



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

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Research Memorandum ARCA-RM-01-13



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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 & Larcker, 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; Udpal, 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**. 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**.² 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 (Zithaml, 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**³ 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

Panel A: Response		
Questionnaires	Number	Percentage
Questionnaires sent (to all listed companies)	167	100%
Questionnaires received	65	39%
Questionnaires used in analysis	54	32%
Panel B: Distribution of sample firms to Economic Sector		
Economic Sector	Number of sample firms	Percentage of all listed firms in sector ^{a)}
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%
Panel C: Analysis of Nonresponse		
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%	

^{a)}: 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).⁴ 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: Market dy- namism	Factor 2: Societal dy- namism	Factor 3: Technological dynamism
Clients’ and customers’ buying behavior	.706	.155	-.080
Distributors’ actions	.610	.013	.284
Suppliers’ actions	.656	-.495	.267
Government’s actions and policies	.250	.801	.065
Societal developments	.068	.811	.273
Developments in technology of products and production	.026	.088	.936
Changes in your own production systems	.068	.119	.855
Eigenvalue	2.63 1	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 eamings or cash *flow*’ (a *harvest strategy*, resulting in declining market share) and ‘divesture 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 **qualita-**
tive 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 **con-**
firmed 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 Meas-*
ures of Performance (QMP) (eigenvalue 4.4) and *Soft Measures of Performance (SMP)* (ei-
genvalue 1.8).

Table 3: Factor Analysis of Performance Measure Questions

Performance Measures	Factor 1: Quantitative measures	Factor 2: Accounting measures	Factor 3: Soft measures
Production efficiency	0.719	0.192	-0.221
Time to develop new products and production systems	0.664	-0.025	-0.021
Adherence to corporate guideliness in solving BU's problems	0.662	-0.257	-0.124
The quality of products or services	0.659	0.086	-0.280
Adherence to prespecified production schedules	0.655	0.282	0.132
Changes in realized net profit	-0.058	0.715	-0.050
Adherence to total cost budget	-0.061	0.673	0.110
Net profit, including corporate overhead allocations	0.294	0.606	0.003
Adherence to the budget line items	0.112	0.602	0.270
Net profit, excluding corporate overhead allocations	0.045	0.455	-0.363
Return on Sales	0.124	0.536	-0.023
Quality of BU manager's relations with his subordinates	0.205	0.287	0.848
The amount of BU manager's efforts	0.090	0.566	0.576
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 **cate**gories 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).⁵

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. An 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
Perceived Environmental Dynamism				
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
Strategy				
Market strategy (build/harvest)	-200 – 100	-80 – 100	14.48	43.40
Product strategy (innovation)	0 - 100	0- 100	38.67	27.74
Performance Measures				
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
Corporate Performance				
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 ^{a)}

Panel A: Total sample (n=52)			
Measures of Performance	Minimum	Maximum	Mean ^{b)} (s.d.)
Accounting Performance Measures	.20	.63	.34 (.05)
Quantitative Performance Measures	.22	.48	.33 (.04)
Soft Measures of Performance	.16	.43	.32 (.04)
Panel B: Production and Service Industries			
Measures of Performance	Production Industry ^{c)} (n= 16)	Service Industry ^{d)} (n=23)	t-test (p-value ^{e)}
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 **per-**formed by professional **specialists**, most performance is generated in close **connection** with **cus-**tomers and it **may** be **difficult** for management to unequivocally assess operational activities' **ef-**fectiveness.

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 **competi-**tive 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 **ex-**pected: 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. 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

** : 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 ^{a)}		Accounting Performance Measures ^{b)}		Soft Performance Measures ^{c)}	
Independent variables	Stand. β ^{d)}	t	Stand. β ^{d)}	t	Stand. β ^{d)}	t
Constant	--- ***	3.876	--- ***	6.801	--- ***	3.999
Market Dvnamism	.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 ^{e)}	-.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 ^{a)}

Independent variables	Model 1		Model 2		Model 3		Model 4	
	Stand. β	t	Stand. β	t	Stand. β	t	Stand. β	t
Constant	---	.282	---	.525	---	2.170	---	3.483
Operational perf.measures	-.207	-1.232	-.344**	-2.098	-.290**	-2.121		
~~Soft performance measures~~	~~.272~~	~~.8389~~	~~.275~~	~~.6470~~	~~.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 ^{b)} = 7.21***		F Change ^{c)} = 9.77***		F Change ^{d)} = 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 **com-**pany'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 **influ-**enced 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 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
- 2 = is not very important
- 3 = neutral
- 4 = important
- 5 = very important

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

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).