'New' Performance Measures: Determinants of Their Use and Their Impact on Performance

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ERASMUS RESEARCH INSTITUTE OF MANAGEMENT

REPORT SERIES
RESEARCH IN MANAGEMENT

ABSTRACT AND KEYWORDS	
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Free Keywords	Contingency Theory, Economic Value Measures, Non-financial Performance Measures, Subjective Performance Measures, Survey
Availability	The ERIM Report Series is distributed through the following platforms: Academic Repository at Erasmus University (DEAR), DEAR ERIM Series Portal Social Science Research Network (SSRN), SSRN ERIM Series Webpage Research Papers in Economics (REPEC), REPEC ERIM Series Webpage
Classifications	The electronic versions of the papers in the ERIM report Series contain bibliographic metadata by the following classification systems: Library of Congress Classification, (LCC) LCC Webpage Journal of Economic Literature, (JEL), JEL Webpage ACM Computing Classification System CCS Webpage Inspec Classification scheme (ICS), ICS Webpage

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Version 31/5/2005

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Abstract

This study investigates the extent to which Dutch organizations use 'new' performance measures to deal with the perceived inadequacies of traditional accounting performance measures. In addition, the determinants of the use of these 'new' performance measures are documented; finally, the alignment hypothesis is tested. Using survey data from Dutch firms, I find that non-financial measures appear to be used most often in addition to more traditional performance measures; economic value measures and subjective measures appear to be used to a lesser extent. Second, the results indicate that the importance of the shareholder value goal and size are positively related to the use of economic value measures. The importance of the shareholder value goal, a growth mission, task culture and size are all positively associated with the use of non-financial measures. The (relative) use of subjective measures is negatively related to size. Finally, I find no support for the alignment hypothesis that a mismatch between the firm's strategic and contextual characteristics and its performance measurement system adversely affect performance.

Keywords: contingency theory; economic value measures; non-financial performance measures; subjective performance measures; survey.

1 Introduction

Previous literature suggests that performance measurement systems should be tied to the goals and strategies of the organization (Malina & Selto, 2004, 2001; Chenhall, 2003; Said et al, 2003; Ittner & Larcker, 2001; Hoque & James, 2000; Otley, 1999; Ittner et al, 1997; Govindarajan & Gupta, 1985; Miller & Friesen, 1982; Gordon & Miller, 1976), as well as matched to other contingency factors (such as environment, culture and size; see Chenhall, 2003; Chapman, 1997; Otley, 1980; and Gordon & Miller, 1976). In addition, performance measures should be effective (i.e., accurate, objective and measurable) and reflect managerial effort (Merchant & Van der Stede, 2003; Malina & Selto, 2001; Simons, 2000). In this research project, the focus is on the first issue; i.e., I investigate the relation between strategic and contextual characteristics of the organization and the use and effectiveness of the specific performance measures.

In the past decade, several 'new' performance measures[1] (such as economic value measures, non-financial measures and subjective measures) have been introduced to deal with the perceived inadequacies in traditional accounting-based performance measures (such as earnings or return on investment; see Hoque & James, 2000; Ittner & Larcker, 2001, 1998). While several studies have investigated the use of contemporary accounting practices in organizations (see, for example, Ferreira & Otley, 2004; Chenhall & Langfield-Smith, 1998b), there is relatively little empirical evidence available on the

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[1] The term 'new' financial performance measure should be considered relatively; some 'new' performance measures are based on concepts that have been around for several decades (see, for example, Kaplan & Norton, 2001; Otley, 1999).

relation between strategic and contextual characteristics, the use of 'new' performance measures and performance (Ittner et al, 2003b; Ittner & Larcker, 2001, 1998; Langfield-Smith, 1997; Chapman, 1997). This study extends previous research on the 'diffusion rate' of contemporary performance measures by documenting the state of affairs in Dutch organizations. Second, and more important, this study provides evidence on the determinants of the use of specific contemporary performance measures. Finally, I investigate the 'alignment hypothesis'; i.e., do organizations that match their performance measurement systems to the strategic and contextual characteristics of their organization perform better than 'non-aligned firms'? Rather than solely relying on self-reported satisfaction or firm performance, I use both perceptual as well as accounting performance measures to investigate the effects of the use of the 'new' performance measures. These last two issues (determinants of the use of 'new' performance measures and impact on financial performance) have received surprisingly little attention in the research literature (see Chenhall, 2003; Ittner et al, 2003b).

Using data from a survey amongst Dutch firms, I find that non-financial measures (such as customer satisfaction, employee measures and quality measures) appear to be used most often to deal with the allegedly negative effects of traditional accounting performance measures. Economic value measures (eg. Economic Value Added, Shareholder Value Analysis) and subjective measures (competence management, managerial intuition) are used to a much lesser extent. Economic value measures are used by large organizations that find shareholder value important. As such, the use of economic value measures appears to be used to align managerial decisions to shareholder

interests. Non-financial performance measures are used mainly in large firms that focus on shareholder value and growth (i.e., have build missions) and have task cultures. Finally, I find that an increase in size is negatively associated with the relative use of subjective performance measures (probably to reduce influence costs). Finally, a closer match between strategic and other contextual factors and the performance measurement system of a company is not related to increased performance. In other words, I find no support for the alignment hypothesis that a mismatch between the firm's strategic and contextual characteristics and its performance measurement system adversely affect performance.

The remainder of this paper is organized as follows. The next section discusses the relevant literature in this area and presents the subsequent hypotheses. The third section describes the methodology and the data which are used in this study. The following section provides the empirical results. Finally, the summary and conclusions of this research project are presented.

2 Literature review and hypothesis development

2.1 Performance measurement

A performance measurement system can be defined as the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities (Simons, 2000). One of the characteristics of an effective performance measurement system, which is capable of promoting desired organizational outcomes, is that it should be tied to the organizational goals and strategies (Ittner & Larcker, 2001;

Otley, 1999) as well as to other organizational characteristics (Chenhall, 2003). A performance measurement system should provide a comprehensive yet parsimonious set of measures, linked with the goals and strategies of the organization; in addition, the performance measures should be effective (i.e., accurate, objective and verifiable; Malina & Selto, 2001). A second characteristic of an effective performance measurement system is that the performance measures should reflect managerial effort, should have appropriate (challenging, yet attainable) targets and should be related to meaningful rewards (Merchant & Van der Stede, 2003; Malina & Selto, 2004, 2001; Simons, 2000). In this paper, the focus is on the first issue (i.e., the relation between the strategic and contextual characteristics of the firm and the use and effectiveness of specific performance measures).

Firms have traditionally relied almost exclusively on financial measures such as budgets, profits or accounting returns to measure performance (PricewaterhouseCoopers, 2004; Said et al, 2003; AICPA, 2001; Otley, 1999; Ittner et al, 1997; Bushman et al, 1996). In the last decade, these 'traditional' accounting performance measures have been increasingly perceived as not meeting the requirements of an effective performance measurement system (Ittner & Larcker, 2001, 1998; Hoque & James, 2000). These perceived inadequacies have motivated several academics and practitioners to suggest a variety of performance measurement innovations, ranging from 'improved' financial metrics such as economic value measures (Stern et al, 1995), to (balanced) scorecards that integrate financial and non-financial measures (Kaplan & Norton, 2001, 1992) and personal or subjective measures (Gibbs et al, 2004; Ittner et al, 2003a). The main

characteristics of both the 'traditional' and 'contemporary' performance measures will be discussed shortly in the following sections.

Accounting performance measures

Accounting-based performance measures have many characteristics that help explain their prominent role in performance evaluation and compensation (Indjejikian, 1999): they are subject to a variety of internal controls that enhance their reliability and they are easy to understand. In addition, they integrate the results of all organizational activities into a single coherent measure (Otley, 1999). A drawback of accounting-based measures is that they provide gaming opportunities (such as earnings management activities)[2]. In addition, they are considered backward-looking and short-term focused (i.e., they are 'lagging variables'); that is, they do not provide any information on the creation of value (Stewart, 2002) or the realization of strategic goals (Kaplan & Norton, 2001). Common accounting performance measures include budgeted versus actual results and return on investment measures (see AICPA, 2001; Hoque & James, 2000; Otley, 1999).

Economic value measures

One line of performance measurement innovations has focused on improving the financial measures ('new financial measures' or 'economic value measures'). Proponents of economic value measures argue that performance measurement systems should be aligned with the firm's ultimate organizational objective: improved economic performance (Ittner et al, 2003b). The foundations for these 'economic value measures'

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[2] It should be noticed that not only financial measures can be manipulated; see, for example, Smith (2002) for an exploration of this issue.

are residual income, internal rate of return and cash-flow concepts. For example, the

EVA©[3]-measure developed by Stern Stewart is defined as adjusted operating income

minus a capital charge; the basic assumption underlying EVA© is that managers only add

value to their organization when the resulting profits exceed the cost of capital (Stewart,

2002). In addition, EVA© improves on residual income by adjusting for 'distortions' in

the accounting model of performance measurement[4] (Stewart, 2002; Biddle et al, 1997).

EVA© is claimed to be the best surrogate for or the predictor of future share price

performance; an increase in EVA© should therefore result in an increase in future cash

flows (Stewart, 2002; Stern et al, 1995). However, Otley (1999) argues that it needs to be

recognized that EVA© remains an historic income measure and does not anticipate the

future earnings, despite the existence of predictions based on stock market valuations.

Non-financial performance measures

Another line of performance measurement innovations has focused on the use of non-

financial performance measures[5]; examples include the Balanced scorecard concept

(Kaplan & Norton, 2001, 1992) and the EFQM-model (EFQM, 2004). Non-financial

performance measures are defined as measures that provide performance information in

non-monetary terms; examples include customer response time, productivity, market

share, customer satisfaction, innovation/new product development and employee turnover

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[3] EVA is a trademark of the Stern Stewart Corporation.

[4] One essential adjustment for accounting distortions is the amortization of investments in soft assets or intangibles. Stewart (2002) argues that investments in intangibles ought to be capitalized like any other asset and depreciated over estimates of their economic lives. As a result, current operating profit (or NOPAT, in EVA-terms) would not be distorted by investments in soft assets that are expected to pay off in the near future.

[5] It should be noticed that the balanced scorecard and the EFQM model represent as an *integrated* set of measures (i.e., linking non-financial and financial measures) rather than *solely non-financial* measures (EFQM, 2004; Kaplan & Norton, 2001; 1992). However, both concepts supplement financial measures with non-financial measures; as such, the non-financial measures are considered as key in this aspect.

(PricewaterhouseCoopers, 2004; AICPA, 2001). Proponents of BSC and EFQM-model contend that many of these variables are leading indicators of future profitability (see Ittner et al, 2003a; Said et al, 2003; Hendricks & Singhal, 2001, 1997; Kaplan & Norton, 2001; Ittner & Larcker, 2001, 1998). However, previous research has provided mixed evidence on the appropriateness of the balanced scorecard (and, more general, non-financial measures) for translating strategy into performance measures (Banker et al, 2004, 2000; Ittner et al, 2003a; Malina & Selto, 2001; Lipe & Salterio, 2000).

Subjective performance measures

Finally, theory suggests that subjective measures may be appropriate performance measures if it is difficult to define objective performance targets or when it is difficult to measure results (Prendergast, 2000; Bushman et al, 1996). Subjective performance measures (sometimes defined as 'individual performance evaluation'; see Bushman et al, 1996) can be defined as measures that are based on factors other than the worker's performance (see Prendergast, 2002a). Subjectivity can be introduced in several ways, which are often used in combination (Gibbs et al, 2004; Ittner et al, 2003a): (1) the use of qualitative, subjective performance measures, (2) flexibility in weighting quantitative performance measures when evaluating performance, and (3) the discretion to use other performance measures than the performance measures previously specified. In this research project, the focus is on the first option, i.e., the use of qualitative subjective measures such as, for example, managerial intuition[6] (Andersen, 2000) and competence management (Wright & Snell, 1991). Subjective performance measures are able to take

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[6] Although it may be argued that managerial intuition may also include the second and third option, i.e., flexibility in weighing performance measures or including other performance measures than those specified previously.

'difficult to measure' strategic aspects (such as employee skills and attitudes, intangible capital) into account. However, previous research (Gibbs et al, 2004; Ittner et al, 2003a; Prendergast & Topel, 1996) suggests that subjective performance measures can have negative effects (favouritism in bonus awards, high influence costs) if the evaluation is unfair or biased.

2.2 Contingency theory and performance measurement

2.2.1 Contingency theory

Contingency-based research has a long history in the study of management control systems (Chenhall, 2003). Contingency theory states that the design and use of control systems is dependent upon the context of the organizational setting (Fisher, 1998; Otley, 1980). Previous research has identified a number of variables that affect the effectiveness of a management control system, including strategy, the nature of the environment, (national) culture, size, and industry (see Chenhall, 2003; Fisher, 1998; Chapman, 1997; Langfield-Smith, 1997; Otley, 1980; Gordon & Miller, 1976). Most contingency studies have focused on the use of budgets in organizations (see Hartmann, 2000 for a review); there is very little contingency research on the use of 'new' performance measurement instruments (Chenhall, 2003). This study extends previous contingency research in management accounting to include more 'contemporary' performance measures (as well as 'traditional' performance measures).

2.2.2 *Goals and strategies*

A central contingent variable is the objectives and strategies that an organization decides to pursue (Otley, 1999). Contingency theory generally starts with the notion that the organizational objectives should be stated, and that strategies to achieve those goals should be adopted and implemented (Ittner & Larcker, 2001; Fisher, 1998). For the purposes of this paper, I distinguish among the overarching goal(s) of the organization, corporate strategy and business unit strategy. This distinction is important since the literature (Ittner & Larcker, 2001) suggests that ignoring higher-level strategic choices made by the firm may result in a misspecification of the relation between lower-level strategies and the design of the accounting system.

Goals

Organizational objectives are likely to affect the mechanisms that have been put in place to measure and monitor goal attainment (Otley, 1999). Since the mid-1990s, the literature on management control systems has emphasized on the creation of firm value through the identification, measurement and management of the drivers of customer value, organizational innovation, and shareholder returns (Ittner & Larcker, 2001). Most economic value measures have been marketed as focusing (lower-level) managers' minds on the delivery of shareholder value (Otley, 1999); as such, economic value measures serve as surrogates for the (nonexistent) stock price (Garvey & Milbourn, 2000). Consulting firms claim that their proprietary economic value measure correlates more closely with stock returns than either traditional accounting measures or the measures of rival firms do (Myers, 1996). For example, Stern Stewart claims that EVA© accounts for

nearly 50% of the changes in market value added (Stern et al, 1995). However, empirical research in this area is contradictory: for example, Biddle et al (1997) find that earnings appear to be more closely related to stock price performance than economic value measures. On the other hand, research by Wallace (1997) indicates that the stock market reacts favourably to the introduction of economic value compensation systems. While the avowed goal of the economic value measures is to increase shareholder wealth, the relation between goals and non-financial or subjective performance measures is somewhat more diffuse. Firms may use non-financial value drivers to identify and manage value drivers in order to increase shareholder value (Banker et al, 2004; Ittner et al, 2003b; Ittner & Larcker, 2001; Kaplan & Norton, 2001b; Banker et al, 2000). Similarly, subjective measures may be used to complement perceived weaknesses in quantitative performance measures (Gibbs et al, 2004); as such, both non-financial and subjective measures may be related to shareholder value. On the other hand, non-financial and subjective measures may also be related to 'stakeholder value goals' (rather than solely shareholder value). For example, Kaplan (2001) indicates that the balanced scorecard can be a useful tool in non-profit organizations since it provides the opportunity to measure multiple aspects of performance. Research by Cavalluzzo & Ittner (2004) indicates that objective performance measures are less useful in non-profit organizations when goals are difficult to quantify, measure and interpret (for example, due to the fact that there are multiple stakeholders). Summarizing, non-financial and subjective performance measures are less likely to be explicitly linked to shareholder value in comparison to economic value measures. This results in the following hypothesis:

H1:

The importance of shareholder value is (a) positively associated with the use of economic value measures, and (b) not related to the use of non-financial or subjective measures.

Strategies

Strategy has been described as a pattern of decisions about the organization's future (Mintzberg, 1978), which take on meaning when implemented through the organization's structure and processes (Miles & Snow, 1978). An organization's strategy can also be defined as the match between the organization's resources and skills, and the environmental opportunities and uncertainties it faces (Hofer & Schendel, 1978). For the purposes of this research project, I distinguish between corporate strategy and business unit strategy (or strategic mission).

Corporate strategy is primarily concerned with answering the question: what set of businesses should we be in (including what businesses to acquire or divest), and how should we structure and finance the company? Organizations can be classified into one of three categories[7] with regard to their corporate strategy (Mintzberg & Quinn, 1996; Hofer & Schendel, 1978). A 'single business' organization operates in one line of business; in its most extreme form, the organization may be totally committed to one industry. A 'related diversified' organization operates in several industries; it possesses core competencies that benefit many of its business units and accomplishes diversification by

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[7] Some authors recognize four corporate strategies: single business, by-product, related diversified and pure diversified firms (Mintzberg, 1996, p. 710; Vancil, 1980). The 'by-product form' is an intermediate form between the single business and the related diversified firm.

relating new businesses to old. These organizations set out to exploit operating synergies

across businesses. Related diversified organizations typically grow through internal

research and development. Finally, an 'unrelated diversified' organization (or

conglomerate) operates in a number of businesses and industries that are unrelated to one

another. The headquarters of an unrelated diversified organization function as a holding

company, lending money to business units that are expected to have high financial

returns. Textbooks in strategy and accounting suggest that corporate management at

unrelated diversified firms has its background mainly in finance, and that it has little

familiarity with the different industries a diversified firm is operating in (Anthony &

Govindarajan, 2004; Mintzberg & Quinn, 1996, p. 714). As a result, they may not be able

to interpret the non-financial and subjective performance measures of individual business

units (due to information asymmetry). Consistent with this notion is that previous

experimental research (Banker et al, 2004; Lipe & Salterio, 2000) suggests that 'unique'

performance measures may be ignored (i.e., used to a little extent) when evaluating

performance. For example, Lipe & Salterio (2000) found that only 'common' measures

(i.e. measures common to multiple and diverse units, such as financial performance) are

included in superiors' evaluations of business unit's performance; 'unique' measures (i.e.

measures that are unique to a particular unit, such as non-financial or subjective

performance) do not appear to affect superior's evaluations. Previous empirical research

in a major financial services firm (Ittner et al, 2003b) indicates that it is almost

impossible to adequately weigh performance subjectively on multiple dimensions. In

addition, balanced scorecards appear to be dominated by financial and corporate or

division-wide performance measures rather than non-financial and/or subsidiary

performance measures (Ittner & Larcker, 1998). As such, non-financial and subjective measures are less likely to be useful for business unit evaluation in diversified firms, since it is difficult to compare the multiple performance dimensions across units. On the other hand, economic value measures may provide one common measure to compare the performance of different business units. The previous review results in the following hypothesis:

H2:

A single business (unrelated diversified) firm strategy is (a) negatively (positively) related to the use of economic value measures, and (b) positively (negatively) related to the use of non-financial and subjective performance measures.

Strategic missions deal with how to create and maintain a competitive advantage in each of the businesses in which an organization participates (Hofer & Schendel, 1978). At the business level, strategy focuses on how to compete in a particular industry or product/market segment. Strategic mission is concerned with product/market segmentation choices and with the stage of product/market evolution (Hofer & Schendel, 1978, p. 29). Different strategic mission typologies and variables have been used in research on the relation between management accounting systems and strategy (Langfield-Smith, 1997). For example, Miles & Snow (1978) focus on the rate of change in products of markets and use three successful organizational types: defenders, prospectors and analyzers. Miller & Friesen (1982) categorize firms as conservative or entrepreneurial, using the extent of product innovation. Porter (1985) describes three

generic strategies: cost leadership, differentiation and focus. Finally, the classification of

build, hold, harvest and divest focuses on variations in strategic missions (Langfield-

Smith, 1997; Fisher & Govindarajan, 1993; Govindarajan & Gupta, 1985); this

classification is considered most relevant for this research project. The choice of strategic

mission signifies the organization's intended trade-off between market share growth and

maximizing short-term earnings and cash flow. The critical success factors associated

with a build strategy, such as new product development, innovation and research &

development, are difficult to quantify (Langfield-Smith, 1997) and will materialize in the

long term. As a result, build firms (i.e., firms oriented towards growth) are more likely to

rely on non-financial and subjective performance measures. Previous analytical (Dutta &

Reichelstein, 2003; Datar et al, 2001) as well as empirical research in this area (Said et al,

2003; Ittner et al, 1997; Govindarajan, 1988; Gupta, 1987; Govindarajan & Gupta, 1985)

is consistent with this notion: a build mission is associated with the use of non-financial

and subjective performance measurement systems. The use of financial measures

(accounting performance measures as well as economic value measures) is likely to

remain the same across strategic missions: financial measures may be used to control

'innovative excess', to facilitate organizational learning or to have a 'common

denominator' (Dent, 1990; Simons, 1987). This results in the following hypotheses:

H3:

A build (harvest) strategic mission is (a) not related to the use of economic value

measures, and (b) positively (negatively) associated with the use of non-financial and

subjective measures.

2.2.3   Culture

Culture can be defined as a set of cognitions (such as fundamental assumptions, values, behavioral norms and expectations) shared by members of a social unit (O'Reilly et al, 1991). Culture is hypothesized to be one of the main determinants of the use of performance measures (Nahm et al, 2004; Bititci et al, 2004; Baird et al, 2004). Several authors in organizational literature (Quinn & Cameron, 1999, 1983; Quinn & Rohrbaugh, 1983; Miller & Friesen, 1983; Ouchi, 1979) suggest that organizational culture may be related to the design, use and success of administrative mechanisms. Several organizational cultures have been recognized in literature (see Cartwright & Cooper, 1993; Deshpandé & Parasuraman, 1986; Smircich, 1983); a rather well-known distinction is that among power, role, task/achievement and person cultures (Harrison, 1972). A power culture refers to a culture where power is centralized; they tend to function on implicit rather than explicit rules (i.e., social/clan controls; Merchant & Van der Stede, 2003; Ouchi, 1979). In addition, individual members are motivated by a sense of personal loyalty to the 'boss' (patriarchal power) or fear of punishment (autocratic power). Role cultures refer to bureaucratic, hierarchical cultures that emphasize rules, procedures and regulations concerning the way work is conducted (i.e., behavioral controls; Merchant & Van der Stede, 2003; Ouchi, 1979). In addition, role requirement and boundaries of authority are clearly defined. Task/achievement cultures are characterized by an emphasis on the achievement of goals; the organization's structure, functions and activities are all evaluated in terms of their contribution to the goal of the organization (i.e., results controls; Merchant & Van der Stede, 2003; Ouchi, 1979). Task cultures are characterized

by high levels of worker autonomy; the way work is organized is determined by the task requirements (for example, MBO-programs). Thus, 'task culture organizations' are hypothesized to use financial and non-financial performance measures, while 'power and role cultures' are expected to rely to a larger extent on 'subjective performance measures' or other controls (behavior, clan controls). This results in the following hypothesis:

H4:

Task cultures (power/role cultures) are (a) positively (negatively) associated with the use of economic value measures and non-financial measures, and (b) negatively (positively) associated with the use of subjective measures.

2.2.4 Environmental Uncertainty

Environmental uncertainty refers to top managers' perceived inability to predict an organization's external environment accurately (Tymon et al, 1998; Milliken, 1987). Generally, environmental uncertainty relates to the unpredictability of actions by suppliers, competitors, customers, financial markets, government and labor unions (Tymon et al, 1998; Miles & Snow, 1978). The relation between environmental uncertainty and economic value measures may go two ways. On one hand, if economic value measures are just 'recalculated' accounting measures, they will not provide additional insight in the performance of managers; in that case, uncertainty will not be related to the use of economic value measure. On the other hand, economic value measures include a capital charge which is based on the (risk-adjusted) cost of capital, which requires managers to make a trade-off between risk and return. In that case,

economic value measures may provide additional information to traditional accounting performance measures and may be used to a larger extent when uncertainty increases. Previous literature also indicates that environmental uncertainty typically results in the use of additional information processing (i.e., the use of non-financial and subjective performance measures; Chenhall, 2003; Gordon & Miller, 1976). In addition, external uncertainty adds observation error to accounting-based performance evaluation (Prendergast, 2002b). As a result, principals may introduce non-financial and subjective measures to obtain provide additional information on the effort of managers (Prendergast, 2002a). Previous empirical research has indicated that an increase in environmental uncertainty is positively related to the use of non-financial and subjective performance measures (Said et al, 2003; Ittner et al, 1997; Chenhall & Morris, 1986; Govindarajan & Gupta, 1985; Govindarajan, 1984; Gordon & Narayanan, 1984) while the relation with economic value measures is unknown. This results in the following hypothesis:

H5:

Environmental uncertainty is (a) not related to the use of economic value measures, and (b) positively related to the use of non-financial and subjective measures.

2.2.5   Size

Previous research has indicated that large organizations are associated with more formal procedures and sophisticated performance evaluation systems (Chenhall, 2003) and tend to introduce economic value measures (Bouwens & Van Lent, 2003) as well as non-financial measures (Said et al, 2003; Hoque & James, 2000). In addition, it is not likely

that subjective measures are used in large organizations due to the large costs of influence activities (Ittner et al, 2003a; Prendergast & Topel, 1996). This results in the following hypothesis:

H6:

Size is (a) positively related to the use of economic value and non-financial measures, and (b) negatively related to the use of subjective measures.

2.2.6 Industry

Finally, the potential impact of industry is taken in account since previous research suggests that manufacturing companies may use economic value measures (Garvey & Milbourn, 2000) and non-financial performance measures to support specific manufacturing strategies (see, for example, Chenhall & Langfield-Smith, 1998a; Perera et al, 1997; Abernethy & Lillis, 1995). Other research suggests that non-manufacturing firms also use non-financial performance measures (Ittner et al, 2003b). Finally, some authors (Gibbs et al, 2004) suggest that an increase in long-term investments in non-tangible assets (which is more likely to be present in the services industry) results in an increase in the use of subjective performance measures. This results in the following hypothesis:

H7:

Manufacturing (service) industry is (a) positively (negatively) associated with the use of economic value measures, (b) not related to the use of non-financial measures and (c) negatively (positively) associated with the use of subjective measures.

2.3   Impact on performance

In addition to evaluating the impact of strategy on performance, I also investigate whether an alignment of strategy and performance measurement systems results in an increase in performance. Previous research has generally indicated that users are generally more satisfied with the 'new financial' and non-financial measures (Ittner et al, 2003b; Ittner & Larcker, 1998; Chenhall & Langfield-Smith, 1998b); also, non-financial measures appear to result in the achievement of executives' goals in case of build strategies (Govindarajan & Gupta, 1985). However, there has been relatively little research on the relation between the use of the 'new' performance measures and financial performance (exceptions are Davis & Albright, 2004; Ittner et al, 2003b; Hendricks & Singhal, 2001, 1997; Biddle et al, 1997; Wallace, 1997). Ittner et al (2003b) indicate that this is rather surprising, considering that most advocates of the 'improved' performance measures indicate that the ultimate objective is to increase economic performance. In this study, I investigate whether an alignment of the performance measurement system to the strategic and contextual characteristics of the firm results in an increased performance compared to 'non-aligned firms'. This results in the following hypothesis:

H8:
Alignment of the performance measurement system to the strategic and contextual characteristics of the firm is positively associated with performance.

2.4   Summary

The following table summarizes the hypothesized results:

INSERT TABLE 1 HERE

The previous table provides the hypothesized relations between strategic and contextual

variables and the use of performance measures. Based on several theoretical arguments,

there are no hypotheses for a relationship between an organization's goals and strategies,

culture, uncertainty, size, industry, and the use of accounting-based performance

measures. First of all, economic value, non-financial and subjective performance

measures often *augment* rather than *replace* accounting based performance measures

(Baker et al, 1994; Chenhall & Morris, 1986; Gordon & Narayanan, 1984). Second, the

reliance on accounting performance measures (RAPM) literature suggests that budgets

and other accounting performance measures remain valid even in case of differences in

strategy, culture, uncertainty, size or industry (Hartmann, 2000). However, different

circumstances may result in the fact that accounting performance measures (such as

budgets) may be used in a different way (see Simons, 2000; Abernethy & Brownell,

1999; Chapman, 1997).

3 Research Methodology

3.1 Research design

A sample of 201 medium-sized and large organizations operating in the Netherlands, drawn from the REACH CD-ROM database[8], is used for this research project. Two criteria were used to select these organizations for our study: they had to employ at least 100 employees in the Netherlands and have sales of at least € 45 mln. After contacting the companies, it has become clear that 21 of the companies has gone bankrupt or has merged with other organizations, resulting in a target population of 180 companies[9]. Since previous research indicates that the finance department is generally involved in performance measurement (see AICPA, 2001; Chenhall & Langfield-Smith, 1998; Hendricks et al, 1996), the survey has been sent to the chief financial officer (CFO) or the controller of the selected organizations. Respondents included CFOs (34%), controllers (57%) and other respondents (9%). On average, the respondents were working for 4 years in their current function. The data collection process results in 61 (at least partially) useable responses from the 180 organizations in the target group (a response rate of 34%). Telephone reminders indicated that reasons for non-participation include lack of time, internal developments (merger with other party or restructurings) and lack of a formal performance measurement system. Compared to data from the Dutch Bureau of Statistics on firms in the Netherlands, financial institutions are overrepresented while the real estate, renting and business activities and, to a lesser extent, construction companies

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[8] REACH is the name of a CD-ROM database that contains data on all organizations registered at the Dutch Chamber of Commerce.
[9] In addition, 27 companies could not be contacted by telephone; a survey has been sent to them yet return characteristics for this sub-population are unknown.

are underrepresented in the sample[10]. Table 2 presents a profile of the responding organizations.

INSERT TABLE 2 HERE

3.2   Measurement of variables

In this section, the measurement and validation process is discussed. The survey questions that have been used are presented in Appendix A. Specific information on the survey instruments is provided below.

Importance shareholder value

The importance of the shareholder value goal is proxied by stock listing. It is likely that firms listed at a stock exchange will have shareholder value as an explicit objective. Respondents have been asked to indicate whether their firm is listed on a stock exchange. A dummy variable labelled SHAREHVL is coded 1 if the company is listed on a stock exchange, and coded 0 otherwise. To validate this measure, we correlated the SHAREHVL variable to answers on a survey question on the importance of shareholder value, stock price and dividends to top management of the organization. The results indicate that SHAREHVL is positively and significantly related ($\rho=0.65$, $p<0.01$) to the

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[10] The non-profit sector was not intended to be included in the survey; however, the shares for some of the companies included in the sample are completely or partially held by government organizations (transport companies, IT companies, etc.). One respondent indicated that it is operating in the non-profit sector; the reason for this answer could be that its shares are held completely by the government.

importance of shareholder value goals. As such, SHAREHVL may be considered a proxy for the importance of shareholder value maximization.

Corporate strategy

Corporate strategy has been measured by using answers to a question adopted from Christie et al (2003) and Vancil (1978). Respondents have been asked to classify their firm as being a single business, related diversified or unrelated diversified firm. Compared to Christie et al (2003), unrelated diversified firms appear to be underrepresented in our sample. For the purposes of this research project, a dummy variable (SINGLEBUS) is created that distinguishes between single business firms (coded 1) and diversified firms (coded 0). This measure is validated by correlating the SINGLEBUS measure to other organizational variables which, according to strategic management literature should be related to corporate strategy[11] (see Quinn & Cameron, 1983; Miller & Friesen, 1983). The results indicate that the correlations are mostly in the hypothesized direction, yet not significant (p>0.28).

Strategic Mission

The measure for strategic mission is derived from Govindarajan & Gupta (1985). Similar to their research, this study views alternative strategic missions as spanning a continuous spectrum. Respondents have been asked to indicate the percentages for each of the relevant mission descriptions provided to them (see Appendix A). The strategic mission measure was derived as follows: a value of +1 was attached to a build strategy, a 0 to a

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[11] We correlated our corporate strategy measure with variables [hypothesized effect] such as size [-], uncertainty [+], age [-], and life cycle stage (growth [+] versus maturity [-]). Except for uncertainty, the actual correlations are in the hypothesized direction.

hold strategy, a –1 to a harvest strategy and a –2 to a divest strategy. The percentage

breakdown provided by the respondent was then used to arrive at a weighted average

strategy index for the firm[12]. A a high score represents a focus on a growth strategy,

while a low score on this measure represents a focus on a hold and/or divest strategy. To

validate this measure (labelled BUILDSTR), we compared the BUILDSTR variable to

the sales growth data for 32[13] companies for 1 and 2 years, respectively (i.e., sales growth

for 2000-2001 and 1999-2001[14]). The Spearman correlation between BUILDSTR and

both measures of sales growth is positive, yet not significant $(p>0.41)$[15]. This may

indicate that there is a difference between intended and realized strategy (Mintzberg,

1978).

Culture

The measure for culture is based on the distinction among power, role, task/achievement

and person/support cultures (Cartwright & Cooper, 1993; Harrison, 1972). Respondents

have been asked to select the description that best describes the culture in their

organization. We distinguish between task culture (TASKCULT) and other cultures[16]; the

score for TASKCULT is 1 if respondents have indicated that the dominant culture of

their organization is a task culture, and 0 for other cultures.

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[12] It should be noticed that I measure strategic mission at the *corporate* level, not at the BU level. That is, respondents at the corporate level have been asked to indicate the strategic mission of their organization; as such, a high score represents a growth strategy. Within the organization, different business units may have different strategic missions.

[13] Not all companies could be identified (the survey was anonymous); in addition, data were not always available.

[14] To correct for skewness of the performance data, we used the Spearman rank correlation.

[15] One reason may be that there is a difference between intended and emergent strategy; see Mintzberg, (1996). In this research project, I assume that strategy is intended and performance measures are used to implement strategy (see Simons, 2000).

[16] The distribution of this variable is such that 70% of the respondents indicates that their firm's culture is characterized as a task culture; a further separation is impossible due to the rather limited number of observations for the other cultural types recognized in the survey.

Uncertainty

The measure for environmental uncertainty (labeled UNCRTTY) is based on an instrument first developed by Miles & Snow (1978) and used by, among others, Kren & Kerr (1993) and Govindarajan (1984). Respondents have been asked to indicate the predictability of the environment on a scale from 1 (=never) to 5 (=always). Relevant items from the environment include suppliers, competitors, customers, financial markets, government and labour unions. Confirmatory Factor Analysis[17] (CFA) has been applied to verify that all survey questions on uncertainty load on one factor. The CFA-results (not provided here) indicate that all uncertainty factors load on one component (all factor loadings above 0.39). Cronbach's alpha is just below acceptable limits (0.55, while the lower limit is generally at 0.60 to 0.70; see Hair et al [1998]). The UNCRTTY measure has been used by summarizing the reversed scores on the instrument, such that a high score on this variable represents a relatively uncertain environment, while a low score represents a relatively stable environment (see Appendix A). To validate this measure, the standard deviation for the return on capital employed (ROCE) for 4 years for 32 companies has been calculated[18]. The Spearman correlation[19] between the standard deviation in ROCE and the uncertainty measure is positive, yet not significant ($p > 0.13$). Considering the previous results, the results for uncertainty should be interpreted with some caution.

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[17] CFA is theoretically superior to exploratory factor analysis if we have a theory on how factors should move together (Fabrigar et al, 1999).

[18] The standard deviation in return on asset measures has been used as an alternative measure of risk (Miller & Bromiley, 1990).

[19] We use the Spearman correlation since tests indicate that the standard deviation in return on capital employed is skewed to the right. The Pearson correlation is positive, and significant ($\rho = 0.54$, $p < 0.01$).

Size

The measure for size (labeled SIZE) is based on the number of full time equivalents

(fte's) employed in the organization. For validation purposes, two additional measures for

size have been included in the survey: sales (in mln euros) and total assets (in mln euros);

all measures for size are correlated ($\rho > 0.63$, $p < 0.01$). To correct for skewness, the

logarithm of the number of fte's is used as a measure of size.

Industry

For the purposes of this study, it is possible to distinguish among primary and

manufacturing industry and other industries by using a dummy variable (labelled

PRIMMFTG)[20]. The dummy variable PRIMMFTG is coded 1 if the company is

operating in the primary or manufacturing industry, and coded 0 otherwise. As such, this

variable distinguishes among companies with tangible and intangible assets.

Use of Performance measures

The measure for the use of specific performance measures has been purposefully

designed for this research project. Based on a review of literature (see section 2), a

number of performance measures have been selected. Respondents have been asked to

indicate to what extent they use[21] a number of performance measures, such as traditional

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[20] The number of responses (61) and the number of variables (7) does not allow the use of more dummy variables for different industry types. However, the distinction amongst primary and manufacturing industry (mostly fixed assets) and other industries (more intangible assets, such as personnel skills) appears to be most essential (see Garvey & Milbourn, 2000).

[21] We included an additional question on the importance of the performance measurement system for several goals. The following percentages of the respondents indicated that the performance measurement system was important or very important for: operational decisions (85%), strategic decisions (80%),

accounting measures (budgets, return on equity), economic value measures (eg. EVA©, Shareholder Value Analysis), non-financial measures (eg. customer satisfaction, quality) or subjective performance measures (eg. competence management, managerial intuition). Similar to Hoque & James (2000) and Chenhall & Langfield-Smith (1998b), I measure the use of non-financial indicators rather than the use of the BSC- or the EFQM-model. Similar to Bushman et al (1996), managerial intuition and competence measures (i.e., individual or personal measures) are considered subjective measures.

Again, I use CFA to verify whether the performance measures mentioned in the survey load on the four hypothesized variables (i.e., accounting-based, economic value, non-financial and subjective performance measures). The results from the factor analysis (see Appendix B.1) indicate that the variables to a large extent load on the factors in the hypothesized way[22]. The scores for the relevant factors have been summarized for each recognized measure[23] (i.e., accounting, economic value, non-financial and subjective)[24]. The resulting measures are labeled ACCTGPMS (accounting performance measures), EVMPMS (economic value measures), NONFIN (non-financial measures) and SUBJPMS (subjective measures). The alpha coefficients for the scales exceed the

evaluating economic performance (71%), evaluating managerial performance (70%), rewarding employees (68%) and communication of strategy (50%). As such, the performance measurement system is used for more purposes than solely evaluating and rewarding managers (although this is an important function).

[22] A number of items were deleted from the original survey to obtain valid measures. For example, risk-adjusted rates of return were eliminated since they hardly are used among non-financial services firms. Second, the CFROI-measure was deleted since its 'economic value measure factor loadings' are relatively low. Finally, 'risk measures' are excluded from the analysis since this measure loaded on the non-financial as well as the subjective measure.

[23] For example, the score for accounting-based performance measures has been calculated by summarizing the scores for the use of a comparison of budget to actual results, ROE, ROCE and ROTC.

[24] Another option is to calculate the percentage for each of these measures as a total of the sum of all measures (for example, the sum of scores of the accounting-based performance measures as a percentage of all measures used by the organization). However, this measure is considered less informative since it is influenced by the number of questions in the survey.

conventional 0.70 level (Hair et al, 1998), with the exception of the measure for

accounting performance measures (Cronbach's alpha coefficient 0.46). As a result, the

results for accounting performance measures should be interpreted with caution[25].

Performance

Finally, the alignment hypothesis is tested by using one perceptual measure of

performance (labelled PERFRMNC) and two accounting performance variables: sales

growth (labelled SALESGR) and return on capital employed (labelled ROCE). The

measure for perceptual performance is based on the instrument used by Govindarajan &

Gupta (1985). Respondents have been asked to indicate how their organization performs

in a number of areas (including sales growth, cost management, profitability, return,

shareholder value, cash flows, customer orientation, innovation, quality, and personnel

development). The two accounting measures have been obtained from REACH and are

measured contemporaneously with the date of the survey (i.e., over 2001). For each

accounting measure, I obtain two observations: sales growth is measured for 2000-2001

and for 1999-2001[26], and return on capital employed is measured over 2001 and over 3

consecutive years (1999-2001). A closer analysis of the distribution of the accounting

variables indicates that they are not normally distributed; to correct for skewness, the

non-parametric Spearman correlation[27] has been used in the analysis of performance.

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[25] Some additional tests have been performed to verify the robustness of the results; see section 5 of this paper.
[26] Sales growth is calculated as a percentage:
Sales growth 2000-2001 is calculated as: (sales 2001-sales 2000)/(sales 2000).
Sales growth 1999-2001 is calculated as: (sales 2001-sales 1999)/(sales 1999)
[27] Other alternatives to reduce the impact of skewness include using the natural logarithm of the performance measures, or using a cap. The first options results in a reduction of the data, since negative growth rates cannot be computed. To solve for this, it is possible to set the growth rate at 0 for negative growth rates. This results in another problem again, since low growth rates result in negative log-scores

3.3   Descriptive statistics

Table 3 and 4 present descriptive statistics and correlations for all dependent and

independent variables in the estimation models described in the next sections.

INSERT TABLE 3 AND 4 HERE

The correlation results indicate that the independent variables appear to be unrelated,

except for the fact that uncertainty is significantly and negatively related to size and to

the primary and manufacturing industry ($p<0.05$). However, the correlation coefficient is

such that all independent measures can be included in the regression analysis (see Hair et

al, 1998). In addition to that, the use of non-financial measures is related to strategic

mission, size, and to other performance measures (accounting performance measures,

economic value measures and subjective measures). Finally, with the exception of the

relation between the use of subjective performance measures and perceived performance

($p=0.09$), there appears to be no statistically significant relation between the use of

specific performance measures and perceived or accounting performance (results not

presented here)[28]. For the purposes of this research project, variables have been

standardized since most distance measures are quite sensitive to differing scales or

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while negative growth rates would result in a log-score of 0. A lot of information is sacrificed if all
negative scores and low scores are set at 0. The second option (using caps, for example, all sales growth
rates exceeding 100% are set at 100%) does not solve the skewness problem. As a result, non-parametric
correlation is used when testing the impact of performance.

[28] Again, we use Spearman correlation (a non-parametric test) to investigate the relation between the use of
performance measures and performance. This is necessary since analysis indicate that performance is not
normally distributed; it also solves for the rather limited number of observations.

magnitude among the variables[29]. Standard scores have been used in the remainder of this research project, with the exception of section 4.1.

4 Results

4.1 Diffusion rate of 'new' performance measures

Table 5 presents information on the use of several performance measures (both 'traditional' as well as 'contemporary') in Dutch organizations.

INSERT TABLE 5 HERE

Table 5 indicates that budgeting is still used most often for performance evaluation: 93% of the respondents indicate that the comparison of budgets to actual results is still the most important performance measure. This result is consistent with other studies in this area (see Ferreira & Otley, 2004; Chenhall & Langfield-Smith, 1998b). Other 'traditional' accounting measures, such as return on equity and return on capital employed, appear to be used less extensively (approximately 40% of the respondents indicates that it uses these measures often or always to evaluate performance). Adoption of risk-adjusted rates of return (RAROC, RORAC) is low (approximately 5%) in Dutch organizations. About 30% of the organizations uses a economic value added (EVA©, CFROI) while approximately 16% uses a shareholder value added measure. Contrary to

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[29] In general, variables with larger dispersion (i.e., larger standard deviations) have more impact on the final value (Hair et al [1998]).

expectations is that these measures are correlated (ρ=0.28, p=0.04); I expected a negative

correlation since previous literature (Myer, 1996) indicates that these performance

measures are marketed by competing consulting firms. One reason may be that firms

design their own measures similar to those of the consulting firms[30]. The adoption of

economic value measures in the Netherlands is fairly similar to adoption rates[31] other

countries (see Ferreira & Otley, 2004; Ittner et al, 2003b; Ittner & Larcker, 1998). About

50% to 60% of the firms in the Netherlands appears to use non-financial measures on an

extensive scale. This adoption rate is similar to some research projects from Australia

(see Hoque & James, 2000), yet higher than in other countries (compare Ferreira &

Otley, 2004 in Portugal; and Ittner et al, 2003b in the financial services sector in the

USA). Similar to other research projects (Hoque & James, 2000; Ittner & Larcker, 1998;

Chenhall & Langfield-Smith, 1998b) is also that the innovation performance measures

are used to a (much) lesser extent than other non-financial performance measures.

Finally, the subjective measures (competence management, intuition higher management)

are used by about 15%-20% of the firms on a regular basis. The results from this study

are consistent with the findings by Chenhall & Langfield-Smith (1998b) that financial

measures remain important issues in management control, yet that they are being

supplemented with a variety of non-financial and, to a lesser extent, economic value and

subjective performance measures.

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[30] For example, a Dutch food company uses performance measures similar to the previously described economic value measures yet has designed them internally rather than purchased them from consulting firms.

[31] An exception is Chenhall & Langfield-Smith, 1998, who report much higher adoption rates for economic value measures; however, their adoption percentages are in general (much) higher compared to other studies in this area.

4.2   Determinants of the use of performance measures

Empirical testing of the hypotheses derived earlier involved assessing the impact of the strategic and contextual factors on the use of several performance measures (accounting performance measures, economic value measures, nonfinancial measures and subjective measures). To estimate the impact of the contextual factors, the following empirical model is defined:

$$PERFMEAS_{ij} = \alpha_j + \beta_{1j} * SHAREHVL_i + \beta_{2j} * SINGLEBUS_i + \beta_{3j} * BUILDSTR_i +$$
$$\beta_{4j} * TASKCULT_i + \beta_{5j} * UNCRTTY_i + \beta_{6j} * SIZE_i + \beta_{7j} * PRIMMFTG_i$$
$$+ \varepsilon_i$$

Where:

$PERFMEAS_{ij}$ = Use of performance measure type j (i.e., accounting performance measure; 'economic value' performance measure; non-financial performance measure; or subjective performance measure) by firm i;

$SHAREHVL_i$ = Importance of shareholder value (i.e., 1=firm is listed on stock exchange, 0=firm is not listed on stock exchange) for firm i;

$SINGLEBUS_i$ = Corporate strategy (single business firm = 1, rest =0) of firm i;

$BUILDSTR_i$ = Strategic mission of firm i;

$TASKCULT_i$ = Task culture dummy variable (i.e., 1=task culture; 0=other culture) for firm i;

$UNCRTTY_i$ = Uncertainty for firm i;

$SIZE_i$ = Size (log of the number of fte's) of firm i;

PRIMMFTG$_i$ =   Industry dummy (i.e., 1=primary and manufacturing industry, 0=other

               industries) for firm i;

ε_i =   Error term of firm i.

Table 6 presents the results of the analysis.

INSERT TABLE 6 HERE

Table 6 indicates that, consistent with expectations, the use of accounting based

performance measure is not influenced by any of the contingency factors. These results

are consistent with expectations; previous research has indicated that accounting

performance measures are used differently rather than that they are abandoned

(Hartmann, 2000; Abernethy & Brownell, 1999; Simons, 1987).

Consistent with my hypotheses is that the importance of the shareholder value goal is

significantly and positively related to the use of economic value performance measures

(p<0.05); apparently, economic value measures are used to align lower level managerial

decision to shareholder value goals. The other strategic variables (corporate strategy,

strategic mission) do not have an impact on the application of economic value measures.

Part of the effect of corporate strategy may be picked up by size; larger companies appear

to use economic value measures to a larger extent (p<0.10). Another reason for the

impact of size may be that larger organizations tend to introduce new accounting instruments faster than smaller organizations (Chenhall & Langfield-Smith, 1998b; Rogers, 1995). Task culture ($p<0.15$) and industry ($p<0.19$) appear to be marginally significant, while uncertainty is not associated with the use of 'economic value measures'.

Contrary to my hypothesis is that the importance of the shareholder value goal ($p<0.10$) is positively related to the use of non-financial measures; apparently, firms use non-financial measures to support the quest for shareholder value. Also contrary to expectations is that a single business strategy is negatively, yet not significant related to the use of non-financial measures. Consistent with my hypotheses is that a strategic build mission ($p<0.01$), task culture ($p<0.10$) and size ($p<0.05$) are positively associated with the use of non-financial measures. The results for a build mission are consistent with previous research (Chenhall, 2003; Govindarajan & Gupta, 1985). The results for culture suggest that some organizational cultures (task culture) appear to reinforce the implementation of strategy through performance measurement, while other cultures (power culture, role culture) may not rely on performance measures to implement strategy. Also consistent with other research (Chenhall, 2003; Hoque & James, 2000; Miller & Friesen, 1983) is that larger firms appear to rely on sophisticated, formal control systems that also provide information on customer satisfaction, quality, and employees. The other variables (uncertainty, industry) are not significantly related to the use of non-financial performance measures.

Finally, contrary to my hypotheses is that the use of subjective measures is not related to either one of the contingency variables. One explanation may be that firms interpret objective performance measures subjectively and include other measures than those previously specified, rather than use subjective performance measures (see Gibbs et al, 2004; Ittner et al, 2003a).

4.3   Impact of performance measures on performance

The preceding tests provide evidence on the relation between strategic and contextual variables and the use of specific performance measures. However, as discussed previously, theory contends that performance measurement practices must be aligned with the firm's strategic and contextual factors to increase performance (Otley, 1980). I investigate this claim by examining whether there is a positive relation between the alignment of the performance measurement system to strategic and contextual variables, and performance. In other words, I investigate whether firms that have aligned their performance measurement system to their strategic and contextual characteristics outperform peers with 'non-aligned' performance measurement systems (Ittner et al, 2003b; Duncan & Moores, 1989; Drazin & Van de Ven, 1985). In order to test this hypothesis, I use regression analysis to calculate 'misalignment measures' for the two specific performance measures (i.e., economic value measures and non-financial measures) for which significant results have been found. This yields two (the importance of the shareholder value goal and size for economic value measures) respectively four (the importance of the shareholder value goal, strategic mission, culture and size for non-financial performance measures) regressions. For each regression, the residual (i.e., the error term) is saved. The proxy for alignment is then computed by taking the square root

of the summarized squared residuals[32] from these regressions. This approach assumes that the residual from the regressions indicates the level of 'misalignment'; that is, if firms have correctly chosen their performance measurement systems the residual from the regressions should approach zero (Ittner et al, 2003b; Duncan & Moores, 1989; Drazin & Van de Ven, 1985). Any deviation from the estimated models (i.e., too much or too little measurement emphasis) should be negatively[33] associated with performance (both the perceptual as well as the accounting performance). The resulting performance tests are presented in table 7.

INSERT TABLE 7 HERE

Table 7 indicates that, contrary to hypothesis 8, there is no significant relation (p>0.10) between the alignment of the performance measurement system to strategic and other contextual factors, and the performance (neither perceptual nor accounting performance). In other words, firms that align their performance measurement system to the strategic and operational characteristics of their firm do not outperform their 'nonaligned' competitors. Although contrary to my hypothesis, this finding is consistent with results from previous research (Ittner et al, 2003b). One reason may be that it is more important

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[32] The residual from each individual regression represents: (1) measurement error in the variables, (2) estimation error in the model, and (3) the potential mismatch of performance measurement system of the firm with regard to that specific variable (i.e., size, industry, strategic mission or culture). For this analysis, the assumption is that the third part is substantial.

[33] The squared root from the squared residuals is used in this analysis in order to obtain a proxy for the deviation from the optimal value. Larger values are hypothesized to be negatively associated with performance in these tests (Ittner et al, 2003b).

to have an *adequate (adaptation of) strategy* rather than an adequate performance measurement system that solely supports the *implementation of strategy* (see Mintzberg, 1978). In sum, the evidence in table 7 provides little support for the hypothesis that a misalignment of the performance measurement system to the strategic and contextual characteristics of the organization is detrimental to performance.

4.4   Statistical considerations

To ensure that the results were robust, a number of tests have been used to evaluate the assumptions underlying the regression models and to examine possible data problems. First, the models are re-estimated by using the relative rather than the absolute use of performance measures (for example, the use of accounting performance measures relative to the total number of performance measures considered in this research project). The results (not presented here) are generally similar to the results provided previously. Most notable deviations from previous results are that the relative use of accounting measures is lower in case of larger size ($p<0.10$), a strategic build mission and a task culture (both $p<0.15$). This is consistent with the results on the use of 'contemporary' performance measures presented previously (i.e., an increase in the use of 'contemporary' performance measures results in a relative decrease in the use of 'traditional' accounting performance measures). For the economic value measures model, we find that primary and manufacturing industries appear to use these measures to a larger extent ($p<0.10$) than service-oriented industries. One reason may be that it is difficult to value intangible assets (training and development, employee competencies), which are relatively more important in the service industry. As a result, the application of economic value measures (that 'tax' assets through the capital charge) may be more difficult in the service industries. For the

non-financial measures model, we find that single business firms appear to use non-financial measures to a lesser extent than more diversified firms ($p<0.05$); this is consistent with the finding that large, diversified firms use more sophisticated controls. Finally, subjective performance measures are used to a lesser extent in large firms than in small firms ($p<0.10$). A reason may be that large firms appear to reduce influence costs by reducing reliance on subjective performance measures (Ittner et al, 2003a). The other results are similar to the results presented in table 6.

Second, the results for the validity tests presented previously indicate that the measure for accounting-based performance measure is questionable. To correct for this, I ran regression analyses for each of the separate measures that constitute the accounting-based performance measure (i.e., comparison of budget versus actual results, ROE, ROCE and ROTC). The results are similar to the results presented previously, with two exceptions: the results suggest that size is positively associated with the use of a comparison of budget versus actual results ($p<0.05$). In addition, the importance of the shareholder value goal is positively related to the use of return on capital employed measures ($p<0.10$). Finally, a number of tests have been executed to check whether the models suffer from ommitted-variable bias[34] or heteroskedasticity[35]; the results from these tests indicate that this is not the case.

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[34] A RESET test (Verbeek, 2004, p. 63, p. 66) has been used to see whether powers of the dependent estimated variable help in explaining the dependent variable. If powers of the dependent estimated variable have non-zero coefficients in the auxiliary regression, it is not unlikely that relevant variables are omitted from the model. In that case, the inclusion of an additional variable may capture the nonlinearities indicated by the test. The results from the RESET-test (not included here) indicate that none of the models appears to suffer from non-linear effects or omitted-variable bias.

[35] The Breusch-Pagan test has been used to test the alternative hypothesis that the error variance depends upon the three explanatory variables (Verbeek, 2004). The results from the Breusch-Pagan test (not included here) suggest that heteroskedasticity is not likely to be a problem for non-financial or subjective

The 'alignment hypothesis' (hypothesis 8, i.e., a mismatch between the strategic and contextual characteristics of the firm and the design of the performance measurement negatively affects performance) has been re-evaluated using the squared root from the sum of the squared residuals from the joint regression of the statistically significant variables affecting the use of a performance measure. That is, the squared root from the sum of the squared residuals from the regression of size and stock exchange listing on the use of economic value measures, respectively strategic mission, culture, size and stock exchange listing on the non-financial performance measures have been correlated to the four measures for performance mentioned previously. Again, I do not find a significant relation (p>0.10) between strategic and/or contextual alignment and performance.

Finally, it may be argued that firms jointly decide on their strategy, industries they are competing in, size, organizational culture, stock listing, and the design of their performance measurement system. These so-called 'endogeneity problems' are likely to exist in all organizational design studies: many organizational choices are interrelated (Ittner & Larcker, 2001). Endogeneity may provide biased and inconsistent results (Verbeek, 2004). An assumption in contingency theory is that 'misfit' between the organizational characteristics and the use of performance measures may occur in some organizations for extended periods (Luft & Shields, 2003); however, the validity of this

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performance measures. However, the results for the accounting and economic value performance measures suggest that the OLS-results may be distorted by heteroskedasticity. Heteroskedasticity may come from the industry dummy (p<0.05) in the accounting performance measure model, respectively from stock listing (p<0.05) in the economic value measure model. Considering their current significance in the original models, it is unlikely that heteroskedasticity affects the significance levels of these variables.

assumption is largely unknown. Thus, a key limitation in this research project is that the results from this study are biased by endogeneity of the predictor variables.

5 Discussion and Conclusions

Using data from a survey amongst Dutch firms, I investigate the use and effectiveness of several 'new' performance measures (including economic value measures, non-financial measures and subjective measures). The results indicate that non-financial measures appear to be used most often to deal with the allegedly negative effects of traditional accounting performance measures; economic value measures and subjective measures are used to a much lesser extent. Consistent with previous research is that accounting performance measures (budgets, return on investment) are equally important to all organizations (Hartmann, 2000; Simons, 1987; Govindarajan & Gupta, 1985). Economic value measures (EVA©, SVA) are appear to be used most often in large firms that find the shareholder value goal important (and, relatively, in the primary or manufacturing industry and in firms with task cultures). As such, the use of economic value measures appears to be used to align managerial decisions to shareholder interests. Non-financial performance measures are used mainly in large firms that focus on shareholder value and growth (i.e., have build missions) and have task cultures. An increase in size appears to be negatively associated with the relative use of subjective performance measures (probably to reduce influence costs; Ittner et al, 2003a; Prendergast & Topel, 1996). Finally, a closer match between strategic and other contextual factors and the performance measurement system of a company does not increase performance.

Like all research projects, this study has several limitations. In addition to endogeneity problems mentioned previously, some variables that might have been relevant for this research project (for example, the allocation of decision rights, Abernethy, Bouwens & Van Lent, 2004; Nagar, 2002; Prendergast, 2002b; and the diagnostic or interactive use of performance measures, Simons, 2000) have not been included in this research project. However, the additional statistical tests indicate that the exclusion of these measures does not appear to affect the results. A second limitation is that 'improper' subjective performance measures may have been used. Although based on a literature review, the subjective performance measures (competence management, managerial intuition) listed in this research project may not be the performance measures which are considered relevant to managers. The subjective use of several variables may result in different results (see Gibbs et al, 2004; Ittner et al, 2003a). Third, several dummy variables have been used in this research project (the importance of the shareholder goal, corporate strategy, culture and industry are all proxied by dummies). Although these measures are validated as much as possible, they remain crude measures. In addition, the poor Cronbach's alpha and the non-random sampling may have affected results. Additional research along these lines provides some fruitful areas for future research and may help to resolve some of the issues which are relevant in performance measurement literature.

Despite the previous listed limitations, this research project sheds some light on issues which are relatively unexplored in previous literature. First of all, there appears to be a relation between task culture and the use of non-financial and, to a lesser extent, economic value performance measures. However, previous literature generally assumes

that culture (cultural controls) *replaces* rather than augments performance measurement (result controls; see Merchant & Van der Stede, 2003; Ouchi, 1979; an exception is Quinn & Cameron, 1999). There may be several reasons for this finding. First of all, a task culture is associated with decentralized decision making, flexible assignment of resources and short communication channels (for example, project teams). Internal integration and coordination of effort is moderate; task culture organizations may be integrated by common goals, but flexible, shifting structures may make coordination difficult (Harrison, 1972). Considering these flexible, shifting structures (and, associated with that, a high rotation of managers), non-financial performance measures may be used to communicate the goals of the organization (Malina & Selto, 2001) or to mitigate the short-term orientation of task culture organizations (Dutta & Reichelstein, 2003). Also, previous literature suggests that the use of performance measures should be matched to the delegation of decision rights (Abernethy, Bouwens & Van Lent, 2004; Nagar, 2002). As a result, it may be that task culture organizations are more decentralized and use a larger variety of performance measures to evaluate the decisions made by lower-level managers. Finally, it may be that task culture is a proxy for industry effects. Task culture is significantly related to two specific industries: financial services and non-financial services ($\rho=0.22$ respectively $\rho=-0.23$, $p<0.10$). Firms in the financial services industries may, to a larger extent than in other industries, use non-financial measures while firms in the non-financial services industry may use them to a lesser extent. An examination of the relation between organizational culture, the use of specific performance measures and the effects on performance appears to be a first fruitful area for future research.

A second avenue for further research is associated with the (lack of a) relation between

strategic and other contextual factors, subjective performance measures and performance.

One reason may be that it is hard to find an impact of specific factors as well as a

performance effect at the same time (see Luft & Shields, 2003; Ittner & Larcker, 2001)[36].

Another reason may be that the measures used in this survey (managerial intuition,

competence management) are not considered useful measures by the firms in this sample.

A third reason may be that the non-financial measures (for example, market share; R&D

output; quality), which are used in case of a build strategy, appear to be able to reduce the

riskiness of the manager to an acceptable level (Baker, 2002). Finally, managers may use

objective performance measures in a subjective way or take the discretion to evaluate

performance on factors other than the measures specified previously rather than that they

use qualitative performance measures (Gibbs et al, 2004; Ittner et al, 2003). An

investigation of the relation between strategy, the use of subjective measures and

performance may provide interesting findings.

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[36] The 'misalignment hypothesis' assumes that a significant percentage of firms have aligned their performance measurement system to the hypothesized variable, while at the same time a 'misalignment' results in lower performance. However, if all firms have (not) adapted to the equilibrium situation you can (cannot) find the impact of specific factors, yet you cannot (may) find the impact of misalignment.

References

Abernethy, M., & A. Lillis, 1995. The impact of manufacturing flexibility on management control system design. Accounting, Organizations & SOcietyt, vol 20, p. 241-258.

Abernethy, M., J. Bouwens & L. van Lent, 2004. Determinants of control system design in divisionalized firms. The Accounting Review, vol 79, 3, p. 545-570.

Abernethy, M.A., & P. Brownell, 1999. The role of budgets in organizations facing strategic change: an exploratory study. Accounting, Organizations and Society, vol 24, p. 189-204.

AICPA, 2001. Performance Measurement Practices Survey Results. AICPA, 2001.

Andersen, J.A., 2000. Intuition in managers: are intuitive managers more effective? Journal of Managerial Psychology, vol 15, no 1, p. 46-67.

Anthony, R.N., & V. Govindarajan, 2004. Management Control Systems, 11th edition. McGraw-Hill, Boston.

Baird, K.M., G.L. Harrison & R.C. Reeve, 2004. Adoption of activity management practices: a note on the extent of adoption and the influence of organizational and cultural factors. Management Accounting Research, vol 15, p. 383-399.

Baker, G., 2002. Distortion and Risk in Optimal Incentive Contracts. Journal of Human Resources, vol XXXVII, no 4, p. 728-751.

Baker, G., R. Gibbons & K.J. Murphy, 1994. Subjective Performance Measures in Optimal Incentive Contracts. The Quarterly Journal of Economics, november 1994, p. 1125-1156.

Banker, R., G. Potter & D. Srinivasan, 2000. An Empirical Investigation of an Incentive Plan that Includes Nonfinancial Performance Measures. Accounting Review, vol 75, no 1, p. 65-92.

Banker, R.D., H. Chang & M.J. Pizzini, 2004. The Balanced Scorecard: Judgmental Effects of Performance Measures Linked to Strategy. The Accounting Review, vol 79, no 1, p. 1-23.

Biddle, G. R. Bowen & J. Wallace, 1997. Does EVA© beat earnings? Evidence on the associations with stock returns and firm values. Journal of Accounting and Economics, vol 24, p. 301-336.

Bititci, U.S., K. Mendibil, S. Nudurupati, T. Turner & P. Garengo, 2004. The interplay between performance measurement, organizational culture and management styles. Measuring Business Excellence, vol 8, no 3, p. 28-41.

Bouwens, J.F.M.G., & L. van Lent, 2003. The use of Value-Based Measures for Assessing Managerial Performance. Universiteit Nyenrode, working paper.

Bushman, R.M., R.J. Indjejikian & A. Smith, 1996. CEO compensation: the role of individual performance evaluation. Journal of Accounting & Economics, 21, p. 161-193.

Cameron, K.S., & R.E. Quinn, 1999. Diagnosing and changing organizations culture. Addison-Wesley, Reading, MA.

Cartwright, S., & G.L. Cooper, 1993. The role of culture compatibility in successful organizational marriage. Academy of Management Executive, vol 7, no 2, p. 57-70.

Cavalluzzo, K.S., & C.D. Ittner, 2004. Implementing performance measurement innovations: evidence from government. Accounting, Organizations & Society, vol 29, p. 243-267.

Chapman, C.S., 1997. Reflections on a contingent view of accounting. Acounting, Organizations & Society, vol 22, no 2, p. 189-205.

Chenhall, R., & D. Morris, 1986. The Impact of structure, environment, and interdependence on perceived usefulness of management accounting systems. The Accounting Review, vol 61, 1, p. 16-35.

Chenhall, R.H., & K. Langfield-Smith, 1998a. The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach. Accounting, Organizations and Society, vol 23, no 3, p. 243-264.

Chenhall, R.H., & K. Langfield-Smith, 1998b. Adoption and benefits of management accounting practices: an Australian study. Management Accounting Research, vol 9, p. 1-19.

Chenhall, R.H., 2003. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. Accounting, Organizations & Society, vol 28, p. 127-168.

Christie, A.A., M.P. Joye & R.L. Watts, 2003. Decentralization of the firm: theory and evidence. Journal of Corporate Finance, vol 9, p. 3-36.

Datar, S., S. Cohen Kulp & R.A. Lambert, 2001. Balancing Performance Measures. Journal of Accounting Research, vol 39, no 1, june, p. 75-92.

Davis, S., & T. Albright, 2004. An investigation of the effect of Balanced Scorecard implementation on financial performance. Management Accounting Research, vol 15, p. 135-153.

Dent, J.F., 1990. Strategy, organization and control: some possibilities for accounting research. Accounting, Organizations & Society, vol 15, no ½, p. 3-25.

Deshpandé, R., & A. Parasuraman, 1986. Linking Corporate Culture to Strategic Planning. Business Horizons, may-june 1986, p. 28-37.

Drazin, R., & A.H. Van de Ven, 1985. Alternative Forms of Fit in Contingency Theory. Administrative Science Quarterly, 30, p. 514-539.

Duncan, K., & K. Moores, 1989. Residual Analysis: A Better Methodology for Contingency Studies in Management Accounting. Journal of Management Accounting Research, vol 1, Fall, p. 89-103.

Dutta, S., & S. Reichelstein, 2003. Leading Indicator Variables, Performance Measurement, and Long-Term versus Short-Term Contracts. Journal of Accounting Research, vol 41, no 5, p. 837-866.

EFQM-website, 2004. see

http://www.efqm.org/model_awards/model/excellence_model.htm#overview

Fabrigar, L.R., D.T. Wegener, R.C. MacCallum & E.J. Strahan, 1999. Evaluating the Use of Exploratory Factor Analysis in Psychological Research. Psychological Methods, 1999, vol 4, no 3, p. 272-299.

Ferreira, A., & D. Otley, 2004. The relationship between design and use of management control systems. Working paper, Monash University.

Fisher, J., & V. Govindarajan, 1993. Incentive compensation design, strategic business unit mission, and competitive strategy. Journal of Management Accounting Research, Fall, Vol. 5, p129-145.

Fisher, J.G., 1998. Contingency theory, management control systems and firm outcomes: past results and future directions. Behavioral research in accounting, vol 10, supplement 1998, p. 47-64.

Garvey, G., & T. Milbourn, 2000. EVA versus earnings: does it matter which is more highly correlated with stock returns? Journal of Accounting Research, vol 38, supplement, p. 209-245.

Gibbs, M., K.A. Merchant, W.A. Van der Stede & M.E. Vargus, 2004. Determinants and Effects of Subjectivity in Incentives. The Accounting Review, vol 79, no 2, p. 409-436.

Gordon, L.A., & D. Miller, 1976. A contingency framework for the design of accounting information systems. Accounting, Organizations & Society, vol 1, no 1, p. 59-69.

Gordon, L.A., & V.K. Narayanan, 1984. Management Accounting Systems: An Empirical Evaluation. Accounting, Organizations and Society, vol 9, no 6, p. 493-505.

Govindarajan, V., & A.K. Gupta, 1985. Linking Control Systems to Business Unit Strategy: Impact on Performance. Accounting, Organizations & Society, vol 10, no 1, p. 51-66.

Govindarajan, V., & J. Fisher, 1990. Strategy, Control Systems, and Resource Sharing: Effects on Business-unit Performance. Academy of Management Journal, vol 33, no 2, p. 259-285.

Govindarajan, V., 1984. Appropriateness of accounting data in performance evaluation: An empirical examination of environmental uncertainty as an intervening variable. Accounting, Organizations & Society, vol 9, p. 125-135.

Govindarajan, V., 1988. A Contingency Approach to Strategy Implementation at the Business-Unit Level: Integrating Administrative Mechanisms with Strategy. Academy of Management Journal, vol 31, no 4, p. 828-853.

Gupta, A.K., 1987. SBU-strategies, corporate-SBU relations, and SBU effectiveness in strategy implementation. Academy of Management Journal, vol 30, no 3, p. 477-500.

Hair, J.F., jr., R.E. Anderson, R.L. Tatham & W.C. Black, 1998. Multivariate data analysis, 5th edition. Prentice Hall, Upper Saddle River, NJ.

Harrison, R., 1972. How to Describe your Organization. Harvard Business Review, May/June, vol 5, no 1, p. 119-128.

Hartmann, F.G.H., 2000. The appropriateness of RAPM: toward the further development of theory. Accounting, Organizations & Society, vol 25, p. 451-482.

Hendricks, J.A., D.G. Defreitas & D.K. Walker, 1996. Changing performance measures at Caterpillar. Management Accounting, december, p. 18-24.

Hendricks, K.B., & V.R. Singhal, 1997. Does Implementing an Effective TQM Program Actually Improve Operating Performance? Empirical Evidence from Firms that Have Won Quality Awards. Management Science, vol 43, no 9, p. 1258-1274.

Hendricks, K.B., & V.R. Singhal, 2001. The long-Run Stock Price Performance of Firms with Effective TQM Programs. Management Science, vol 47, no 3, p. 359-368.

Hofer, C.W., & D. Schendel, 1978. Strategy Formulation: Analytical Concepts. West Publishing Company, St. Paul/New York.

Hoque, Z., & W. James, 2000. Linking Balanced Scorecard Measures to Size and Market Factors: Impact on Organizational Performance. Journal of Management Accounting Research, vol 12, p. 1-17.

Indjejikian, R.J., 1999. Performance Evaluation and Compensation Research: An Agency Perspective. Accounting Horizons, vol 13, no 2, p. 147-157.

Ittner, C.D., & D.F. Larcker, 1997. Quality Strategy, Strategic Control Systems, and Organizational Performance. Accounting, Organizations & Society, vol 22, no ¾, p. 293-314.

Ittner, C.D., & D.F. Larcker, 1998. Innovations in Performance Measurement: Trends and Research Implications. Journal of Management Accounting Research, vol 10, p. 205-238.

Ittner, C.D., & D.F. Larcker, 2001. Assessing empirical research in managerial accounting: a value-based management perspective. Journal of Accounting and Economics, vol 32, p. 349-410.

Ittner, C.D., D. Larcker & T. Randall, 2003b. Performance implications of strategic performance measurement in financial services firms. Accounting, Organizations & Society, vol 28, p. 715-741.

Ittner, C.D., D.F. Larcker & M.V. Rajan, 1997. The Choice of Performance Measures in Annual Bonus Contracts. The Accounting Review, vol 72, no 2, p. 231-255.

Ittner, C.D., D.F. Larcker & M.W. Meyer, 2003a. Subjectivity and the Weighting of Performance Measures: Evidence from a Balanced Scorecard. The Accounting Review, vol 78, no 3, p. 725-758.

Kaplan, R., & D. Norton, 1992. The balanced scorecard: Measures that drive performance. Harvard Business Review, January-February, p. 71-79.

Kaplan, R.S., & D.P. Norton, 2001a. Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part I. Accounting Horizons, vol 15, no 1, march, p. 87-104.

Kaplan, R.S., & D.P. Norton, 2001b. Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part II. Accounting Horizons, vol 15, no 2, june, p. 147-160.

Kren, L., & J.L. Kerr, 1993. The effect of behaviour monitoring and uncertainty on the use of performance-contingent compensation. Accounting and Business Research, vol 23, p. 159-168.

Langfield-Smith, K., 1997. Management Control Systems and Strategy: A Critical Review. Accounting, Organizations & Society, vol 22, no 2, p. 207-232.

Lipe, M.G., & S. Salterio, 2000. The balanced scorecard: Judgmental effects of common and unique performance measures. The Accounting Review, vol 75, no 3, p. 283-298.

Luft, J., & M.D. Shields, 2003. Mapping management accounting: graphics and guidelines for theory-consistent empirical research. Accounting, Organizations & Society, vol 28, p. 169-249.

Malina, M.A., & F.H. Selto, 2001. Communicating and Controlling Strategy: An Empirical Study of the Effectiveness of the Balanced Scorecard. Journal of Management Accounting Research, vol 13, p. 47-90

Malina, M.A., & F.H. Selto, 2004. Choice and change of measures in performance measurement models. Management Accounting Research, vol 15, p. 441-469.

Merchant, K.A., & W.A. Van der Stede, 2003. Management Control Systems: Performance Measurement, Evaluation and Incentives. Prentice Hall, London.

Miles, R.E., & C.C. Snow, 1978. Organizational Strategy, Structure and Process. New York, McGraw-Hill.

Miller, D., & P.H. Friesen, 1982. Innovation in conservative and entrepreneurial firms: two models of strategic momentum. Strategic Management Journal, vol 3, p. 1-25.

Miller, D.L., & P. Friesen, 1983. Successful and Unsuccessful Phases of the Corporate Life Cycle. Organization Studies, vol 4, no 4, p. 339-356.

Miller, K.D., & P. Bromiley, 1990. Strategic risk and corporate performance: An analysis of alternative risk measures. Academy of Management Journal, vol 33, no 4 (December), p. 756-779).

Milliken, F.J., 1987. Three types of perceived uncertainty about the environment: sate, effect and response uncertainty. Academy of Management Review, vol 12, p. 133-143.

Mintzberg, H., & J.B. Quinn, 1996. The strategy process: concepts, contexts, cases. 3rd international edition. Prentice Hall International.

Mintzberg, H., 1978. Patterns in Strategy Formation. Management Science, vol 24, no 9, May, p. 934-948.

Myers, R., 1996. Metric Wars. CFO, October 1996, p. 41-50.

Nagar, V., 2002. Delegation and Incentive Compensation. The Accounting Review, vol 77, no 2, p. 379-395.

Nahm, A.Y., M.A. Vonderembse & X.A. Koufteros, 2004. The Impact of Organizational Culture on Time-Based Manufacturing and Performance. Decision Sciences, vol 35, no 4, p. 579-607.

O'Reilly, C.A., J. Chatman & D.F. Caldwell, 1991. People and organizational culture: a profile comparison approach to assessing person-organization fit. Academy of Management Journal, vol 34, no 3, p. 487-516.

Otley, D., 1999. Performance management: a framework for management control systems research. Management Accounting Research, 10, p. 363-382.

Otley, D.T., 1980. The Contingency Theory of Management Accounting: Achievement and Prognosis. Accounting, Organizations & Society, 5, 4, p. 413-428.

Ouchi, W.G., 1979. A Conceptual Framework for the Design of Organizational Control Mechanisms. Management Science, vol 25, no 9, p. 833-848.

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

Prendergast, C., & R.H. Topel, 1996. Favoritism in Organizations. Journal of Political Economy, vol 104, no 5, p. 958-978.

Prendergast, C., 2002a. Uncertainty and Incentives. Journal of Labor Economics, vol 20, no 2, p. s115-s137.

Prendergast, C., 2002b. The Tenuous Trade-off between Risk and Incentives. Journal of Political Economy, vol 110, no 5, p. 1071-1102.

PricewaterhouseCoopers, 2004. Trendsetter Barometer, PricewaterhouseCoopers, 2004.

Quinn, R.E., & J. Rohrbaugh, 1983. A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis. Management Science, vol 29, no 3, p. 363-377.

Quinn, R.E., & K. Cameron, 1983. Organizational Life Cycles and Shifting Criteria of Effectiveness: Some Preliminary Evidence. Management Science, vol 29, no 1, p. 33-51.

Rogers, E.M., 1995. Diffusion of Innovations. 4th Edition. New York, Free Press.

Said, A.A., H.R. HassabElnaby & B. Wier, 2003. An Empirical Investigation of the Performance Consequences of Nonfinancial Measures. Journal of Management Accounting Research, vol 15, p. 193-223.

Simons, 2000. Performance Measurement & Control Systems for Implementing Strategy. Prentice Hall, Upper Saddle River, NJ.

Simons, R., 1987. Accounting control systems and business strategy: an empirical analysis. Accounting, Organizations and Society, vol 12, no 4, p. 357-374.

Smircich, L., 1983. Concepts of Culture and Organizational Analysis. Administrative Science Quarterly, vol 28, p. 339-358.

Smith, M.J., 2002. Gaming Nonfinancial Performance Measures. Journal of Management Accounting Research, vol 14, p. 119-133.

Stern, J.M., G.B. Stewart III & D.H. Chew, Jr., 1995. The EVA© Financial Management System. Journal of Applied Corporate Finance, Vol 8, no 2, p. 32-46.

Stewart, G.B., III, 2002. Accounting is Broken- Here's How to Fix It: A Radical Manifesto. EVAluation, vol 5, issue 1, p. 1-29.

Tymon, W.G., D.E. Stout & K.S. Shaw, 1998. Critical analysis and recommendations regarding the role of perceived environmental uncertainty in behavioral accounting research. Behavioral Research in Accounting, vol 10, p. 23-46.

Vancil, R., 1978. Decentralization: Managerial Ambiguity by Design. Dow Jones-Irwin, Homewood, IL.

Verbeek, M., 2000. A Guide to Modern Econometrics. John Wiley & Sons, Ltd.

Wallace, J., 1997. Adopting residual income-based compensation plans: do you get what you pay for? Journal of Accounting and Economics, vol 24, p. 275-300.

Waterhouse, J.H., & P. Tiessen, 1978. A contingency framework for management accounting systems research. Accounting, Organizations & Society, vol 3, no 1, p. 65-76.

Wright, P.M., & S.A. Snell, 1991. Toward an integrative view of strategic human resource management. Human Resource Management Review, vol 1, no 3, 1991, p. 203-225.

6   Appendices

Appendix A: Questionnaire (partially, original questions in Dutch)

Characteristics of the organization

A number of relevant data of your organizations is gathered in this part of the survey. Please indicate the most relevant alternative, or provide the requested information. If the provided alternatives do not provide an adequate description of the current situation within your organization, you can provide some alternatives. Please respond to all questions for your current function, i.e. for the organization (firm, division) for which you are responsible as a manager or that is your responsibility as a financial expert.

1. Is your company listed on a stock exchange (SHAREHVL)?

	(%)
o Yes	49%
o No	51%

2. To what extent are the actions of the following actors in your external environment predictable (UNCERTTY)?
   (0 = irrelevant, 1 = never, 2 = hardly, 3 = sometimes, 4 = most of the time, 5 = always)

	mean	Std. Dev.
(a) Suppliers (e.g. price or quality changes, new materials) [R]	3.18	1.28
(b) Competitors (e.g. price or quality changes, new products) [R]	3.21	1.05
(c) Customers (e.g. demand for existing or new products) [R]	3.18	0.89
(d) Financial/capital markets (e.g. changes in interest rates, availability of credit) [R]	3.02	1.06
(e) Government regulatory agencies (e.g. changes in regulations on prices or product standards) [R]	3.05	0.99
(f) Labor unions (e.g. changes in wages, working conditions) [R]	3.07	1.17
Total summarized score	20.26	2.37
Cronbach's alpha	0.55	

[R]: item is reverse scored in order to make sure that a high score on this measure represents a high uncertainty score.

3. How would you characterize the corporate strategy of your organization?

	(%)
o Single business firm (SINGLBUS, dummy)	26%
o Related diversified firm	66%
o Unrelated diversified	8%

4. How would you characterize the strategic mission of your organization (BUILDSTR)? *(Please indicate below what percentage of your sales is accounted for by each of the four alternatives. Your answers should total 100%)*

	Mean (%)	Std. Dev
(a) Build strategy: an increase in market share is more important than short-term profits and short-term cash flows of your organization	39.5	26.4
(b) Hold strategy: protection of market share and competitive position is most important to your organization	40.0	22.8
(c) Harvest strategy: maximizing profitability and short-term cash flows is more important than market share to your organization	15.5	17.8
(d) Divest strategy: your organization is preparing for sale or liquidation	5.1	9.0
	100%	

5. What was the size of your organization at the end of the previous year?

	Mean	Std. Dev.
(a) Number of employees (in full time equivalents, fte; SIZE = log fte)	5,001	10,765
(b) Sales (Mln Euros)	1,637	4,475
(c) Total assets (mln euros)	12,900	58,320

6. What is the focus of the culture of your organization?

	(%)
o Centralizing power, use of power in positions (power culture)	8.5%
o Formal roles: emphasis on procedures, rules and regulations (role culture)	18.6%
o Task requirements determine the way work is organized (task culture) TASKCULT, dummy)	72.9%
o Other (please specify) …….	

7. How satisfied are you with the performance of your organization on the following aspects?
(0 = irrelevant, 1 = extremely dissatisfied, 2 = dissatisfied, 3 = neutral,
4 = satisfied, 5 = extremely satisfied)

	mean	Std. Dev.
(a) Sales growth	3.30	1.28
(b) Cost control, cost reduction	3.23	.99
(c) Profit, profit margin	3.30	1.26
(d) Return on investment	3.23	1.03
(e) Shareholder value, share price, dividends	1.81	1.54
(f) Operational cash flows	3.19	1.17
(g) Market orientation, customer orientation	3.45	.98
(h) Innovation, R&D	3.15	.93
(i) Quality of the organization, products and services	3.44	.65
(k) Personnel development, human capital	3.13	.81
Total summarized score	31.24	5.89
Cronbach's alpha	0.73	

Appendix B: Analysis results

B.1 Results Factor Analysis

Rotated Component Matrix

	Component NONFIN	EVMPMS	SUBJPMS	ACCTGPMS
Process measures	*0.855*	0.006	0.059	-0.034
Employee measures	*0.840*	-0.033	-0.167	0.169
Customer measures	*0.837*	0.118	0.103	0.160
Quality measures	*0.827*	0.217	0.221	0.087
Innovation measures	*0.775*	0.141	0.222	0.100
Shareholder value added (SVA)	0.118	*0.838*	0.091	0.171
Economic value added (EVA©)	0.241	*0.804*	-0.111	0.071
Intuition higher management	-0.003	-0.017	*0.921*	0.107
Competence management	0.367	0.044	*0.786*	-0.163
Return on total capital (ROTC)	-0.130	0.276	0.058	*0.719*
Return on capital employed (ROCE)	0.118	0.351	0.138	*0.616*
Comparison of budget to reality	0.307	-0.129	-0.127	*0.577*
Return on equity (ROE)	0.301	-0.382	-0.234	*0.485*
Cronbach's Alpha	0.91	0.73	0.76	0.46

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 9 iterations.

NONFIN = non-financial measures;
EVMPMS = economic value measures;
SUBJPMS = subjective measures;
ACCTGPMS = accounting performance measures.

Table B.1: Results confirmatory factor analysis

TABLE 1: Hypothesized results

Performance measure	Accounting-based performance measures	Economic value performance measures	Non-financial performance measures	Subjective performance measures
Determinant				
Importance of shareholder value (H1)	0	+	0	0
Single business strategy (H2)	0	-	+	+
Build strategic mission (H3)	0	0	+	+
Task culture (H4)	0	+	+	-
Uncertainty (H5)	0	0	+	+
Size (H6)	0	+	+	-
Manufacturing industry (H7)	0	+	0	-
Performance (H8)	0	+/- a)	+/- a)	+/- a)

a): performance is high if the organization is matched to the previous pattern. otherwise performance will be low.

TABLE 2: Profile of Responding Companies

Number of Employees (fte)	0-100	100-500	500-1000	1.000-10.000	10.000 or more	Total in sample	Distribution Sample (%)	CBS 2001 (%) a)
Industry								
Agriculture. hunting & forestry		2				2	3	1
Fishing					1	1	2	0
Mining & quarrying						0	0	0
Manufacturing		7	5	6	2	19	33	34
Electricity. gas & water supply						0	0	1
Construction	1			1		2	3	10
Trade	1		2	4	3	10	17	19
Hotels & Restaurants				1		1	2	2
Transport. storage & communications				4		4	7	8
Financial intermediation	2	6		1	2	11	19	3
Real estate. renting and business activities			4	2		6	10	21
Non-profit. other	1					1	2	NR
Total	5	15	11	19	8	58	100%	100%

a) The table provides the distribution amongst several industries. The target sample does not include non-profit companies; however. the shares of some companies are held by government organizations. The actual response is compared to the distribution of large Dutch organizations (>100 full time equivalents) provided by the Dutch Bureau of Statistics (CBS) over 2001. excluding public sector organizations.

TABLE 3: Descriptive Statistics for Dependent and Independent Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Independent variables:					
SHAREHVL	61	0	1	.49	.50
SINGLEBUS	61	0	1	.26	.44
BUILDSTR	59	-140.00	100.00	13.83	45.63
TASKCULT	61	0	1	.70	.46
UNCTTY	61	7.00	27.00	11.29	3.59
SIZE	58	2.08	10.92	6.90	1.89
PRIMMFTG	61	0	1	.43	.50
Dependent variables:					
ACCTGPM	56	5.00	20.00	12.29	3.50
VBMPMS	55	.00	10.00	4.05	2.77
NFINPMS	54	5.00	25.00	16.50	5.79
SUBJPMS	56	.00	10.00	4.34	2.51
PERFRMNC	58	16.00	46.00	31.24	5.89
SALESGR99-01 a)	33	-11.08	474.48	51.68	95.03
SALESGR00-01 a)	33	-12.78	219.88	14.56	39.74
ROCE99-01 a)	32	-.07	76.01	19.19	14.19
ROCE2001 a)	32	-3.01	118.64	18.73	22.45

a): in %; distribution is skewed to the right.

SHAREHVL =	Importance of shareholder value (i.e., 1=firm is listed on stock exchange, 0=firm is not listed on stock exchange);
SINGLEBUS =	Corporate strategy (single business firm = 1, rest =0);
BUILDSTR =	Strategic mission;
TASKCULT =	Task culture dummy variable (i.e., 1=task culture; 0=other culture);
UNCRTTY =	Uncertainty;
SIZE =	Size (log of the number of fte's);
PRIMMFTG =	Industry dummy (i.e., 1=primary and manufacturing industry, 0=other industries);
ACCTGPMS =	accounting performance measures;
EVMPMS =	economic value measures;
NONFIN =	non-financial measures;
SUBJPMS =	subjective measures;
PERFRMNC =	performance (perceptual measure);
SALESGR99-01=	sales growth 1999-2001;
SALESGR00-01=	sales growth 2000-2001;
ROCE99-01=	return on capital employed (average 1999-2001);
ROCE2001=	return on capital employed over 2001.

TABLE 4: Pearson Correlations between Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. SINGLEBUS										
2. GROWTHSTR	.153									
3. TASKCULT	.141	-.054								
4. UNCERTTY	-.049	-.015	-.118							
5. SIZE	-.006	.033	.025	-.278*						
6. PRIMMFTG	-.062	.105	.049	-.295*	-.014					
7. SHAREHVL	-.139	.037	-.083	-.137	.176	.213				
8. ACCTGPMS	-.050	.125	.054	-.065	-.037	.203	.183			
9. EVMPMS	.062	.130	.099	-.190	.263	.227	.311*	.265		
10. NFINPMS	-.061	.290*	.191	-.172	.371**	.039	.239	.340*	.274*	
11. SUBJPMS	.047	-.017	.043	-.034	-.025	.076	.089	.055	.098	.307*

*.** Correlation is significant at the 0.05 level respectively 0.01 level (2-tailed).

SHAREHVL = Importance of shareholder value (i.e., 1=firm is listed on stock exchange, 0=firm is not listed on stock exchange);
SINGLEBUS = Corporate strategy (single business firm = 1, rest =0);
BUILDSTR = Strategic mission;
TASKCULT = Task culture dummy variable (i.e., 1=task culture; 0=other culture);
UNCRTTY = Uncertainty;
SIZE = Size (log of the number of fte's);
PRIMMFTG = Industry dummy (i.e., 1=primary and manufacturing industry, 0=other industries);
ACCTGPMS = accounting performance measures;
EVMPMS = economic value measures;
NONFIN = non-financial measures;
SUBJPMS = subjective measures;

TABLE 5: Diffusion of performance measures

A performance measure is defined as the indicator or criterion that is used to measure the performance of managers, employees and departments within your organization. The performance measurement system is defined as the whole sum of performance measures that are used in your organization. The questions refer to the current situation in your organization.

Please indicate to what extent your organization uses the following performance measures
(0 = measure unknown, 1 =never, 2 = hardly, 3 = sometimes, 4 = often, 5 = always)

	Mean	Standard deviation	% using measure often or always
(a) No explicit performance measure	1.31	1.23	NR
Budgets:			
(b) Comparison of budget to actual results	4.73	.59	92.9%
Rates-of-return / return on investment (ROI):			
(c) return on equity (ROE)	2.96	1.49	39.2%
(d) return on capital employed (ROCE)	2.77	1.88	41.0%
(e) return on total capital (ROTC)	1.82	1.40	14.3%
- other rate-of-return: …			
Risk adjusted rates-of-return:			
(f) risk adjusted return on capital (RAROC)	1.07	.99	5.4%
(g) return on risk adjusted capital (RORAC)	1.05	.98	5.4%
- other risk adjusted rate-of-return. nl: …			
Value based management measures:			
(h) economic value added (EVA©)	2.21	1.68	28.6%
(i) cash flow return on investment (CFROI)	2.38	1.65	30.4%
(j) shareholder value added (SVA)	1.89	1.46	16.4%
- other value based management measure: …			
Nonfinancial measures:			
(k) Process measures (eg time to market, # of process improvements)	3.38	1.56	56.4%
(l) Customer measures (eg customer satisfaction, customer loyalty)	3.45	1.32	57.1%
(m) Employee measures (eg employee satisfaction, sickness rates)	3.45	1.32	51.8%
(n) Innovation measures (eg: education budget, number of innovations)	2.71	1.21	27.3%
(o) Quality measures (eg. Quality scores, number of defects)	3.36	1.42	55.4%
(p) Risk measures (eg. Operational risk, credit risk)	2.95	1.38	41.8
- other non-financial measures: …			
Subjective measures:			
(q) Competence management	2.23	1.37	19.7%
(r) Intuition higher management	2.11	1.42	17.8%
- other subjective measures: …			

TABLE 6: The Impact of Contextual Factors on the Use of Corporate Performance Measurement Systems (Absolute)

Dependent:	ACCTG PMS			EVM PMS			NONFIN PMS			SUBJ PMS		
	Predictd sign	Stand. β	t	Predictd sign	Stand. β	t	Predictd sign	Stand. β	t	Predictd sign	Stand. β	t
(Constant) [a]	-		-1.214	-***		-2.852	-**		-2.298			-1.047
SHAREHVL		.181	1.210		.326**	2.447		.226*	1.795		.110	.710
SINGLEBUS		-.056	-.370		.131	.976		-.145	-1.132		.127	.816
BUILDSTR		.156	1.047		.108	.812		.353***	2.787		-.038	-.246
TASKCULT		.134	.911		.212#	1.613		.323**	2.615		.061	.404
UNCERTTY		.035	.233		.070	.509		.149	1.129		.002	.015
SIZE		-.060	-.403		.253*	1.906		.298**	2.339		-.020	-.130
PRIMMFTG		.116	.758		.185	1.356		-.029	-.224		.106	.672
R^2		0.10			0.29			0.38			0.04	
Adj R^2		-0.05			0.18			0.28			-0.11	
F-value		0.66			2.55			3.77			0.26	
Significance		0.71			0.03			0.01			0.97	
N		51			50			49			51	

[a] The sign for the constant is presented. including the significance level.
#,*, **, *** Significant at the 0.15, 0.10, 0.05 respectively 0.01 level (2-tailed).

SHAREHVL = Importance of shareholder value (i.e., 1=firm is listed on stock exchange, 0=firm is not listed on stock exchange); SINGLEBUS = Corporate strategy (single business firm = 1, rest =0); BUILDSTR = Strategic build mission; TASKCULT = Task culture dummy variable (i.e., 1=task culture; 0=other culture); UNCRTTY = Uncertainty; SIZE = Size (log of the number of fte's); PRIMMFTG = Industry dummy (i.e., 1=primary and manufacturing industry, 0=other industries); ACCTGPMS = accounting performance measures; EVMPMS = economic value measures; NONFIN =non-financial measures; SUBJPMS = subjective measures.

TABLE 7: Spearman Correlation between Sum of Square Root from Squared Standardized Residuals and Performance

Spearman correlation		PERFRMNC	SALESGR 1999-2001	SALESGR 2000-2001	ROCE 1999-2001	ROCE 2001
RES(EVMPMS)	Correlation	.055	.128	-.190	.004	.291
	Significance	.701	.501	.316	.983	.126#
	N	51	30	30	29	29
RES(NFINPMS)	Correlation	.022	.099	-.156	-.291	-.213
	Significance	.881	.618	.427	.134#	.277
	N	47	28	28	28	28

#. *. ** Correlation is significant at the 0.15. 0.10 level and 0.05 level (2-tailed).

PERFRMNC =	performance (perceptual measure);
SALESGR99-01=	sales growth 1999-2001;
SALESGR00-01=	sales growth 2000-2001;
ROCE99-01=	return on capital employed (average 1999-2001);
ROCE2001=	return on capital employed over 2001.
RES(EVMPMS) =	sum of squared residuals for regressions of importance of shareholder value goal and size on use of economic value measures (EVMPMS);
RES(NFINPMS) =	sum of squared residuals for regressions of importance of shareholder value goal, strategic build mission, task culture and size on use of non financial performance measures (NONFINPMS);

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