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performance measures**

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Examining a *positive* psychological role for performance measures

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Abstract

Emerging evidence suggests that management control systems may generate positive psychological effects, leading to higher levels of managerial performance. We extend this literature by examining the extent to which (1) financial vis-à-vis non-financial measures and (2) diagnostic vis-à-vis interactive utilisation of performance measures may be associated with decreasing role ambiguity and increasing psychological empowerment with performance as the ultimate outcome variable. We find that the interactive utilisation of non-financial performance measures can be particularly important for generating a positive psychological experience and (indirectly) increasing performance. Our study contributes further evidence of the psychologically beneficial role played by management control systems.

Keywords: management control, performance measures, role ambiguity, psychological empowerment, positive effects

Examining a *positive* role psychological for performance measures

1. Introduction

While debate continues, reliance on accounting performance measures is generally viewed as likely to create unfavourable psychological effects which frequently prove to be organizationally dysfunctional (Hartmann, 2000). Financial measures have been associated with a range of dysfunctional effects, including: data manipulation (Hopwood, 1972), ‘gaming’ (Hofstede, 1968), job-related tension (Hopwood, 1972), group based negative behaviour (Argyris, 1952), interdepartmental strife (Argyris, 1960), budgetary slack (Merchant, 1985), and short-termism (Merchant, 1990; Van der Stede, 2000). The generally negative perspective towards financially orientated performance measures underlies calls for the demise of budgeting (Hope and Fraser, 2003), and has tended to endure since Argyris’ (1952; 1953) early observations that were encapsulated in the phrase “Human problems with budgets”.

Nevertheless, an emerging body of literature is beginning to examine the potential for financially based controls to fulfil a *positive* psychological role. Hartmann (2005), for example, shows how tolerance for ambiguity may moderate how managers view the appropriateness of accounting performance measures in conditions of uncertainty; the higher the tolerance for ambiguity, the greater the perceived appropriateness of accounting as a measure of performance. Marginson (2006) finds that increasing reliance on financial information may reduce role ambiguity. Marginson and Ogden (2005a, p.437) show that managers may commit to achieving pre-set budgetary targets because “doing so offers a sense of clarity and security” within a role subject to ambiguity and uncertainty. Marginson and Ogden (2005b) propose that budgets may enable managers to feel psychologically empowered. The importance of these studies

arises from the improved organisational performance that follows on from positive psychological effects (Hall, 2008).

Marginson and Ogden (2005a,b) argue that positive psychological effects are due to the relatively clear, concise and unambiguous indicators of performance provided by financial measures. They provide empirical evidence to support their position. In contrast, Hall's (2008) study is consistent with the argument that a broad range of measures, incorporating non-financial measures, overcomes the inadequacies of traditional narrowly-based financial measures (see Ittner and Larcker, 1998; Ittner, Larcker and Meyer, 2003; Lau and Sholihin, 2005; Lau and Moser, 2008; Kaplan and Norton, 2001). Hall (2008) examined how 'comprehensive performance measurement systems (PMS)' are related to both psychological empowerment (PE) and role clarity, with consequences for managerial performance. Hypotheses are based upon the assumption that a comprehensive PMS "provides richer and more complete feedback about operations and results ... which is expected to have positive effects" (pg. 144). Defining comprehensive PMS in terms of information provision (to assist managers in managing firm operations) (Ittner, Larcker and Randall, 2003; Lillis, 2002), Hall (2008) reports support for his hypotheses.

Our contribution seeks to explore the differences between Marginson and Ogden (2005a,b) and Hall (2008) by providing theoretical and empirical evidence to clarify the psychological impact of comprehensive PMS vis-à-vis relatively narrow financial measures. We re-specify Hall's (2008) concept of comprehensive PMS to explicitly address financial and non-financial measures as separate constructs. Both are recognised as playing an increasingly important role in PMS (Bhimani and Langfield-

Smith, 2007; Kaplan and Norton, 2001; Otley, 1999). The assumption that non-financial performance measures are essential for overcoming the inadequacies of financial measures increases the importance of investigating the former alongside the latter (Lau and Sholihin, 2005), and leads us to hypothesise different psychological effects for financial vis-à-vis non-financial measures.

We also extend the existing literature on the positive psychological effects of PMS by investigating the possibility that it may not be the mere existence of performance measures, but how such measures are *used* in a management control context, that explains impact. That is, we argue that different types of utilisation generate different effects (see Veen-Dirks, 2009; Marginson et al., 2010). We define use of PMS in terms of diagnostic control (to monitor performance against pre-set standards) vis-à-vis interactive control (to encourage dialogue about strategic uncertainties) (Simons, 1995; 2005). The focus on diagnostic vis-à-vis interactive utilisation extends research which shows these are two key organizational roles for performance measures (Henri, 2006; Widener, 2007).

Our final contribution complements prior research that suggests an intervening role for psychological variables: management control systems affect a person's psychological state, which, in turn, affects performance (Collins, 1982; Luckett and Eggleton, 1991). Shields, Deng and Kato (2000) find an intervening psychological role that is more significant than a direct relationship between management control systems and performance, whilst Hall (2008) finds a full intervening role; PMS are observed to affect managerial performance, but only through psychological impacts. Hence, role ambiguity and psychological empowerment are affected by PMS

(Hopwood, 1972; Hall, 2008), and affect managerial performance (e.g. Dunk, 1993; Hall, 2008). We therefore hypothesise an intervening role for role ambiguity and psychological empowerment and examine managerial performance as the outcome variable. We define managers' psychological state in terms of both role ambiguity and psychological empowerment, given (1) the implications of both for organizational performance (Spreitzer, 1996; Menon, 2001), and (2) research which demonstrates their interconnectedness (Spreitzer, 1996; Hall, 2008).

We tested our hypotheses using data collected from a questionnaire survey involving 284 middle-level managers and yielding 98 usable responses, a response rate of 34.5%. We find the following. Financial measures affect role ambiguity, but no effect is observed for psychological empowerment. Increasing use of *non*-financial measures is associated with both decreased role ambiguity and increased psychological empowerment. In contrast to diagnostic utilisation (which is seen to affect only role ambiguity), increasing *interactive* utilisation of performance measures is associated with both reduced role ambiguity and higher levels of psychological empowerment. Both lower levels of role ambiguity and higher levels of psychological empowerment are associated with higher levels of managerial performance. Finally, our results show that PMS affects managerial performance indirectly through effects on role ambiguity and psychological empowerment. Overall, we contribute evidence to suggest that the nature and extent of any positive psychological effects generated by performance measures may depend on *both* the type of measure involved *and* the style of utilisation. Positive psychological effects may arise in particular from the *interactive* utilisation of *non*-financial measures.

The next section develops the study's hypotheses. In subsequent sections, we describe the research methodology, present the empirical results, and discuss the implications and limitations of our study.

2.Hypothesis development

We first introduce goal theory as a means to develop hypotheses, and we subsequently use goal theory to explain our findings in the discussion and conclusions section.

Following the introduction to goal theory, we hypothesise the psychological effects that might be expected to arise from the utilisation of financial vis-à-vis non-financial performance measures (model 1) before hypothesising psychological effects associated with diagnostic vis-à-vis interactive utilisation of financial and non-financial measures (model 2). For both models, we hypothesise relationships between psychological empowerment, role ambiguity, and managerial performance.

2.1. Goal theory

Hartmann (2000, pg. 474) argues that accounting performance measures, "should be approached as a combination of functional and dysfunctional consequences"; and that goal theory may provide a basis for explaining the positive effects that can result from using accounting measures as a response to uncertainty. Goal theory is "based upon action caused by a purpose" (Locke, 1996: 118). Locke (1996) defines goals as objects, such as performance levels, that are intentionally sought by individuals. Goal theory is premised on the assumption that individuals calculate outcomes relative to effort, and choose to expend effort commensurate with the attainment of attractive (or avoidance of unattractive) outcomes (House, 1996; Locke and Latham, 1990). The effective pursuit of goals requires feedback as a means to monitor progress towards

goal attainment (Locke and Latham, 1990). Feedback on past performance leads to further goal setting which is influenced by self-efficacy, or personal belief in the ability to attain particular goals (Bandura, 1986; Locke and Latham, 1990). Improved performance has been shown by several studies to be the consequence of appropriate goal setting and self efficacy (Locke, 1996). Self efficacy is necessary to empowerment (Bandura, 1986; Ozer and Bandura, 1990), and goal theory views role ambiguity as a stressful and unpleasant experience (House, 1996).

2.2.Role ambiguity and financial measures

Role ambiguity (RA) refers to a lack of clarity and structure in a role (Kahn, Wolfe, Quinn, Snoek and Rosenthal, 1964; House and Rizzo, 1970). Individuals may experience RA because of a lack of clarity about what is expected in a role, the criteria of evaluation and how evaluation is to be conducted (House, 1996). Sources of RA include: environmental turbulence, cross boundary activities, innovative processes, and poor communications between superior and subordinate (King and King, 1990). RA may manifest in the form of increased physiological stress (Siegall, 2000) and, in the limit, RA is injurious to health (Kahn, 1974).

Individuals respond to RA by invoking coping strategies (Kahn et al., 1964). These are actions undertaken in an attempt to (re)gain clear, orderly, structured, and meaningful cognitive experiences (Kahn et al., 1964; King and King, 1990). Such actions are explained by goal theory and the need for the clarification that provides psychological structure through clear statements of expectations (House, 1996). Marginson and Ogden (2005a) provide evidence consistent with goal theory by showing that managers commit to meeting budgetary targets because budgeting can

provide structure and clarity to the role to counter RA. In theory, RA is implicated in responsibility centres, which help to establish ‘who is responsible for what’ (McNally, 1980). Achieving pre-set budgetary and other financial targets through responsibility accounting is normally perceived to contribute to organizational objectives (Merchant and Van der Stede, 2007), and, as such, the manager is able to identify the path to a positive evaluation. The apparent certainty of accounting numbers (Barratt, Cooper, and Jamal, 2005) and the act of setting budgetary targets helps to reinforce clear goals. In short, by utilising financial measures, managers may derive structure, certainty and clarity to counter the experience of RA (Marginson and Ogden, 2005a). We therefore hypothesise that:

H1: Utilisation of financial measures is negatively related to role ambiguity

2.3. Psychological empowerment and financial measures

Psychological empowerment (PE) is defined in terms of four factors or dimensions: ‘impact’, ‘competence’, ‘meaning’ and ‘self-determination’ (Conger and Kanungo, 1988; Thomas and Velthouse, 1990; Spreitzer 1995). ‘Impact’ is the extent to which persons perceive they can ‘make a difference’ by influencing what happens within the particular work environment (e.g. department, business unit). Being able to ‘make a difference’ may relate to influencing strategic, administrative, and/or operating outcomes at work (Ashforth, 1989; Spreitzer, 1995). Competence refers to self-efficacy and to belief in the ability to ‘do the job’ by performing work activities with skill (Gist, 1987). Competence is analogous to mastery of behaviour (Spreitzer, 1995). Meaning or meaningfulness represents the value of a work goal or purpose, as adjudged by the individual in relation to personal ideals and standards (Thomas and Velthouse, 1990). Meaning reflects the extent to which a person cares about a given

task for intrinsic reasons and involves a fit between the requirements of a work role and an individual's beliefs and values (Brief and Nord, 1990; Hackman and Oldham, 1980). Self-determination refers to an individual's sense of having choice in initiating and regulating actions, such as making decisions about work methods, pace, and effort (Deci, Connell and Ryan, 1989). Self-determination derives from having a sense of autonomy in deciding how the job is done (Spreitzer, 1995).

PE is influenced by organizational environment (Siegall and Gardner, 2000), and providing managers with relevant performance information will increase feelings of PE (Drake, Wong and Salter, 2007; Spreitzer, 1995). Relevant performance information is defined as that relating both to an organization's mission and to information related to individual performance (Thomas and Velthouse, 1990). Both types are viewed as critical antecedents to empowerment (Spreitzer, 1995). Both may be derived from the utilisation of financial performance measures.

Managers gain a sense of impact because achieving financial targets enables them to feel that they make a difference to the achievement of organizational objectives (Merchant, 1998). The visibility of accounting information makes managers' efforts evident to superiors and colleagues (Roberts, 1991), and thus the manager can be *seen* to be contributing to organizational goals. Equally, achieving financial measures signals 'mastery of behaviour' and competence (Marginson and Ogden, 2005b). Meaning may be experienced as utilisation of financial measures can suggest an individual's commitment towards, and intrinsic concern for, organizational aims and objectives (Marginson and Ogden, 2005b). Self-determination may be enhanced by the choices the manager may make in seeking to ensure the achievement of financial

measures. Responsibility accounting systems normally provide managers with a degree of independent responsibility and autonomy within their designated area of authority (Ezzamel and Hart, 1987). We therefore hypothesise the following:

H2: Utilisation of financial measures is positively related to the four dimensions of psychological empowerment

2.4. Non-financial measures, role ambiguity and psychological empowerment

A positive impact of non-financial measures is consistent with Hall's (2008) analysis of the impact of comprehensive PMS on role clarity and PE. We do not rehearse those arguments here but develop hypotheses that are both consistent with goal theory and the possibility that financial and non-financial measures achieve contradictory effects. This leads us to elaborate the possible negative implications of non-financial measures. We develop hypotheses that are supported by the management accounting literature, and that are consistent with our previous arguments based upon goal theory. We present the view that parsimonious measures hold the potential to provide positive outcomes, whilst extensive measures may overwhelm users of PMS. Our framing is consistent with theory that addresses the consequences of information overload (Kahn et al., 1964). We do not presume to ignore the literature that emphasizes positive impacts, but we recognise that empirical evidence for both positive and negative outcomes is needed to inform existing and future debates on the value of non-financial measures (see Nørreklit, 2000). We return to this argument in the discussion and conclusions section.

Greater ambiguity indicates greater RA by definition, and managers may view non-financial measures as being more ambiguous than financial measures (Chow and Van der Stede, 2006; Ittner, Larcker and Meyer, 2003). Non-financial measures have been

characterised as more subjective and less ‘factual’ than financial measures (Lau and Buckland, 2001; Ross, 1994). These characteristics suggest greater ambiguity, and thereby increased RA. In contrast to the short-term orientation of financial measures (Merchant and Van der Stede, 2007), non-financial measures are viewed as future orientated (e.g. Ittner, Larcker and Meyer, 2003; Lau and Moser, 2008). A focus on the longer-term implies increased uncertainty (Prelec and Loewenstein, 1991: 784). In turn, increased uncertainty suggests increasing RA (Marginson and McAulay, 2008). Finally, responsibility for non-financial measures may be shared (Meyer, 1994), thereby promoting jurisdictional and decisional ambiguity, with concomitant consequences for RA and the individual’s ability to identify appropriate goal clarifying behaviour (House, 1996). We therefore hypothesise the following:

H3: Utilisation of non-financial measures is positively related to role ambiguity

Non-financial measures do not necessarily provide a common yardstick for benchmarking and comparison on a wider organizational scale (Meyer, 1996). Rather, they tend to relate to specific parts of the organization; and this has been claimed as a strength (Kaplan and Norton, 1993; Lipe and Salterio, 2000). Nevertheless, Lipe and Salterio (2000) show that managers may be evaluated solely on the basis of common, as opposed to specific measures. Unresolved contradictions may therefore arise between local divisional PMS, which should be salient but which might lack salience in practice, and organisation-wide, or common, PMS. Related to this finding, and despite their role as ‘leading indicators’ of performance (Kaplan and Norton, 1992; 2001), improvements due to non-financial measures may be difficult to link to organizational goals of profitability (Fisher, 1992; Nørriklit, 2000). Both these features may limit the potential for managers to secure and demonstrate a sense of

overall organizational impact and competence through the use of non-financial measures. Additionally, meaning may be compromised by the multiplicity of non-financial measures, which may create difficulties in assigning objective value to any particular measure(s), because empirical evidence suggests that diversity of performance measurement leads to lenient ratings by evaluators and less differentiation of managers who are evaluated (Moers, 2005). Non-financial measures lose capacity to differentiate between ‘good’ and ‘bad’ performance over time (Meyer, 1996), further undermining the potential for managers to gain a sense of meaning via utilisation of such measures. The following hypothesis summarises these arguments:

H4: Utilisation of non-financial measures is negatively related to the four dimensions of psychological empowerment

2.5. Diagnostic and interactive utilisation of performance measures, role ambiguity and psychological empowerment

Following Hopwood’s (1972; 1974) earlier contribution, recent research has recognised the importance of examining how performance measures are *used* (Henri, 2006; Mundy, 2010; Van Deeks, 2010; Widener, 2007). We next consider how diagnostic vis-à-vis interactive utilisation of financial and non-financial performance measures may affect RA and PE. As in the case of our hypothesis development for non-financial measures, we recognise that we reverse familiar arguments, in this case the framing that aligns diagnostic control with dysfunctional consequences and interactive control with positive outcomes (Simons, 1995), and we return to the arguments in the discussion and conclusion section.

Diagnostic control involves monitoring progress against key performance indicators or ‘critical performance variables’ (Henri, 2006, p.534; Simons, 2005). It is therefore

consistent with feedback and is centrally important to goal theory. Feedback is necessary “so that people can get a clear indication if they are moving fast enough and in the right direction” (Locke, 1996, pg. 120). Diagnostic control is a form of learning entailing single loop feedback through which deviations from pre-set standards of performance are corrected (Argyris, 1999; Vandebosch, 1999; Henri, 2006). Thus, diagnostic utilisation (of both financial and non-financial) performance measures can provide clear goals, clarity and direction. Direction is achieved because diagnostic utilisation is about tracking progress towards goals, monitoring results, reviewing key measures, and meeting clearly defined targets (Henri, 2006). Role clarity in particular is enhanced because the manager can confidently anticipate a positive evaluation from meeting organizationally significant targets or key performance indicators (Marginson and Ogden, 2005a).

An observed inverse relationship between RA and PE (Hall, 2008; Spretizer, 1996) suggests that, if diagnostic utilisation of performance measures reduces RA, the same diagnostic utilisation should increase PE. Although we do not hypothesise the relationship between RA and PE, because it is not directly relevant to our research question, the following arguments ensue.

Diagnostic utilisation has the potential to provide managers with the type of performance information which is predicted to increase feelings of PE. As achieving organizationally significant key performance indicators (KPIs) demonstrates ‘making a difference’, single-loop feedback about target achievement may help the manager secure a sense of impact. Diagnostic utilisation of performance measures enables the manager to achieve a sense of competence where success in meeting targets signals

mastery of behaviour and an 'ability to achieve' (Marginson and Ogden, 2005a). Meaning may be experienced as increasing diagnostic utilisation of organizationally significant KPIs suggests self-evaluation by reference to the apparent objectivity of financial and similar numeric targets (Roberts, 1991). Self-determination may be enhanced by the choices the manager may make through the discretion which accompanies the operation of responsibility accounting (Ezzamel and Hart, 1987). Finally, Ogden et al. (2006) show that managers value increased accountability, based on target achievement, that tends to accompany empowerment initiatives.

Performance measures may also be utilised interactively (Simons, 1995; 2000). Compared to diagnostic control which emphasises predictable goal achievement (Johnson and Gill, 1993), interactive control is designed to encourage creativity and innovation (Simons, 1995), alongside discussions about strategic uncertainties (Bisbe and Otley, 2004; Simons, 1995). Interactive control expands opportunity-seeking and learning throughout the organization, and allows subordinates to challenge assumptions about action plans (Simons, 2000; Widener, 2007).

We suggest that utilising performance measures interactively will be associated with increasing RA. As interactive control allows for the revision of objectives and assumptions (Simons, 2000), questions arise about role goals, objectives and assumptions, by how much any should be revised, and, consequently, which actions may lead to a favourable evaluation. Such uncertainties contribute to RA (Kahn et al., 1964). In addition, Simons (2005) acknowledges the problems that can be associated with selecting an inappropriate strategic uncertainty as the focus of management attention (Simons, 2005). Interactive control is therefore more ambiguous than

diagnostic control. The learning and adaptation enabled by interactive control (Abernethy and Brownell, 1999; Simons, 2005) may further increase subjectivity and undermine role clarity. This point is reinforced if we consider the preferences expressed by managers for precise performance metrics and instructions on what is necessary to achieve success (Covaleski, Dirsmith, Heian and Samuel, 1998: 317). Interactive networks imply the use of cross boundary teams (e.g. multifunctional project teams), and a focus on innovative processes (Simons, 2005). These are sources of RA (King and King, 1990). Interactive control demands subjective performance evaluation (Simons, 2000), further increasing RA.

There is no basis supported by the available management accounting literature for predicting a clear, unidirectional effect of interactive control on PE. We maintain consistency by hypothesising a negative impact but return to the arguments in the discussion and conclusion section. The arguments presented so far in this section can be summarised as follows:

H5: Diagnostic utilisation of performance measures is negatively related to role ambiguity

H6: Diagnostic utilisation of performance measures is positively related to the four dimensions of psychological empowerment

H7: Interactive utilisation of performance measures is positively related to role ambiguity

H8: Interactive utilisation of performance measures is negatively related to the four dimensions of psychological empowerment

2.6. Role ambiguity, psychological empowerment and performance

Prior research is consistent in showing an inverse relationship between RA and managerial performance (see e.g. Dunk, 1993; Hall, 2008; Jackson and Schuler, 1985; Marginson and Ogden, 2005a; Tubre and Collins, 2000). The key theoretical

argument is that a lack of information regarding goals can result in effort which is inefficient, misdirected and/or insufficient for the role, thus reducing performance (Hall, 2008: 5; Tubre and Collins, 2000). In line with this analysis, we hypothesise:

H9: Role ambiguity is negatively related to managerial performance

The following summarises Hall's (2008: 147-8) comprehensive review that supports a positive relationship between PE and performance: (1) individuals who perceive that they can 'make a difference' are more likely to have an impact, and thus be more effective; (2) people who feel competent tend to be more likely to act competently; (3) both impact and competence result in more effort and persistence in the face of difficulties; (4) individuals who attach more meaning to their work, exert more effort, are more committed to their tasks, and are thus more likely to persist in the face of difficulties and setbacks than individuals who attach less meaning to their work; and (5) work performance is enhanced if managers believe they have autonomy over how their work is to be accomplished. In summary, higher levels of PE are associated with effort intensity, effort duration, and flexibility. These behaviours enhance performance and lead to the following hypothesis.

H10: The four dimensions of psychological empowerment are positively related to managerial performance

Our hypotheses are summarised in figures 1 and 2. Figure 1 presents model 1 and shows the hypothesised relationships between financial and non-financial performance measures, role ambiguity, the dimensions of psychological empowerment, and managerial performance. Figure 2 presents model 2 and shows the hypothesised relationships for diagnostic vis-à-vis interactive utilisation of performance measures.

INSERT FIGURES 1 AND 2 ABOUT HERE

3.Method

3.1.Context and sample

We tested our hypotheses within the telecommunications industry, drawing respondents from Newcom¹, a major organization within this globalised industry. The study of Newcom is particularly apposite to developing our understanding of the potential psychologically functional role that performance measures may play in managers' work experiences. Exploratory interviews revealed an emphasis on empowerment and the use of non-financial performance measurement to help the company maintain a high rate of strategic adaptation and change in the context of intense competition which endangers firms' short-term survival (Dutton, Ashford, O'Neil, Hayes and Wierba, 1997).

The use of a single firm for the sample is both a strength and a weakness. While limiting our ability to make claims for generalizability, single site research enables us to assume consistency of factors which may independently affect the behaviour of respondents. The factors which remain consistent across the present analysis include: organizational size and competencies, design and operation of financial and non-financial performance measurement and reward systems, and organizational strategy. Drawing respondents from a single organization is not uncommon in the literature. For example, Brownell (1981), Hopwood (1972), Otley (1978), and Marginson and Ogden (2005a) have all drawn on single organization settings to examine the use of (financial) performance measures.

¹ A fictitious name is used to respect confidentiality.

Data were collected via a questionnaire survey distributed to middle and senior managers of Newcom. 284 questionnaires were distributed electronically and 98 usable responses were obtained. The response rate was 34.5%. We tested for non-response bias, drawing on the familiar assumption that non-respondents are more likely to be similar to late respondents than early respondents (Fowler, 1993). A two-sample t-test revealed significant differences in mean values for two variables: age ($p < 0.05$) and diagnostic use of non-financial measures ($p < 0.05$). Given the importance of the latter to the present study, the analysis to follow was also conducted using the separate groups of early versus late respondents. No significantly different results were found compared to the composite group of respondents.

Questionnaire instruments were pre-tested and piloted prior to the main study. Two of the research team who were not involved in developing the questionnaire were asked to assess the questionnaire instruments for ambiguity, style of question and length. The revised questionnaire was distributed to MBA students studying in the USA and in New Zealand. 45 completed questionnaires were returned in total from these two groups. Responses were analysed using confirmatory factor analysis, scaling, and correlation analysis. Comments made by respondents were also reviewed. These processes led to the research instruments being revised. The final versions of the instruments are described below.

3.2. Variable measurement

We used Henri's (2006) adapted version of Vandenbosch's (1999) instruments to measure respondents' utilisation of financial and non-financial measures both diagnostically and interactively (with minor changes to wording being introduced

after pilot testing). Separate instruments for financial and non-financial measures were developed. Each instrument comprises 11 items, with four items representing diagnostic use and seven items representing interactive use (items 1 – 11, Appendix).

We measured RA using House and Rizzo's (1970) multi-item role stressor instrument. This instrument has generally superseded the original 15-item Kahn et al. (1964) instrument (see Elovainio and Kivimäki, 2001: 86) which was developed to measure role stress along three dimensions: role ambiguity, role conflict, and role overload (Kahn et al., 1964). The House and Rizzo's instrument comprises six items representing RA, and eight items devised to measure role conflict. We omitted one of the items for role conflict from the questionnaire on the grounds of irrelevance to Newcom. To confirm RA as a distinct role stressor, we conducted principal component factor analysis with varimax rotation on our 13-item role stressor instrument. Results are presented in Table 1. They reveal a three factor solution. The six items for RA load onto a single factor (Factor 1). The RA items are shown in the Appendix (see items 12 – 17). Two items were eliminated, as only items loading above 0.50 were retained (all six role ambiguity items are presented in the Appendix).

INSERT TABLE 1 ABOUT HERE

PE is measured using Spreitzer's (1995) twelve-item scale, with three items for each empowerment dimension: impact, competence, meaning, and self determination (see items 18 – 29 in the Appendix). Respondents were asked to indicate on a 5-point scale the extent to which they agreed or disagreed with each item. Items 19, 26 and 29 were reverse-scored.

We measured managerial performance using a two-item instrument (items 30/31 in the Appendix)². One of these two items draws directly on the frequently used Mahoney, Jerdee and Carroll (1965) measure, and asked respondents to assess their recent performance (scale: 1 = performance is barely satisfactory, 7 = performance is very good). The other is a comparative measure based on Marginson and Ogden (2005a). We asked respondents to indicate the extent to which they regarded their performance as below average or above average (scale: 1 = well below average, 7 = well above average). The use of self-report measures of performance is consistent with prior research (Chalos and Poon, 2000; Chong and Chong, 2002; Hall, 2008; Marginson and Ogden, 2005; Otley and Pollanen, 2000). We added our two items together to form a composite measure of performance.

We included control variables in our two models to reduce the possibility that demographic characteristics might confound responses. Three demographic characteristics were measured and controlled for: age, gender, and level of education. These may influence managerial beliefs, values, opinions, and actions (e.g. Fulk, 1993; Tabachnick and Fidell, 1989), and may thus influence the responses obtained. We also controlled for hierarchical level, given the argument that authority increases with seniority, thereby potentially influencing feelings of empowerment.

Partial least squares regression

We test our hypotheses using partial least squares (PLS) regression (Barclay et al., 1995; Chin, 1998; Fornell and Larcker, 1981; Hartmann, 2005; Sholihin and Pike, 2009; Wold, 1985). PLS is a multivariate technique that can be used for examining

² Size of the performance measurement instrument was dictated, in part, by restrictions placed on overall questionnaire length by Newcom's senior managers.

complex problems (Hartmann, Naranjo-Gil and Perego, 2010). The technique comprises a measurement model and a structural model. The former is akin to principle component factor analysis, and specifies relations between manifest items and latent constructs. The latter is similar to ordinary least squares regression, and specifies relations between latent constructs (Hartmann, 2005). PLS is particularly useful for this study, as the technique makes minimal data assumptions and is robust for small sample sizes (Hall, 2008)³.

4. Analysis and results

Measurement model

We first assessed the reliability and validity of the PLS measurement model for the full dataset relevant to our analysis (i.e. the full dataset that incorporates model 1, relationships based upon financial and non-financial measures, and model 2, relationships based upon diagnostic and interactive controls). We examine: (1) individual item reliabilities, (2) convergent reliability of the measures associated with individual constructs, and (3) discriminant validity.

Item reliability is considered adequate where factor loadings exceed 0.50 (Hulland, 1999). One item for Impact loaded below 0.50 and was deleted following an item trimming process (Hartmann et al., 2010). Table 2 presents the factor loadings for the final measurement model. The table shows that, except for financial performance measures (where diagnostic and interactive load as a single construct), all items load higher on the construct they intend to measure than on any other construct.

INSERT TABLE 2 ABOUT HERE

³ PLS analysis has become an accepted statistical tool in management accounting research. Given the now many explanations of PLS in the literature, we refer the reader to notable examples, rather than repeat the explanations here (see Haenlein and Kaplan, 2004, and Hall, 2008).

We assess convergent reliability using Cronbach's alphas (Hulland, 1999). These are reported in Table 3. In all cases (except for performance), alpha scores exceed 0.80, which demonstrates acceptable reliability (Nunally, 1978). At 0.622, reliability for the performance measure is relatively low, but still acceptable. Further evidence of reliability of the performance measure is provided by the findings. As will be shown, these are consistent with Hall (2008), in revealing that psychological variables (in our case RA and PE) moderate the relationship between performance measures and performance.

Discriminant validity is considered to be satisfactory where the average variance extracted (AVE) by the latent constructs from their manifest variables exceeds 0.50 (Fornell and Larcker 1981 – ex Hartmann et al. 2010). AVE should also exceed the squared correlation between the construct and other constructs in the model for discriminant validity to be sufficient (Barclay et al. 1995 – ex Hartmann et al. 2010). Table 3 shows that AVE values are adequate except for RA, for which AVE is marginal at 0.48. Table 3 also shows that the square roots of the AVEs (diagonal) all exceed the respective correlations between constructs.

INSERT TABLE 3 ABOUT HERE

Test of hypotheses

The results for the measurement model shown in Table 2 confirm a distinction between diagnostic and interactive control for non-financial performance measures,

but not for financial performance measures. Table 2 also shows a marginal AVE value for RA. Given this, we proceeded to test our hypotheses in the following two ways⁴.

First, we re-ran our PLS analysis after removing items relating to both financial interactive and non-financial interactive. Doing so enabled us to directly compare financial versus non-financial measures, with diagnostic control as the focus⁵. We focus on diagnostic control for comparing financial and non-financial measures, given it has been suggested that “virtually all writing on management control refers to diagnostic control systems” (Simons, 1995: 60). This analysis provides a direct test of hypotheses 1 – 4 (model 1).

Results for the revised measurement model show adequacy in terms of item reliability, convergent validity and discriminant validity⁶. Results for our structural model are reported in Table 4. Structural models in PLS regression are evaluated by examining the proportion of explained variance of the endogenous variables (i.e. R^2 values), together with the size of the structural path coefficients (Hartmann et al., 2010).

Regarding these, Table 4 suggests the following: that both financial and non-financial measures are significantly related to RA (H1 is supported; results are contrary to H3); partial support for the idea that performance measures affect levels of PE (non-financial measures are shown to be significantly related to self-determination, and, at

⁴ The results for a structural model consistent with the reported measurement model (i.e. containing financial PMS, diagnostic use of non-financial PMS and interactive use of non-financial PMS) support the findings presented in the paper. We proceed in the way reported to ensure that the requirements for PLS are fully met in our reported results.

⁵ We also repeated the testing of hypotheses 1 – 4 by removing items relating to both financial diagnostic and non-financial diagnostic and conducting the analysis based on the items for *interactive* utilisation. In this instance, results show a significant relationship between non-financial measures and, except for impact, all dimensions of PE. All other results are similar to those shown in Table 4.

⁶ For reasons of brevity, results for the revised measurement model are omitted from the paper, but are available on request.

$p < 0.1$, impact and competence); and that both RA and PE are significantly related to performance (H9 and H10 are supported).

INSERT TABLE 4 ABOUT HERE

Second, given the lack of differentiation for financial measures as shown in Table 2, we removed all items relating to financial measures and used diagnostic versus interactive utilisation of *non*-financial measures as the basis for testing hypotheses 5 – 8 for model 2. Again, the revised measurement model reveals adequacy in terms of item reliability, convergent validity and discriminant validity. Results for the structural model are shown in Table 5. Table 5 shows that interactive utilisation of non-financial performance measures decreases RA and increases PE. This is contrary to our hypotheses (H7 and H8). Diagnostic utilisation of non-financial measures affects only RA (supporting H5, but not H6). Results confirm the reported associations between RA, PE and performance, as per model 1 and hypotheses 9 and 10. Across both the structural models, results suggest that performance measure utilisation is indirectly related to managerial performance through the effects on RA and PE. No direct effect is observed (although Table 3 reports significant zero-order correlations).

INSERT TABLE 5 ABOUT HERE

5. Discussion and conclusions

In contrast to the longstanding tradition, an emerging literature suggests that financial measures may play a positive psychological role in managers' work experiences (Hartmann, 2005; 2007; Marginson and Ogden, 2005a,b; Marginson, 2006). Defining a positive psychological effect in terms of reduced role ambiguity (RA) and increased

psychological empowerment (PE), we have drawn upon goal theory and the existing management accounting literature to explore this possibility and to hypothesise that: (1) financial (rather than non-financial) measures generate a positive psychological experience, and (2) diagnostic utilisation (rather than interactive utilisation) of performance measures generates a positive psychological experience. These hypotheses provide theoretical grounding for Marginson and Ogden's (2005a, b) suggestion that positive psychological effects follow from the clear, concise and unambiguous indicators of performance provided by financial measures. They contradict Hall's (2008) argument that positive effects are due to the more complete and richer information about operations and results that is associated with comprehensive PMS that incorporates non-financial measures. We followed the established orthodoxy and hypothesised that a positive psychological experience will increase managerial performance.

Our results support the emerging literature that argues in favour of a positive effect of the use of financial measures. More broadly, we find a positive impact of *both* financial *and* non-financial PMS; and, therefore, we do not find that non-financial measures overcome deficiencies that are inherent in financial measures. Nor do we find that diagnostic utilisation of PMS creates effects that are opposite to interactive utilisation, although we do find differences. Our findings support a subtle interpretation of Simon's (1995, pp 7-8) contention that positive impacts arise from the dynamic tension between the "yin" and "yang" of PMS (see Mundy, 2010); and point away from the dynamic interaction of opposing forces of diagnostic and

interactive control that provides the basis for our hypothesis formation⁷. In reinforcing the possibility that PMS creates positive effects, results for the relationship between RA, PE and performance are clear and consistent. For the two models of (1) financial versus non-financial measures and (2) diagnostic versus interactive utilisation of PMS, we find an increasing positive psychological experience to be associated with higher levels of managerial performance. Our analysis suggests that managers' psychological experience plays an important intervening role in determining how performance measurement might (indirectly) affect performance.

RA is defined as “uncertainty about what an occupant of a particular office is supposed to do” (Katz and Kahn, 1978, p. 206), where uncertainty creates the need for increased information (Galbraith, 1974). Our findings suggest that RA is reduced by *both* financial *and* non-financial measures and *both* diagnostic *and* interactive utilisation. Our findings therefore support the intuition that financial measures and non-financial measures, used diagnostically and interactively, are efficacious sources of information to counteract RA (and therefore increase role clarity).

Our findings are consistent with the argument that information is a source of PE (Conger and Kanungo, 1988). We clarify the existing literature by showing that non-financial measures in particular support PE and that the interactive use of non-financial measures is crucial to their effect. In this respect our findings are consistent with the literature that argues that it is the way in which measures are used, rather than

⁷ Simons (1995; 2000) argues that combining diagnostic and interactive controls creates positive ‘fruitful dynamic tensions’ (Lillis, 2002). Henri (2006) examines this through the use of interaction terms. To explore the psychological effects of combining diagnostic and interactive utilisation, we introduced interaction terms into model 2 and repeated the PLS analysis. All relevant correlation coefficients are non-significant. This suggests that combining diagnostic and interactive utilisation does not generate psychological effects, positive or otherwise.

the measures themselves, which create impact (Hopwood, 1972; Veen-Dirks, 2009; Marginson et al., 2010). Our findings therefore extend the contributions of Marginson and Ogden (2005 a,b) and Hall (2008) because neither of these studies considered the ways in which PMS are used.

We offer two explanations for our findings based upon aspects of goal theory that transcend the arguments presented in our hypothesis section. First, we can explain differences in our results for financial and non-financial measures through the goal theory argument that commitment to goals is critical, particularly when goals are difficult, and that high commitment depends upon individuals being convinced that a goal is important (Locke and Latham 1990). Conviction about the importance of a goal can be increased where senior managers provide reasons that support the goal (Latham, Erez and Locke, 1988). For Newcom, discussions with senior managers suggested that (1) financial measures were accorded low priority following experiences consistent with the dysfunctional consequences extensively outlined within the literature (see the opening paragraph of this paper); and (2) the senior management team was stressing the use of non-financial measures over financial measures in its pursuit of a policy based upon the principles of beyond budgeting (Hope and Fraser, 2003). Given these observations, the salience of goals represented by non-financial measures was amplified and therefore might have been expected to give rise to a significant effect because of their organisational legitimacy relative to financial measures.

Our second explanation for our results draws upon House's (1996) description of the alternative ways in which goals might be clarified to address the question of why our

results differed from our hypotheses with regard to interactive controls. House's analysis includes the encouragement of subordinate involvement and the interpersonal interactions that are associated with interactive controls (Simons, 1995; 2005). By encouraging discussion and debate, interactive utilisation may help to reduce RA and to promote PE. The face-to-face interactions that are central to interactive control (Simons, 1995) are appropriate for ambiguous situations (Daft and Lengel, 1986; 1990). RA is reduced through the process of face-to-face dialogue that may lead to agreement about how to cope with uncertainties (Daft and Lengel, 1990). In terms of PE, the benefit to be derived from the use of performance measures may apply only or primarily to interactive utilisation. Results shown in Table 5 suggest that diagnostic utilisation has little if any effect on PE. Our findings suggest that encouraging face to face discussions, and encouraging continual challenge and debate of underlying assumptions and data, interactive utilisation can promote a greater sense of, for instance, competence and meaning. Based on the findings, it appears that examining the potential *functional* role that performance measurement may play in managers' work experiences may offer a potentially fruitful and important line of future enquiry where research further clarifies the roles of interactive and diagnostic control.

The exploratory nature of our study implies that there are limitations which future research can address. First, the generalizability of the study is limited by the use of respondents from a single organization. There is a research opportunity to be gained from examining the hypotheses across a range of organizations. Second is the limitation that both reverse causality and endogeneity may apply; unobserved variables may affect both RA and PE, which in turn may cause managers to utilise financial and non-financial measures both diagnostically and interactively. In

particular, we did not address the question of supervisory style, for which existing instruments are available (Hartmann, 2010). Third, the dynamic and potentially subtle nature of the association between PMS, RA and PE suggests a need to differentiate between the consequences/manifestation of ‘attitude’ and the effects of ‘action’. For instance, increasing RA may give rise to a more positive attitude towards PMS, as demonstrated through increased budgetary commitment (Marginson and Ogden, 2005a). At the same time, utilisation of performance information and performance measures may serve to reduce RA (Marginson, 2006). Subtleties such as this suggest a need for a longitudinal analysis of the interplay between RA, PE and PMS over time, so that we may better understand the dynamics of this relationship. Fourth, our two-item measure of performance yields a low Cronbach alpha, although results are consistent with prior research (Hall, 2008), and alternative measures, including measures based upon superior’s evaluations of subordinate’s performance, may improve the rigour of future studies. Finally, we did not consider other ways in which performance measures may be utilised, and how this may affect the psychological impact that financial and non-financial measures may have at the individual level. Our results suggest that manner of utilisation may be key to understanding how management control systems may fulfil a positive psychological role. Nevertheless, we cannot disregard the possibility that other forms of use may have psychological consequences. Our theoretical framing centred on the feedback function of PMS as a means to track progress towards goals, which focuses upon scorekeeping (Locke, 1996), but scorekeeping must be seen alongside attention directing and problem solving (Simon, Guetzkow, Kozmetsky and Tyndall, 1954; Vandenbosch, 1999).

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Appendix

Financial targets and non-financial measures

The following wording was used as a framework from which to establish separate instruments for financial and non-financial measures:

Rubric on the questionnaire

The statements below relate to financial (*non*-financial) targets. Using the scale shown below, please rate the extent to which you currently use financial (*non*-financial) targets to:

Scale: 1 (Not at all) – 5 (To a great extent)

Diagnostic use (this wording was not shown on the questionnaire and diagnostic and interactive items were listed randomly)

1. Track progress towards goals
2. Monitor results
3. Compare outcomes to expectations
4. Review key measures

Interactive use (this wording was not shown on the questionnaire and diagnostic and interactive items were listed randomly)

5. Encourage discussions in meetings*
6. Encourage continual challenge and debate of underlying data, assumptions and action plans
7. Provide a common view of the organization
8. Tie the organization together
9. Enable your area to focus on common issues*
10. Develop a common vocabulary in your area*
11. Enable your area to focus on critical success factors*

*The wording of these statements was adapted to fit the circumstances

Role ambiguity

Rubric on the questionnaire

The following statements describe how people may feel about their work situation. Please indicate the extent to which you agree or disagree with each item using the following scale:

Scale: 1 (Strongly agree) – 5 (Strongly disagree)

- 12. I know that I have divided my time properly
- 13. I have clear, planned goals and objectives for my job
- 14. I know what my responsibilities are
- 15. I feel certain about how much authority I have
- 16. I know exactly what is expected of me
- 17. Explanation is clear what has to be done

Psychological empowerment

Rubric on the questionnaire

The following statements describe how people may feel about their work. Please indicate the extent to which you agree or disagree with each using the following scale:

Scale: 1 (Strongly agree) – 5 (Strongly disagree); items 19, 26 and 29 reverse scored

Impact

- 18. My impact on what happens in my department/unit is large*
- 19. I have little control over what happens in my department/unit*
- 20. I have significant influence over what happens in my department/unit*

Competence

- 21. I am confident about my ability to do my job
- 22. I am self-assured about my capabilities to perform my work activities
- 23. I have mastered the skills necessary for my job

Meaning

- 24. The work I do is meaningful to me
- 25. My job activities are personally meaningful to me
- 26. The work I do is unimportant to me*

Self determination

- 27. I have significant autonomy in determining how I do my job
- 28. I can decide on my own how to go about doing my work
- 29. I have little opportunity for independence and freedom in how I do my job*

*The wording of these statements was adjusted to fit the circumstances. The changes included adding 'unit' to the sentence and changing the polarity of items 19, 26 and 29.

Managerial performance

Rubric on the questionnaire

30. Please indicate using the following seven-point scale your rating of your own recent performance:

Performance is barely satisfactory			Performance is adequate			Performance is extremely good
1	2	3	4	5	6	7

31. How do you think you compare as a manager with other managers at the same level as you? Taking everything into consideration, would you consider yourself:

Well below Average			Average			Well above average
1	2	3	4	5	6	7

Figure 1: Hypothesised relations involving financial versus non-financial performance measures

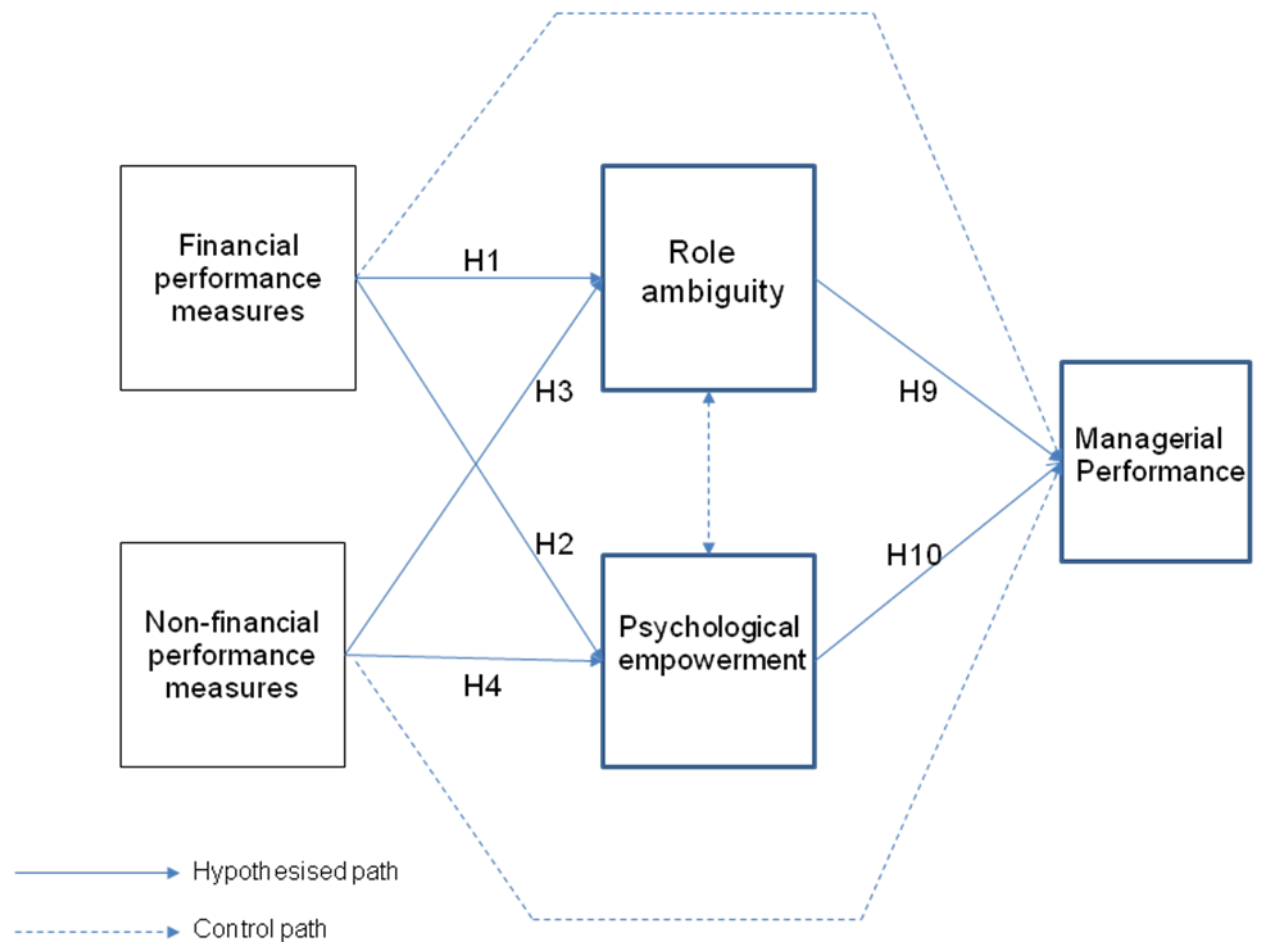


Figure 2: Hypothesized relations involving diagnostic versus interactive utilisation of performance measures

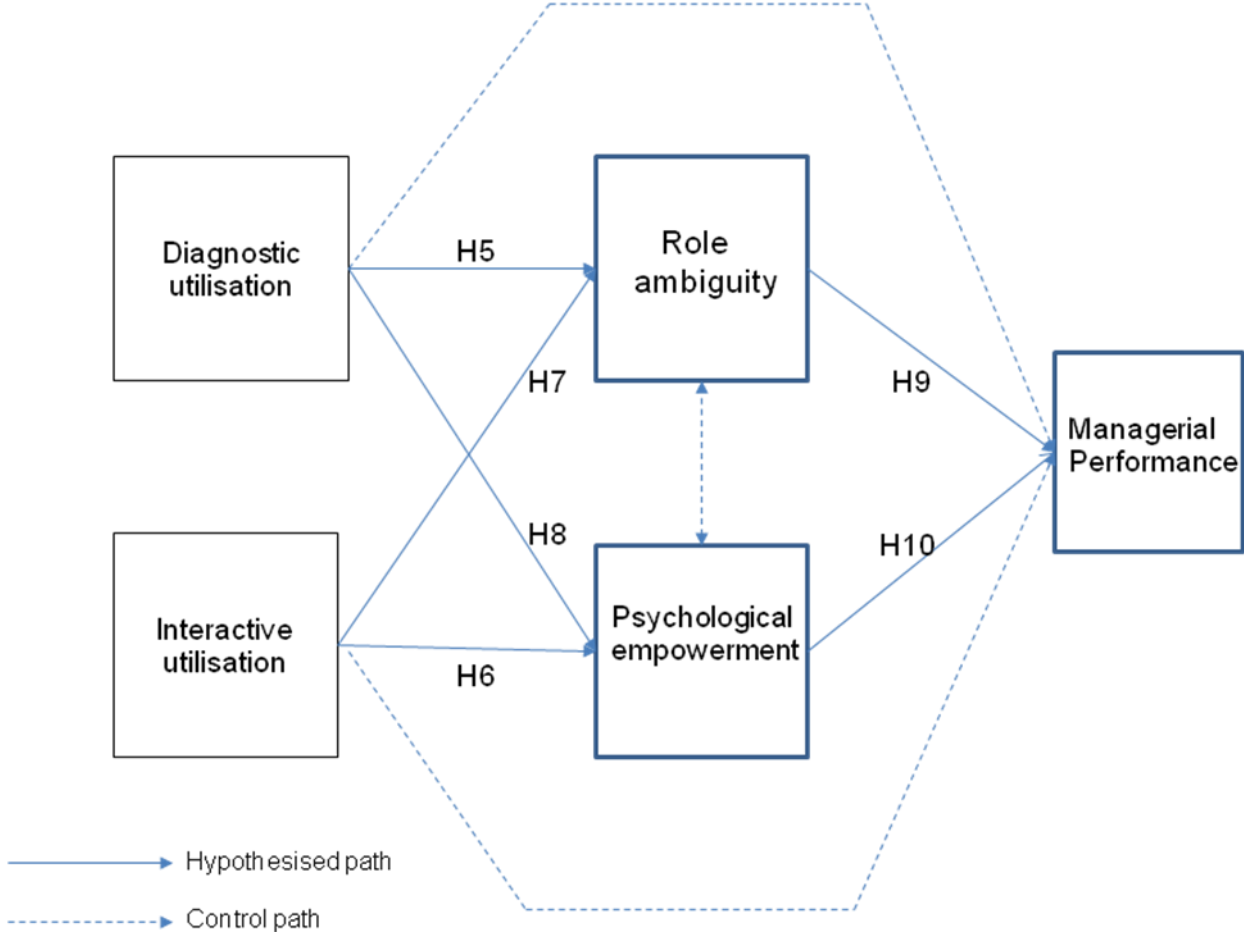


Table 1: Factor analysis results for role ambiguity

	Factor 1	Factor 2	Factor 3	Communalities
C. Do things differently	0.069	0.740	0.177	0.584
C. Work on unnecessary things	-0.327	0.627	0.361	0.630
C. Assignment without resources	-0.049	0.764	0.287	0.668
C. Incompatible requests	0.053	0.595	0.460	0.569
C. Groups operating differently	0.111	0.141	0.751	0.597
C. Break rules to carry out assignment	-0.412	0.334	0.507	0.538
C. Do things differentially accepted	-0.342	0.168	0.594	0.498
A. Certain about amount of authority*	0.390	-0.640	0.329	0.671
A. Clear, planned goals and objectives	0.768	0.055	-0.125	0.608
A. Know divided time properly	0.726	-0.022	-0.150	0.551
A. Know responsibilities	0.769	-0.215	0.038	0.638
A. Know exactly what is expected	0.700	-0.433	0.086	0.685
A. Explanation clear of what to do*	0.414	-0.411	-0.089	0.348
Eigen values	4.59	1.87	1.12	
Explained variance	35.33%	14.40%	8.61%	

Kaiser-Meyer-Olkin Measure of sampling adequacy: 0.816

C = Measures for role conflict

A = Measures for role ambiguity

*These items were eliminated from the analysis

Table 2:
Factor loadings from final measurement model

Item	Fin	NFI	NFD	Com	Self	Mean	Imp	RA	Perf
Fin1	0.807	0.350	0.473	0.225	0.241	0.089	0.152	0.331	0.209
Fin2	0.822	0.402	0.392	0.263	0.206	0.145	0.177	0.305	0.225
Fin3	0.785	0.374	0.441	0.196	0.168	0.195	0.214	0.287	0.187
Fin4	0.795	0.411	0.483	0.240	0.221	0.236	0.188	0.324	0.278
Fin5	0.818	0.429	0.375	0.199	0.256	0.176	0.220	0.358	0.254
Fin6	0.836	0.334	0.413	0.283	0.187	0.234	0.207	0.311	0.179
Fin7	0.775	0.353	0.524	0.135	0.246	0.240	0.159	0.268	0.213
Fin8	0.829	0.317	0.368	0.205	0.190	0.266	0.192	0.337	0.236
Fin9	0.780	0.406	0.490	0.276	0.223	0.187	0.231	0.380	0.158
Fin10	0.779	0.386	0.431	0.219	0.184	0.278	0.248	0.341	0.208
Fin11	0.830	0.452	0.316	0.297	0.208	0.255	0.139	0.310	0.134
NFI1	0.221	0.744	0.395	0.424	0.447	0.506	0.376	0.428	0.188
NFI2	0.175	0.690	0.481	0.495	0.426	0.437	0.355	0.416	0.244
NFI3	0.239	0.754	0.354	0.386	0.403	0.421	0.389	0.390	0.220
NFI4	0.190	0.760	0.303	0.410	0.512	0.447	0.366	0.408	0.264
NFI5	0.228	0.735	0.447	0.444	0.437	0.367	0.351	0.362	0.190
NFI6	0.188	0.729	0.323	0.307	0.481	0.509	0.277	0.419	0.255
NFI7	0.230	0.732	0.411	0.293	0.519	0.380	0.332	0.355	0.262
NFD1	0.168	0.450	0.745	0.286	0.300	0.271	0.226	0.378	0.207
NFD2	0.254	0.396	0.707	0.294	0.258	0.334	0.289	0.412	0.230
NFD3	0.219	0.415	0.693	0.326	0.360	0.291	0.345	0.437	0.212
NFD4	0.263	0.175	0.735	0.270	0.359	0.320	0.274	0.391	0.170
Com1	0.216	0.245	0.217	0.800	0.441	0.378	0.519	0.378	0.079
Com2	0.301	0.178	0.231	0.865	0.498	0.334	0.403	0.463	0.275
Com3	0.154	0.206	0.294	0.731	0.343	0.415	0.447	0.521	0.116
Self1	0.228	0.399	0.215	0.368	0.773	0.479	0.486	0.432	0.309
Self2	0.263	0.378	0.087	0.310	0.742	0.307	0.497	0.331	0.123
Self3	0.287	0.241	0.273	0.439	0.746	0.517	0.342	0.350	0.206
Mean1	0.319	0.423	0.247	0.322	0.432	0.752	0.543	0.291	0.134
Mean2	0.266	0.329	0.202	0.364	0.189	0.737	0.451	0.287	0.272
Mean3	0.275	0.301	0.228	0.374	0.403	0.812	0.505	0.340	0.251
Imp1	0.328	0.330	0.231	0.341	0.420	0.558	0.761	0.294	0.378
Imp2	0.292	0.404	0.323	0.481	0.329	0.476	0.722	0.355	0.247
RA1	0.311	0.349	0.364	0.453	0.351	0.426	0.442	0.684	0.322
RA2	0.233	0.386	0.297	0.389	0.462	0.440	0.397	0.671	0.373
RA3	0.263	0.412	0.347	0.433	0.395	0.387	0.333	0.707	0.297
RA4	0.303	0.373	0.241	0.468	0.409	0.323	0.423	0.715	0.241
Perf1	0.336	0.413	0.375	0.197	0.233	0.350	0.400	0.445	0.694
Perf2	0.380	0.289	0.413	0.225	0.274	0.402	0.256	0.357	0.746

Fin = financial performance measures; NFI = non-financial interactive; NFD = non-financial diagnostic; Com = competence; Self = self-determination; Mean = meaning; Imp = impact; RA = role ambiguity; Perf = performance. n = 98.

Table 3:
Descriptive statistics (based on full measurement model)

Variable	Mean	SD	TR	AR	CA	AVE	1	2	3	4	5	6	7	8	9
1.RA	8.28	2.28	4-20	4-13	0.78	0.48	0.68								
2.Financial	14.79	4.36	11-55	11-50	0.95	0.65	-0.23	0.80							
3.Nonfindiag	15.96	2.72	4-20	6-20	0.87	0.52	-0.32	0.72	0.72						
4.Nonfininter	27.84	4.77	7-35	14-35	0.90	0.54	-0.27	0.69	0.66	0.73					
5.Impact	3.55	1.43	2-10	2-8	0.70	0.55	0.46	0.05	-0.36	-0.39	0.74				
6.Compet.	5.30	1.67	3-15	3-13	0.77	0.64	0.41	-0.08	-0.18	-0.27	0.31	0.80			
7.Meaning	4.97	1.99	3-15	3-10	0.80	0.59	0.49	-0.13	-0.24	-0.30	0.36	0.20	0.77		
8.Self-detm.	5.04	1.89	3-15	3-10	0.78	0.57	0.35	-0.22	-0.25	-0.31	0.42	0.18	0.48	0.75	
9. Perform.	10.61	1.27	2-14	7-14	0.62	0.52	-0.48	0.13	0.19	0.28	-0.29	-0.30	-0.57	-0.40	0.72

TR = Theoretical range

AR = Actual range

CA = Cronbach Alpha

AVE = Average variance extracted

RA = Role ambiguity (four items)

Financial = Financial measures, diagnostic + interactive (model 1)

NFinancial = Non-financial measures, diagnostic + interactive (model 1)

Nonfindiag = Diagnostic utilisation of non-financial measures (model 2)

Nonfininter = Interactive utilisation of non-financial measures (model 2)

Impact = Two-item measure of impact

Compet. = Competence

Meaning = Meaning

Self-detm = Self-determination

Perform. = Managerial performance

Correlations above 0.20 significant at $p < 0.05$ (Pearson correlation coefficients reported, off-diagonal elements)

Diagonal elements are the square roots of the AVE statistics.

Table 4:

PLS results for model 1: financial vis-à-vis non-financial (diagnostic utilisation the focus)

<i>Paths to:</i>						
	<u>RA</u>	<u>Impact</u>	<u>Competence</u>	<u>Meaning</u>	<u>Self-determ</u>	<u>Perform</u>
	<i>Adjusted R² for endogenous variables</i>					
<i>Paths from:</i>	0.162	0.164	0.126	0.103	0.259	0.352
Financial measures	-0.187* (2.144)	-0.058 (0.710)	-0.091 (0.958)	-0.044 (0.309)	-0.137 (1.342)	0.063 (0.767)
Nonfinancial measures	-0.297** (3.062)	-0.167 ^a (1.582)	-0.160 ^a (1.574)	-0.141 (1.322)	-0.211* (2.092)	0.140 (1.366)
RA		0.381*** (3.207)	0.319** (2.759)	0.401*** (3.395)	0.276** (2.623)	-0.338** (3.159)
Impact						-0.204* (1.696)
Competence						-0.188* (1.605)
Meaning						-0.380*** (3.367)
Self-determ						-0.276** (2.453)
<i>Control variables:</i>						
Age	0.059 (0.496)	0.034 (0.489)	0.078 (0.612)	0.057 (0.559)	0.176 ^a (1.594)	0.080 (0.628)
Gender	0.069 (0.890)	0.061 (0.551)	0.122 (1.117)	0.073 (0.743)	0.045 (0.351)	0.050 (0.587)
Education	0.167 ^a (1.398)	0.110 (0.992)	0.081 (0.772)	0.117 (1.089)	0.061 (0.542)	0.078 (0.674)
Hierarchical level	-0.096 (0.920)	-0.079 (0.793)	-0.118 (1.241)	-0.075 (0.884)	-0.176 ^a (1.599)	-0.091 (0.804)

n = 98.

Each cell reports the path coefficient (*t*-value).

Blank cells indicate that the path was not hypothesised within the model. We report the results for the relationship between RA and PE, given the relevance to model 1.

*p < 0.05; **p < 0.01; ***p < 0.001 (two-tailed)

^aWe report significance at p < 0.1, through this superscript, to retain consistency with Hall's (2008) reportage of significance at p < 0.1.

Table 5:

PLS results for model 2: diagnostic vis-à-vis interactive utilisation (non-financial measures the focus)

	<i>Paths to:</i>					
	<u>RA</u>	<u>Impact</u>	<u>Competence</u>	<u>Meaning</u>	<u>Self-determ</u>	<u>Perform</u>
	<i>Adjusted R² for endogenous variables</i>					
<i>Paths from:</i>	0.143	0.113	0.184	0.110	0.269	0.311
NonFdiag	-0.210** (2.115)	-0.099 (0.850)	-0.124 (1.112)	-0.087 (0.798)	-0.071 (0.637)	0.057 (0.414)
NonFinter	-0.191* (1.803)	-0.174 (1.867)	-0.219* (2.404)	-0.206* (2.233)	-0.290** (2.798)	0.091 (0.834)
RA		0.335** (3.123)	0.312** (2.977)	0.390*** (3.558)	0.284** (2.785)	-0.326** (3.113)
Impact						-0.135 (1.225)
Competence						-0.207* (1.982)
Meaning						-0.321** (3.090)
Self-determ						-0.278** (2.587)
<i>Control variables:</i>						
Age	0.082 (0.799)	0.064 (0.598)	0.090 (0.872)	0.108 (0.976)	0.186* (1.700)	0.104 (0.913)
Gender	0.064 (0.513)	0.077 (0.702)	0.090 (0.805)	0.055 (0.487)	0.049 (0.401)	0.065 (0.545)
Education	0.173 ^a (1.788)	0.113 (0.992)	0.081 (0.691)	0.071 (0.677)	0.087 (0.820)	0.082 (0.861)
Hierarchical level	-0.095 (1.107)	-0.083 (0.754)	-0.171 ^a (1.602)	-0.082 (0.908)	-0.168 ^a (1.576)	-0.078 (0.734)

n = 98.

Each cell reports the path coefficient (*t*-value).

Blank cells indicate that the path was not hypothesised within the model. We report the results for the relationship between RA and PE, given the relevance to model 2.

*p < 0.05; **p < 0.01; ***p < 0.001 (two-tailed)

^aWe report significance at p < 0.1, through this superscript, to retain consistency with Hall's (2008) reportage of significance at p > 0.1.

For tables 4 and 5:

Perform =	managerial performance
RA =	role ambiguity
Self-determ =	self-determination
NonFdiag =	diagnostic utilisation of non-financial measures
NonFinter =	interactive utilisation of non-financial measures

Regarding the results shown in tables 4 and 5, the negative sign for the main effects is consistent with expectations and the questionnaire design, in that increasing psychological empowerment is denoted by a lower score, while increasing utilisation of performance measures is denoted by a higher score.