models 2 and 3. Because of the unchanged position of this factor, we may conclude that this result is fairly robust: the use of operational performance measures is related with lower economic performance. This result confirms the unanticipated results found by Ittner and Larcker (Ittner & Larcker, 1995) and by Van der Stede (2000). They concluded that the combination of quality initiatives and non-financial measures are related to lower performance. A possible explanation may be that the use of operational measures of performance leads to dysfunctional effects, like operational delays and adverse behavioral responses from operational managers (Emmanuel et al., 1990; Merchant, 1998). The causality may also be reverse: companies confronting suboptimal economic performance need to look closer at their operations by applying more operational measure of performance when using a more 'interactive' control mode (Simons, 1995; Simons, 2000). The dependent variable chosen in these models has a two-year time-window, in the middle of which the research was undertaken. This leads to the conclusion that, if the choice of operational performance measures was a *response* to detrimental economic performance, the sample companies apparently were not able to improve their performance within a year from the observation date. Extending the time window seems problematic since it opens the possibility that the sample companies may have changed their performance measurement practices as well in the mean time.

If we return to Eccles' prediction, then it appears that current companies are indeed using a wide arrange of different performance measures to evaluate their most important production units' managers. The fact that this study is concerned with performance practices of managers at the company's corporate level may explain why operational performance measures are adversely related to the creation of economic value.

The current choice of the dependent variable introduces another complication. The economic return factor is not only determined by corporate management, but also by the reactions of shareholders and developments on the stock market. Appreciation of the firm value may very well be influenced by shareholders' opinions about the company's strategy and performance measures choice. Looking at all four models it appears that the (environmental) position of the company and the strategy adopted are the most influential factors explaining economic returns. This could very well be influenced by the availability of information about these factors: both elements frequently play a dominant role in analysts' reports. It may very well be that, once also more information is disclosed about companies' control practices, also performance measurement choice will play an important role in explaining and prediction economic performance.



## Appendix A

### Perceived Environmental Dynamism

The question was:

“Please indicate to what extent the following aspects of your company’s environment have changed during the last year.”

The responses were fully anchored on a four-points scale:

|                                 |                                     |
|---------------------------------|-------------------------------------|
| 1 = very stable, no changes     | 3 = dynamic, many changes           |
| 2 = fairly stable, some changes | 4 = very dynamic, very many changes |

The following aspects were distinguished:

1. Customers’ and Clients’ buying behavior
2. Behavior of Distributors
3. Behavior of Suppliers
4. Competitors’ strategies
5. Developments in Technology of Products and Production
6. Changes in your firm’s Production Systems
7. Your shareholders’ demands on the company
8. Government’s policies
9. Societal developments

After factor analysis:

**Market dynamism** (aspects 1 to 4, eigenvalue 2.9,  $\alpha = 0.69$ )

**Technological dynamism** (aspects 5 and 6, eigenvalue 1.2,  $\alpha = 0.75$ )

**Societal dynamism** (aspects 8 and 9, eigenvalue 1.5,  $\alpha = 0.78$ )

## Appendix B

### Performance Measurement

The question was:

“This list contains performance measures which can be used to measure the performance of Business Units manager's performance. Please indicate of each measure how much weight it has in your assessment of the performance of your most important business units.”

The responses were fully anchored on a five-points scale:

- |                           |                    |
|---------------------------|--------------------|
| 1 = is not considered     | 4 = important      |
| 2 = is not very important | 5 = very important |
| 3 = neutral               |                    |

#### ***Quantitative Measures of Performance (QMP):***

2. The way the BU manager solves his BU's management problems
  3. The efficiency of production
  5. The quality of products
  10. Adherence to prespecified production schedules
  16. Time needed by the BU to develop and apply new production systems or produce new products
- [17. Expansion of market share]

#### ***Accounting Measures of Performance (AMP):***

1. The BU manager's ability not to exceed total costs
  6. Return on Sales (ROS)
  7. Adherence to the line items specified in the budget
  14. Net profit, excluding corporate overhead allocations
  15. Net profit, including corporate overhead allocations
  18. Change in net or gross profit
- [8. Return on Investment (ROI)]  
[11. Residual Income (RI)]

#### ***Soft Measures of Performance (SMP):***

4. The BU manager's capacity to motivate his people
  12. The BU manager's efforts
  13. Quality of BU manager's relations with his subordinates
- [9. The manager's capacity in explaining organizational objectives to his people]

#### Note to this appendix:

- the category headings were not included in the original version of this instrument
- the item numbers indicate the item's position in the questionnaire
- the questionnaire items between square brackets were not used in subsequent analyses

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## Notes

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1 This is also true for non-profit organizations, as they have to take into account the financial conditions under which service can be provided. The financial conditions co-determine the organization's possibilities in rendering adequate assistance to clients.

2 This explains also why in the early twenties, when the divisionalized organization emerged (like the DuPont Powder Company and General Motors), new accounting performance measures like return on investment (ROI), methods of variance analyses and budgeting systems were developed in a rather short period of time (Johnson, 1978; Sloan, 1963).

Two investment funds are separately listed at the Amsterdam Stock Exchange while belonging to the same (listed) investment firm. These two funds were excluded from the survey, preventing duplication of data.

3 The original list contained the following six factors: (1) buying patterns of customers; (2) distributors' attitudes; (3) industry buying patterns; (4) competitors' strategies; (5) relevant technical developments; (6) changes in production processes. We added the following categories to the instrument: (7) demands by shareholders; (8) state/governmental behavior; (9) societal developments.

4 The greatest difference between our classification and those by Merchant and Ouchi is in the position of quantitative measures of performance: our list contains some measures not related to actions but to outputs (for instance efficiency of production and product quality).