

**REWARD SYSTEMS, MAS INFORMATION AND MANAGERIAL PERFORMANCE:  
THE IMPACT OF OWNERSHIP TYPE**

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## **REWARD SYSTEMS, MAS INFORMATION AND MANAGERIAL PERFORMANCE: THE IMPACT OF OWNERSHIP TYPE**

*Abstract*—Reward systems and managerial use of broad scope management accounting system (MAS) information are critical in improving managerial performance. Researchers remark that reward systems may affect the use of MAS information and performance; however, these effects vary in different contexts. Previous studies have examined the effects of contingency factors, such as organisational structure and external environment, on the use of MAS information and managerial performance. In transitional economies, however, such studies are few in number. Reward systems and ownership type play important roles in transitional economies and they are different from western countries. This empirical study, using a contingency approach, examines the relationships between reward systems and managerial performance, taking into account the role of managerial use of MAS information and ownership type in the context of Vietnam. One hundred and eighty-two department managers in Vietnamese enterprises with different ownership types participated in a cross-sectional survey. The findings indicate that managers' perception of the link between reward systems and performance was positively associated with managerial performance directly and indirectly via the use of MAS information. Regarding the impact of ownership type, the significance of the relationship between reward systems and managerial performance was driven by privately owned enterprises (POEs) and foreign-owned enterprises (FOEs). In addition, with the structural model for state-owned enterprises (SOEs), the use of MAS information fully mediates the relationship between reward systems and managerial performance while it plays a partial mediating role in POEs and FOEs.

*Keywords*— Contingency, department managers, transitional economies, Vietnam

## 1. INTRODUCTION

Accounting information is critical among the different types of information available to managers (Demski, 2008). Managers need broad scope MAS information (including non-financial, future oriented, and long-term oriented) in order to cope with a more competitive business environment (Bromwich, 1990, Mia and Clarke, 1999). However, the extent to which managerial use of broad scope MAS information (hereafter, the use of MAS information) in making decisions helps to improve performance depends on several factors (Chenhall, 2006). Previous studies have examined the influence of factors, such as environmental uncertainty, organisational structure (Gul, 1991, Mia and Chenhall, 1994, Chia, 1995), task uncertainty (Chong, 1996, Mia and Goyal, 1991), intensity of market competition (Mia and Clarke, 1999), information technology (Mia and Winata, 2008), span of control (Mia and Goyal, 1991), size (Mia and Winata, 2008), culture (Etemadi et al., 2009, Patiar, 2005, Tsui, 2001), corporate strategy (Abernethy and Guthrie, 1994, Chong and Chong, 1997, Bangchokdee, 2008), and industry (Bangchokdee, 2008).

Effective motivation for individual performance is the main goal of rewards (Epstein, 2008). In order to achieve certain goals, managers may orient themselves to using the appropriate information, such as MAS information, to make decisions (Eldenburg and Krishnan, 2008, Henri, 2006). However, previous researchers have paid little attention to the relationship between reward systems, the use of MAS information, and performance.

Moreover, the effects of related factors, such as reward systems, on the use of MAS information, and performance are different depending on the context (Chenhall, 2003). The literature suggests that ownership is one of the most important factors affecting companies in managing and controlling operations in transitional economies (Tan, 2002, Wang and Judge, 2011). Contingency-based research on the use on MAS information in such a economic and social context is needed because a MAS only appropriate to a particular circumstance (Otley, 1980, Chenhall, 2003). To our knowledge, there are no studies on the impact of ownership type on the relationships between reward systems, the use of MAS information, and managerial performance in transitional economies such as Vietnam. Vietnam has moved from a centrally planned economy, in which state ownership dominated and the business environment was stable and less competitive, to a market-oriented economy, which is characterised by multiple ownership types and a competitive business environment (Pham and Mohnen, 2005, Nguyen and Pham, 1996). Many factors such as reward systems from the centrally planned economy have affected organisations, in particular state-owned enterprises, in the current economy. Accordingly, empirical research into the effects of reward systems on managerial performance, both direct and indirect, via the use of MAS information incorporating the impact of ownership type, may contribute to the literature.

The purpose of this paper is to provide insight into this issue. Findings from this research may provide a better understanding of the important role of reward systems, which have positive effects on the use of MAS information, and managerial performance in certain ownership types. The research attempts to answer the following research questions (RQ):

**RQ1.** How do reward systems affect the use of MAS information and managerial performance?

**RQ2.** How does ownership type affect the relationship between reward systems, the use of MAS information, and managerial performance?

In order to answer these questions, the research model illustrated in Figure 1 was developed. This model aims to examine the role of reward systems and the use of MAS information in improving managerial performance. Then, the impact of ownership type on the model is investigated.

Insert Figure 1 here

The rest of this paper is structured as follows: section two reviews the literature and develops hypotheses; the research method is discussed in section three; section four provides the findings and discussions of the results; and finally, the article concludes with discussions on theoretical and managerial contributions. Limitations and directions for future research are also offered.

## 2. THEORY AND HYPOTHESES

Reward systems and their association with other variables, in particular the relationship between rewards/compensation and performance, have attracted the attention of management accounting (MA) researchers (Davila, 2008). The main goal of reward is to motivate individuals to achieve higher performance (Sprinkle, 2000). Performance measures play an important role in evaluating and rewarding employees. A close linkage between rewards and achieving performance targets may improve managerial performance. In order to achieve targets and thus obtain rewards, managers tend to use appropriate information in making decisions (Eldenburg and Krishnan, 2008, Henri, 2006). Researchers have emphasised the important role of MAS information in compensation practices (Rankin and Sayre, 2011).

### Reward systems

A reward system is considered a sub-element in the management process of organisations and a motivator of managerial performance (Davila, 2008). According to Langfield-Smith, Thorne and Hilton (2006), “a reward system consists of processes, practices and systems that are used to provide levels of pay and benefits to employees.” (p. 627). A good reward system has to include two aims: rewarding employees for the outcomes of past actions/decisions and encouraging people to improve their performance. Performance-based reward systems “base rewards on achieving some performance targets” (p. 629). This study characterised a reward system in terms of the departmental managers’ perception of a link between rewards and performance targets (hereafter reward systems).

### Broad scope MAS information

MAS information characteristics are classified in four dimensions: scope, timeliness, aggregation, and integration (Chenhall and Morris, 1986). These dimensions have been studied in many previous studies on management accounting. This study examines the use of broad scope MAS information. Broad scope MAS information comes from both internal (e.g., operation, finance, marketing, and human resources) and external sources (e.g., economic conditions, customer taste, and competitors); information of a financial and non-financial nature (e.g., output rate and machine efficiency); and information about historical and future-oriented events (e.g., expected price and expected sales volume). In a competitive and uncertain business environment, it is critical for managers to use MAS information in decision making appropriately in order to improve their performance (Bromwich, 1990, Mia and Clarke, 1999).

### Managerial performance

Performance can be measured at different levels: industry, organisation, divisions (corporate, plant, department, or team), or managerial hierarchy (Langfield-Smith et al., 2006). The current study focuses on examining managerial performance at the department level, because measuring performance at this level provides “valuable feedback on the effectiveness of various resources and processes” (Patiar, 2005, p. 24) in planning and control systems.

In line with several contemporary management accounting studies (Agbejule, 2005, Chong, 2004, Tsui, 2001), this study uses the instrument developed by Mahoney, Jerdee and Carroll

(1963) to measure the main aspects of a manager's performance through eight functional dimensions: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing.

### Ownership type

As a transitional economy, Vietnam has moved from a centrally planned economy with the domination of state ownership to a market-oriented economy with many types of ownership coexisting (Pham and Mohnen, 2005, Nguyen and Pham, 1996). The present study examines ownership in three groups: state-owned (including enterprises with over 50% state capitals); privately owned (100% domestic private); and foreign-owned (including partial and 100% foreign investment) enterprises, hereafter abbreviated to SOEs, POEs, and FOEs, respectively.<sup>1</sup>

#### *2.1 Reward systems and the use of MAS information*

MAS information plays an important role in evaluating and rewarding managers (Chenhall and Langfield-Smith, 2003). MAS information is critical in developing a performance measurement system, based on which managers can plan and control their organisations (Chenhall and Langfield-Smith, 2007). A performance evaluation system can motivate managers to focus on key aspects of the organisations (Kaplan and Norton, 1992). A reward system will be effective in motivating employees when employees can perceive more clearly the link between their efforts and achieving performance targets through performance measures (Langfield-Smith et al., 2006). The link between rewards and performance measures may influence the extent to which managers use MAS information in making decisions (van Veen-Dirks, 2010, Chow et al., 2006). Once managers have the information related to achieving targets, they are more likely to use appropriate information such as MAS information for making better decisions to enhance performance (Eldenburg and Krishnan, 2008, Sprinkle, 2000, Sprinkle, 2003). For example, when rewards are linked to specific performance measures such as quality and productivity, managers' efforts may be guided towards the desire to achieve these measurements (Gupta and Govindarajan, 2000). In particular, when managers are rewarded for improving quality and productivity, they may require broad scope MAS information such as production budgeting, product quality and vendor quality in making decisions (Fullerton and McWatters, 2002, van Veen-Dirks, 2010). Accordingly, there is a potential effect of reward systems on the use of MAS information; however, the literature review suggests that studies on the relationship between them have not been carried out. Thus, conducting research on this relationship is crucial to test the limit of MAS knowledge.

Operating in a transitional economy, Vietnamese enterprises have been forced to innovate production operations and change to new technologies. Many contemporary management practices have been implemented. For example, companies have strengthened the link between reward systems and skills and outcomes of performance. Besides financial targets, as in traditional performance measurement systems, non-financial indicators for rewarding such as learning new skills and improving productivity have been encouraged (Zhu et al., 2007). Such a comprehensive performance measurement system focuses more on broader management perspectives with non-financial measures arising from operations management, marketing, human resource management, and corporate strategy (Chenhall and Langfield-Smith, 2007). These, in turn, encourage managers to use more broad scope MAS information to achieve

<sup>1</sup> According to the Law on Investment Vietnamese National Assembly 2005, Law on Investment 2005, Statistical Publishing House, Hanoi, Vietnam.: "Enterprises with foreign owned capital comprise any enterprise established by a foreign investor in order to conduct investment activities in Vietnam; or a Vietnamese enterprise in which a foreign investor purchases shares, [with which it] merges or which it acquires" (p. 2).

performance targets. Extrapolating from these discussions, the present study proposes the following hypothesis:

**H<sub>1</sub>:** There is a positive relationship between department managers' perceptions of reward systems and the use of MAS information.

### *2.2 The use of MAS information and managerial performance*

The extent to which broad scope MAS information is used to improve performance depends on the context (Chenhall, 2003). In particular, under high levels of uncertainty, managers use more broad scope MAS information in making decisions in order to improve their performance (Chong and Eggleton, 2003, Chong, 2004, Mia, 1993). For example, when managers' perceived environmental uncertainty (PEU) increased, managers used more MAS information to improve their performance (Mia, 1993). However, under low task uncertainty, the relationship between the use of MAS information and managerial performance was negative (Chong and Eggleton, 2003, Chong, 2004). Therefore, conducting research on the relationship between the use of MAS information and managerial performance in different business environments is crucial for providing more useful evidence to the understanding of the use of MAS information in specific contexts. This also helps enterprises have a better understanding of the extent to which managers use broad scope MAS information in making decisions to enhance performance and account for the possible influence of related factors. To have a better understanding of the issue, this study examines the impact of ownership type on this relationship.

MAS information, one of the most important components in the organisational planning and control system (Chenhall, 2003, Simons, 1995), helps managers understand and perform their job better (Mia, 1987). Researchers state the decision-facilitating role of MAS information (Sprinkle, 2003). A major function of MAS is to support the needs of top management in controlling decisions and the needs of lower level managers in managing decisions. In a dynamic business environment, managers need broad scope information to deal with many non-routine decisions (Chenhall, 2003, Abernethy and Bouwens, 2005, Tiessen and Waterhouse, 1983, Chenhall and Morris, 1986). For example, information such as performance targets and criteria for evaluating the achievements of these targets supports managers in planning, controlling, and making more appropriate decisions (Chenhall and Morris, 1986, Mia, 1993, Horngren et al., 2006). To deal with complex and uncertain events in a transitional economy, managers need broad scope MAS information, such as non-financial and future oriented information. Managers who use more broad scope MAS information are able to make more effective managerial decisions for setting suitable targets and evaluating achievements, which in turn improve managerial performance (Mia and Clarke, 1999). It is thus argued that the use of MAS information may help managers improve their performance, leading to the following hypothesis:

**H<sub>2</sub>:** There is a positive relationship between the use of MAS information and managerial performance.

### *2.3 Reward systems and managerial performance*

An appropriate reward system may encourage managers, while a system based on subjective and uncertain criteria to reward employees may negatively affect managerial performance (Ittner et al., 2003). One of the most important tools to motivate employees is an appropriate reward system (Schulz et al., 2010). Managers are motivated through their perceptions of performance measures, type of rewards, evaluation/reward systems and the links between these perceptions (Kominis et al., 2007).



A close linkage between rewards and performance targets may improve managerial performance. A significant association between reward systems and performance has been found in many studies (Byun et al., 2009, Gomez-Mejia et al., 2010, O'Connor et al., 2006). However, it may be problematic if the performance measurement is not appropriate. For instance, Ittner et al. (2003) found that managers complained more when their organisation used a high level of subjectivity to assess their performance and reward them (e.g. bias in bonus awards and uncertain criteria used to determine rewards). The literature review shows that appropriate reward systems may have a positive effect on managerial performance. However, the extent to which reward systems affect performance is different depending on a particular context. Therefore, more studies examining the relationship between reward systems and managerial performance in different circumstances will provide a better understanding of the issue.

Regarding the link between rewards and performance targets, once employees perceive a close link between their efforts and achieving performance targets, they may extend their efforts to enhance performance (Langfield-Smith et al., 2006). For example, when sales managers perceive that they will receive valuable rewards for achieving performance targets such as customer satisfaction, they may investigate information relating to customer needs and expectations (Bangchokdee, 2008). Such information is then used in negotiating and contracting for goods or services delivered to the customer as expected. As a result, these sales managers may achieve high performance. In other words, linking rewards to performance targets may lead to the improvement of managers' performance (Sprinkle, 2003). Based on the literature, the present research thus proposes the following hypothesis:

**H<sub>3</sub>:** There is a positive, direct relationship between department managers' perceptions of reward systems and managerial performance, in addition to the indirect effect via the use of MAS information stated in H1.

#### *2.4 Impact of ownership*

The literature suggests that ownership is one of the most important factors affecting companies in managing and controlling operations in transitional economies (Tan, 2002, Wang and Judge, 2011). Different types of ownership might have different effects on organisational characteristics, such as reward systems, decision-making authority and use of information (Ding et al., 2011, Macias, 2002). Therefore, understanding the relationships between these characteristics and managerial performance is very important for enterprises operating in a transitional economy. However, the literature suggests that studies on the influence of ownership type on these relationships have not been carried out. To fill the gaps in the literature, this study examines the impact of ownership type on reward systems, the use of MAS information, managerial performance, and on relationships between these factors in Vietnamese enterprises.

The innovation in enterprises after the 1997 Asian financial crisis has brought many contemporary management practices into the workplace. However, the traditional core practices have still been hard to replace in Vietnamese SOEs (Zhu et al., 2007). In general, reward systems in SOEs have been egalitarian and indirectly related to organisational efficiency and individual efforts. Nevertheless, individuals might be rewarded depending on seniority and lifetime of employment in some compensation schemes (Zhu et al., 2008). The link between rewards and performance targets in such systems is weak; therefore, managers have little motivation for using MAS information relating to these targets in their decisions. Accordingly, reward systems in SOEs may have less impact on the use of MAS information.

By contrast, enterprises in the private sector, especially the ones with foreign partner involvement, have a tendency to adopt more contemporary management practices. These

companies motivate individuals by rewarding good outcomes based on both financial and non-financial performance measures such as profit, productivity, and skills (Zhu et al., 2007). When managers are aware that good outcomes will be rewarded based on non-financial performance measures such as productivity, they may require information relating to these measures in order to support their decision-making to solve agency problems (Gupta and Govindarajan, 2000).

Reward systems influence performance differently depending on the context (Gomez-Mejia et al., 2010, O'Connor et al., 2006). Company ownership is one of the key determining factors in rewarding employees, in terms of how to pay and at what level such decisions are made (Gunnigle et al., 1994). The monitoring role of reward systems differs according to the type of ownership. For example, the level of monitoring of managers through performance-based compensation in widely-held companies is higher than in family-controlled firms (Gomez-Mejia et al., 2003, Jiang, 2011, Khan et al., 2005).

In the rapidly changing business environment of a transitional economy, the impacts of reward systems are uncertain depending on the contexts (Ji et al., 2007). Ownership type has played an important role in determining the incentive pay scheme and performance-based pay for managers. In transitional economies, reward systems adopted from a centrally planned economy still dominate in SOEs. Such a system has a weak connection between rewards and individual efforts and performance (O'Connor et al., 2004). This egalitarian system rewards managers in much the same way even though there are differences in their efforts. Subjective and uncertain criteria in reward systems lead to the dissatisfaction of managers, which in turn may negatively affect managerial performance (Ittner et al., 2003). Consequently, managers are not motivated to improve their performance through reward systems. In other words, reward systems in SOEs may have less effect on managerial performance.

By contrast, POEs often strengthen the link between executive pay and performance more effectively than SOEs. Private and foreign companies tend to use performance-based rewards more than SOEs to motivate managers (Kato and Long, 2004, Batjargal, 2010). In these enterprises, reward systems link tightly to organisational and individual performance in terms of “profit, productivity, responsibility and skills” (Zhu, 2005, p.1265). When managers believe that their efforts are recognised and rewarded through a set of objective and clear criteria, they may try their best to improve managerial performance (Gomez-Mejia et al., 2010, O'Connor et al., 2006). Therefore, it can be argued that in Vietnamese POEs, reward systems, which are based more on performance targets, may have a significant positive effect on managerial performance.

Extrapolating from the literature, the present study proposes the following hypotheses:

**H<sub>4a</sub>** The assessment by managers in SOEs of the link between rewards and performance targets, their use of the MAS information and performance was lower than the assessment by their counterparts in POEs and FOEs.

**H<sub>4b</sub>** Ownership type affects the relationships between reward systems, the use of MAS information and managerial performance.

### 3. METHODOLOGY

#### 3.1 Questionnaire survey method

A quantitative approach was used to test the hypotheses of the study.

#### Sample selection

The target population of this study is department managers in Vietnamese enterprises from a variety of ownership types: state-owned, privately owned, and foreign owned firms operating



under The Law of Enterprise 2005 in Vietnam. The participants are managers from sales, production, accounting, marketing, and operation departments, who can provide information about their use of MAS information in managerial decision making (Chenhall and Morris, 1986, Chong and Eggleton, 2003, Mia, 1993), and about their perspective of the link between reward systems and performance (Chenhall and Langfield-Smith, 2003, van Veen-Dirks, 2010, Schulz et al., 2010).

A convenience sampling instead of random sampling approach was used to collect as many responses as possible because there is little tradition of independent and confidential inquiry for research in Vietnam, managers often hesitate to decide to participate in a survey. The convenience sampling is prone to bias, for example, under/over-representation (Kumar, 2006). To reduce sampling bias, a number of necessary steps, such as careful review of previous studies, continuous reminders, and in-depth interviews with managers, were conducted. A list of 2787 email addresses of department managers collected from websites of enterprises, Department of Planning and Investment, and Businessperson Association, was used to send the questionnaire of the survey.

#### Questionnaire preparation

A cross-sectional survey was conducted since it is not as costly and difficult as a longitudinal survey. According to Van der Stede, Young, and Chen (2005), results of a cross-sectional survey method may lead to a lowering of confidence. Therefore, three stages of questionnaire preparation were carried out to improve confidence.

First, a strong theoretical basis was developed through an extensive literature review. Well-established instruments from previous studies were used to measure variables of the research to improve reliability and validity. Second, key considerations (e.g., reasonable order, familiar terms, clear response format) were taken into account when we designed the questionnaire package to reduce response errors. This package was translated from English into Vietnamese. The Vietnamese version was back-translated to English by an independent translator. Two translators (from English to Vietnamese and from Vietnamese to English) resolved any translation difference in order to preserve the original meaning. Finally, the appropriateness of the questions, instruments, and procedures were tested through a pilot study. The questionnaire was then modified, according to the comments and suggestions of academics and department managers from the pilot study. The final version was prepared and used for data collection.

#### Data collection

We collected data through a web-based survey called *LimeSurvey*. This online survey was chosen for several reasons. First, this method has been widely used in management accounting research (Sands, 2006, Burkert et al., 2011, Elbashir et al., 2011). Second, in the pilot study, department managers indicated that they preferred to answer the questionnaire online since it could be accessed and submitted at any time. Third, previous studies suggested that an online survey could reach across great geographic distances and save time and cost of conducting research (Smyth et al., 2010, Wright, 2006). Fourth, mandatory questions could be prepared in the web-based survey to deal with the problem of missing answers.

An invitation letter with a URL link to the web-based survey was sent to department managers through a variety of methods, such as managers' email addresses, LinkedIn groups and management forums. Managers, who received the invitation letter, agreed to participate by clicking on the link to the web-based questionnaire. This method has weaknesses of response errors (respondents provide inaccurate data) and non-response errors (target respondents do not reply). In order to deal with these errors, appropriate procedures were carried out (Smith, 2003).

In particular, the Mann-Whitney U Test for possible non-response bias was run. No major non-response bias was indicated since differences between early and late respondents were insignificant. Every fortnight, for 2 months after the initial invitation letter, reminder letters were sent to encourage responses. There were 707 managers who clicked on the link to participate: 291 filled in the questionnaires and submitted them; 109 responses from managers in small enterprises were excluded; three outlier cases were removed from the data; finally, 182 cases were used for data analysis.

Table 1 presents the demographics of sample respondents. Of the 182 cases collected in this survey, 95 (52%) were from Ho Chi Minh, the largest and most dynamic city in Vietnam and 87 (48%) were from other cities and provinces. Nearly half (46%) of responses were from POEs, 60 (33%) from FOEs and 38 (21%) from SOEs. Managers in SOEs and FOEs tended to be better qualified than those in POEs: 35% of respondents in SOEs and 30% in FOEs had a Master's degree or higher qualifications compared to 19% in POEs. In POEs and FOEs, managers had more years of managerial experience in their companies: 23% and 25% respectively, compared to only 18% in SOEs, who had more than 9 years' experience.

Insert Table 1 here

### *3.2 Variable measurement*

Well-developed instruments from previous research were used to measure the variables of the study.

#### Managerial performance

The instrument developed by Mahoney et al. (1963) was used to measure managerial performance. Participants rated their performance on eight dimensions of a 7-point Likert-type self-evaluation scale. Even though self-rating has been criticised for being subjective, this instrument has been widely used in management accounting research (Burkert et al., 2011, Agbejule, 2005, Chong and Eggleton, 2003, Gul and Chia, 1994, Etemadi et al., 2009) because of the significant correlation between self-rating and super-rating. Moreover, the adoption of objective measures is very difficult due to the complexity of the information. There are a number of studies which have rejected the criticism of subjective measures (Alam and Mia, 2006, Mia et al., 2005, Dunk, 2003).

Managers rated their own performance by placing a point from 1 "very poor" to 7 "excellent" on a eight dimensions, namely planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing. However, two items (negotiating and representing) were dropped because they were loaded on multi-factors (cross-loadings) with the cross-loadings differing by less than 0.2 (Hair et al., 2010) and the values of 'Cronbach's alpha if item deleted' were higher than the final alpha value (Pallant, 2011). The remaining six dimensions were used to examine managerial performance, which satisfied the reliability level with a Cronbach's Alpha of 0.92 (see Table 2).

#### The use of MAS information

The instrument developed by Chenhall and Morris (1986) has been widely used in most studies on MAS. Following previous studies, the present study adopted a 7-point Likert-type scale on six items developed by Chenhall and Morris (1986), and Mia and Chenhall (1994) to measure the use of MAS information. The respondents rated the extent to which they use each item for making decisions by placing a point from 1 "not used at all" to 7 "used to a great extent". The average scores for the six items (including future events, probability estimated information, non-economic information, external information, non-financial information, and non-financial

market information) represent the overall score for the use of MAS information. This instrument satisfied the reliability level with a Cronbach's Alpha of 0.86 (see Table 2).

### Reward systems

This study characterises a reward system in terms of department managers' perceptions of the link between reward systems and performance targets (performance measures). Questions used to measure the perceptions were adapted from Schulz (2010), Chow et al. (1999), and Shield and Young (1993). Five items are measured with a 7-point Likert-type scale ranging from 1 "not at all" to 7 "to a great extent": (1) rewards are directly tied to individual performance; (2) rewards are directly tied to performance measures; (3) people's rewards increase as their performance increase; and (4) individuals whose performance ranks in the top 25% receive higher rewards than those in the bottom 25%. The instrument satisfied the reliability level with a Cronbach's Alpha of 0.93 (see Table 2).

Insert Table 2 here

### 3.3 Model analysis

This survey tests the hypotheses of multiple relationships between a set of continuous variables (dependent, mediating, and independent); therefore, structural equation modelling (SEM) was used (Hair et al., 2010). SEM is a multivariate technique which can test complex relationships amongst variables. It can also find and test relationships amongst observed and unobserved variables. Other analytical techniques are also included in SEM, such as regression, path analysis and factor analysis. Many software packages, such as Amos, LISREL, PLS and Mplus, are available for estimating SEM models. The SmartPLS 2.0 (M3) Beta software package (Ringle et al., 2005) was used to test the hypotheses of the partial least square (PLS) model of the research. This technique is appropriate for this study because it estimates path models with many latent variables (construct variables) indirectly measured by multiple indicators (manifest variables), and it can be used for analysing data without specifying any distribution assumption (Hair et al., 2011).

As with other component-based SEM techniques, PLS allows the simultaneous examination of both the measurement model (outer model - the relationship between the latent variable and its indicators) and the structural model (inner model - the relationship between the constructs). According to Ringle et al (2005), in the SmartPLS, the assessment of measurement model is similar to the principal components analysis (using the PLS algorithm with 300 maximum iteration, standardised values and centroid weighting scheme), while the structural model with path coefficients is comparable with ordinary least squares regression (using bootstrapping of 5000 resamples). These two models are discussed in the following sections (see Figure 2).

## 4. RESULTS

Insert Figure 2 here

### 3.4 Measurement model

We examined the reliability and the convergent and discriminant validity of the constructs by analysing the measurement model (see Table 2 and Table 3). The reliability was confirmed since the composite reliability values and Cronbach's Alpha for all constructs exceeded the critical value of 0.7 (Hair et al., 2010). The convergent validity was demonstrated with all manifest variables loading on the constructs exceeding 0.6, with cross-loadings differing by less than 0.2 and with the average variance extracted (AVE), and communality values exceeding 0.5. Finally, the discriminant validity of the measures was demonstrated, since the square root of AVE for each construct (diagonal elements in Table 3) exceeded the correlations

between that construct and the others (Hulland, 1999, Hair et al., 2011, Fornell and Larcker, 1981).

Insert Table 3 here

### 3.5 Structural model

Figure 2 presents the results from PLS analysis, including the measurement model with manifest variables loading on the latent variables and the structural model with standardised path coefficients. In this analysis, significance was based on one-tailed t-test and the amount of variance explained ( $R^2$ ). Standard errors were calculated based on the bootstrapping of 5000 resamples to obtain t-statistics in order to assess the path coefficients' significance (Hair et al., 2011). The bootstrapping standard error is similar to the standard deviation (Ringle et al., 2005). First, we analysed the effect of reward systems and the use of MAS information on managerial performance ( $H_1$ ,  $H_2$ , and  $H_3$ , see Table 4 and Figure 2). Second, we tested the mediating role of MAS information based on procedures recommended by Cohen and Cohen (1983). See Table 5. Finally, to compare the differences among three groups of enterprises, we did PLS-based multi-group analysis as suggested by Henseler (2012). This is a non-parametric approach and there is no requirement for any distributional assumption (Figure 4). Following Tabachnick and Fidell (2007), the statistical significance of the difference between path coefficients ( $\beta$  values) was tested by converting them into z scores and calculating the observed value of z ( $z_{obs}$  value). See Table 7 and Figure 5.

Table 4 and Figure 2 show that all hypothesised paths ( $H_1$ ,  $H_2$  and  $H_3$ ) were strongly supported, since all path coefficients ( $\beta = 0.26$ ;  $0.51$ , and  $0.21$  respectively) are positive and significant at the .01 level (one-tailed). They indicate that the reward system has significant positive effects on the use of MAS information and managerial performance. Moreover, there is a significantly positive relationship between the use of MAS information and managerial performance. The results are consistent with discussions in previous studies (van Veen-Dirks, 2010, Schulz et al., 2010, Sprinkle, 2003, Sprinkle, 2000). In the model, reward systems explained 7% (not significant) of the variance in the use of MAS information, while 36% of the variance in managerial performance was explained by reward systems and the use of MAS information. Overall, the research model is an acceptable fit since the squared multiple correlation ( $R^2$ ) of our dependent variable (managerial performance) is reasonable (0.36). In the PLS path model,  $R^2$  values of 0.75, 0.50, and 0.25 are substantial, moderate, and weak, respectively. A "moderate"  $R^2$  may be acceptable if an endogenous latent variable is explained by a few (e.g., one or two) exogenous latent variables (Hair et al., 2011).

Insert Table 4 here

In addition, Table 5 presents the results of testing the mediating effects of the use of MAS information on the relationship between reward systems and managerial performance, based on Cohen and Cohen (1983). First, we tested the significance of correlations among latent variables (column 2, Table 5). Then, we assessed the level of mediation in the full model (columns 3 to 6, Table 5). All correlations and paths are significant at the .01 level (one-tailed). The results show that the use of MAS information partially mediated this relationship ( $H_3$  is supported), since (1) all latent variable correlations are significant; (2) all paths in the full model are significant; and (3) the  $\beta_3$  in the full model (0.21) was lower than the correlation between reward systems and managerial performance (0.36).<sup>2</sup> According to Hair et al. (2010),

<sup>2</sup> Mediating level is assessed as follows: (1) there is significant correlations among all three constructs; (2) paths from the independent variable to the mediator ( $\beta_1$ ) and from the mediator to the dependent variable ( $\beta_2$ ) are significant; (3a) if the path from the independent to the dependent variables ( $\beta_3$ ) remains significant and equal to the correlation between independent and dependent variables, then mediation is not supported; (3b) if  $\beta_3$  remains significant but less than the correlation between independent and dependent variables, then partial effect is

an indirect effect of 0.08 or less is insignificant. The indirect effect of reward systems on managerial performance was large (0.13), therefore it is considered significant relative to the indirect effect.

Insert Table 5 here

The effect size ( $f^2$ ) of each construct (the change in R-squares) was calculated to indicate the impact of an exogenous (independent) variable on an endogenous (dependent) variable. The  $f^2$  of 0.02, 0.15, and 0.35 indicates that the effect of a predictor latent variable is small, medium, and large, respectively, at the structural level (Cohen, 1988, Chin, 2010).

$$f^2 = \frac{R^2_{\text{included}} - R^2_{\text{excluded}}}{1 - R^2_{\text{included}}}$$

where  $R^2_{\text{included}}$  and  $R^2_{\text{excluded}}$  are provided on the endogenous variable with or without the exogenous variable in the structural model

It can be seen from Table 6 that the use of MAS information had moderate effects on managerial performance with the  $f^2$  of 0.37, while the effect of reward systems on managerial performance was small with the  $f^2$  of 0.06.

Insert Table 6 here

The influence of ownership type on the research model was examined. The Kruskal-Wallis test in SPSS was used to compare the mean scores of the three groups of enterprises, SOEs, POEs, and FOEs (these calculations are not presented in this paper, but are available from the authors). Figure 3 presents the comparison of mean values of the constructs among the groups. There were statistically significant differences among groups of enterprises in two constructs: reward systems and managerial performance. Department managers' perceptions of the link between reward systems and performance in POEs were higher than those in SOEs and FOEs (significant differences at .05 level, one-tailed); and department managers' perception of their performance in SOEs was lower than that of their counterparts in POEs and FOEs.  $H_{4a}$  was supported.

To test the effects of ownership type on hypothesised relationships, a PLS-based multi-group analysis approach suggested by Henseler (2012) was employed. First, the PLS algorithm was run for the full model with all data to generate latent variable scores (Lvs) for subsequent analysis (Hair et al., 2011). Second, the data with Lvs were divided into three subgroups of SOEs (n=38), POEs (n=84), and FOEs (n=60). Finally, PLS models were run separately for each group. Table 7, Figure 4 and Figure 5 present the results of the analysis with significant and positive relationships among latent variables except for the relationship between reward system and managerial performance in SOEs. It was expected that the hypothesized relationships in POEs and FOEs would be significant and positive, while those relationships would not be significant in SOEs. The results in Table 7 and Figure 4 suggest that in SOEs, the relationship between reward system and managerial performance was not significant; moreover, the relationship between reward systems and the use of MAS information was not significant at the 0.1 and .05 level. Therefore,  $H_{4b}$  was supported.

Insert Figure 3 here

Insert Figure 4 here

Insert Table 7 here

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evidenced; and (3c) if the path from the independent variable to the dependent variable is not significant, then full mediation is supported Cohen, J & Cohen, P 1983. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, Lawrence Erlbaum Associates, Mahwah, NJ, Hair, JF, Anderson, RE, Tatham, RL & Black, WC 2010. *Multivariate Data Analysis*, Pearson Education, Inc., Upper Saddle River, New Jersey 07485..



Insert Figure 5 here

The results run contrary to our expectations for SOEs with regard to the relationship between the use of MAS information and managerial performance ( $\beta_2$ ). It was stronger than that in POEs and FOEs. According to Hartmann and Moers (1999), testing the differences in ‘strength’ of the relationships between variables is based on the ‘clouds’ of observations (scatter diagrams). The use of MAS information and managerial performance in SOEs had a higher correlation than in POEs and FOEs since the cloud of observations in SOEs was narrower (data are not presented in this paper, but are available from the authors). However, the differences among three groups were not significant ( $z_{\text{obs}} < 1.24$ , one-tailed; see Table 7 and Figure 4).

## 5. DISCUSSIONS AND CONCLUSION

This study examined the effects of reward systems on the use of MAS information and managerial performance. It also studied the mediating role of the use of MAS information in the relationship between reward systems and managerial performance. In addition, the impact of ownership type on the relationships was analysed.

To our knowledge, it is the first study that evaluates the relationships between reward systems, the use of MAS information and managerial performance under the influence of ownership type.

### 5.1 Summary of findings

The results can be summarised as follows.

Our findings show a positive relationship between reward systems and the use of MAS information in Vietnamese enterprises. This is in line with previous arguments that a strong link between rewards and performance targets might encourage managers to use more broad scope MAS information in making decisions to fulfill these targets (Sprinkle, 2003, van Veen-Dirks, 2010, Fullerton and McWatters, 2002). Regarding the relationship between the use of MAS information and managerial performance, the results show the more that managers used broad scope MAS information the higher the performance they achieved (Mia and Clarke, 1999, Chong and Eggleton, 2003, Chong, 2004, Mia, 1993). We also found a positive relationship between reward systems and managerial performance, and a positive mediating role of the use of MAS information on this relationship. The findings improve the understanding of positive direct effects of reward systems and the use of MAS information on managerial performance in Sprinkle (2000). In addition, the evidence for positive indirect effects of reward systems on managerial performance via the use of MAS information was also provided.

The findings of this study provide the first evidence for the impact of ownership type on the use of MAS information and the link between rewards and performance, as well as on their effect on managerial performance in Vietnamese enterprises. In particular, managers in SOEs assessed the link between rewards and performance targets in their companies, their use of MAS information and performance as being less significant than that of their counterparts in POEs and FOEs. However, the correlation between the use of MAS information and managerial performance in SOEs was higher than that in POEs and FOEs. This unexpected result might be attributed to the high level of instability in SOEs’ business environment in the 2000s and 2010s. The process of conversion of state-owned enterprises into corporations (equitisation) occurred rapidly at this time due to pressure from international donors, such as the World Bank and the IMF (World Bank, 2001). All state enterprises had to be transformed into one-member limited companies or corporations by July 2010 and had to operate under the same law, *Enterprise Law*, as other organisations, instead of under the *Law on State Enterprise*



prior to July 2010 (Pham, 2010, Sjöholm, 2006, Vietnamese Government, 2006). Since then, the state companies with poor performance have been privatised.

In this equitisation process, the state sector made efforts to improve organisational efficiency and effectiveness (Le and Truong, 2005). In such an uncertain and competitive business environment, the relationships between reward systems, the use of MAS information and managerial performance, might be more meaningful. This is because firms often increase the use of performance-based rewards in response to environmental uncertainty (Schulz et al., 2010), which may affect manager's efforts in performing their functions, as well as the motivation of managers in seeking information that can help them approach performance targets (Fullerton and McWatters, 2002, van Veen-Dirks, 2010, Zhu et al., 2007).

The sampling data indicate that, although the use of MAS information and managerial performance in FOEs was higher than in SOEs, the relationship between these two variables in SOEs was significantly stronger. This finding could also be attributed to the higher level of uncertainty in SOEs' business environment compared to that in FOEs in the 2000s (as discussed above). In this context, the business environment in SOEs might be more competitive and less stable, which led to the effect of the use of MAS information on managerial performance being more positive (Patiar and Mia, 2008, Agbejule, 2005).

### *5.2 Managerial implications*

Today, the important role of reward systems in motivating managers' behaviour, such as their use of MAS information in making decisions and their efforts in performing managerial functions, has been recognised (Fullerton and McWatters, 2002, van Veen-Dirks, 2010, Zhu et al., 2007, Sprinkle, 2000). Our study indicates that, in transitional economies, enterprises with a strong link between rewards and performance targets may encourage followers to make an effort to achieve higher performance. This is especially the case for SOEs in the equitisation process to assist them in making changes and in improving managerial performance. Thus, performance-based rewards may be important in Vietnamese SOEs currently.

The old reward system, which was egalitarian and less based on individual efforts and organisational efficiency (Zhu et al., 2008), has had an influence on most equitised SOEs, since the state is often the majority shareholder in these companies, even in those with less than 20% state capital investment. The other stakeholders, such as customers, employees, and outside investors, are only minority shareholders. The old reward system in these companies needs time and positive factors to change (Zhu et al., 2007). Consequently, this study suggests that the link between rewards and performance should be strengthened in equitised SOEs to encourage managers to use MAS information in making decisions to achieve performance targets, which in turn improves managerial performance.

### *5.3 Limitations and directions for future research*

Several limitations should be considered in generalising the results of this study. First, the measurements of all variables of the study were based on one single questionnaire; therefore, the strength of the associations between these variables may be somewhat overestimated. Second, the use of convenience sampling to collect data is prone to sampling bias in terms of under or over representing subgroups of enterprises (Kumar, 2006). Although necessary steps (e.g., careful review of previous study, in-depth interviews with managers) to reduce sampling bias were conducted, the findings of the study should be treated as suggestions. A future study should collect longitudinal data to examine the causal relationships among variables of the study, especially through the equitisation process of SOEs. Moreover, a probability sampling approach may improve our understanding of how reward systems and the use of MAS information impact on managerial performance. The third limitation of the study is the

measurement of managerial performance, which was only based on self-rating scales (subjectivity). This measurement is a threat to the validity of the results and likely to have higher mean values (Thornton, 1968). Future research may improve the validity of the construct by using 360° feedback (from the superior, self, co-workers, subordinates, and customers) to assess managerial performance (Fletcher and Baldry, 2000). Finally, a large number of factors may affect the relationships examined in this study; therefore, future studies should consider more factors, such as leadership style, culture, and firm size in the research model to enrich the literature regarding the use of MAS information and managerial performance.

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Figures and Tables

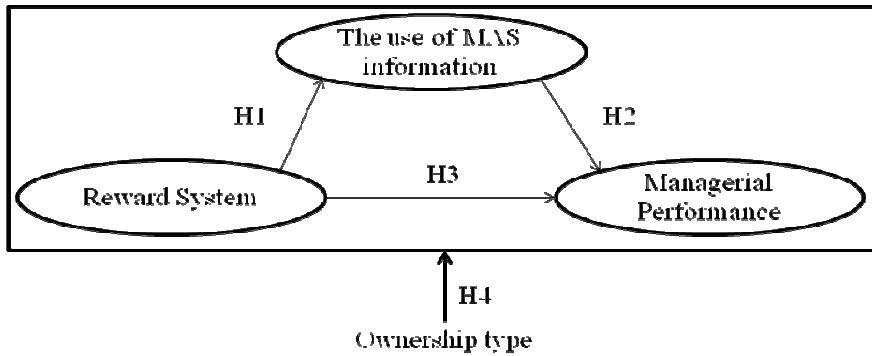
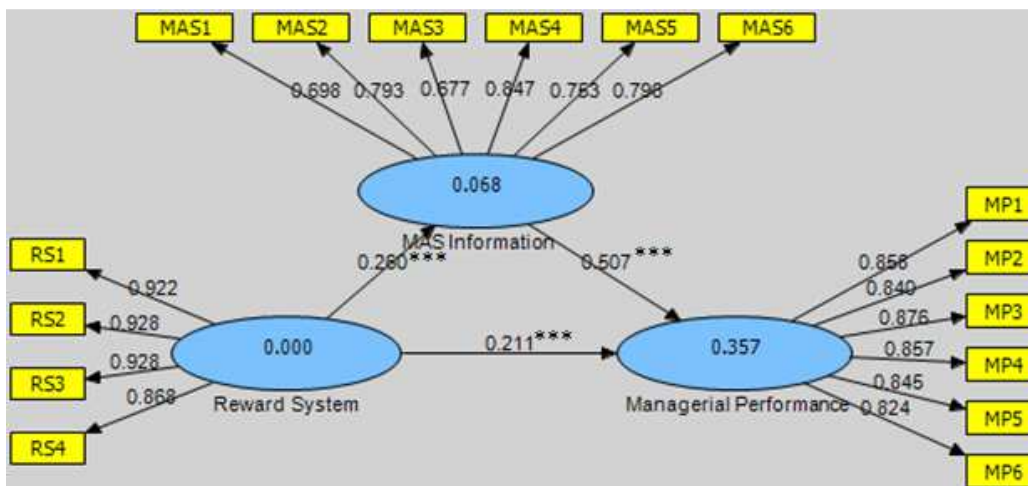
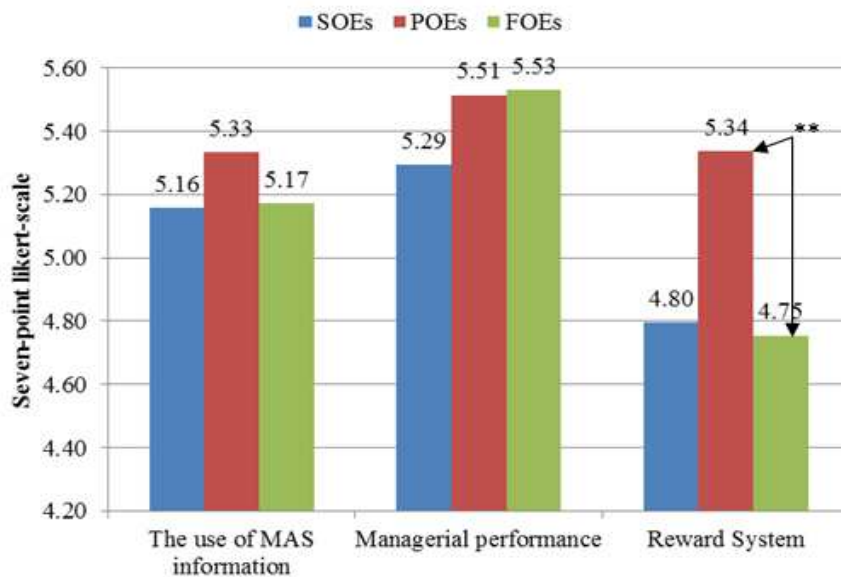


Figure 1 The Research Model



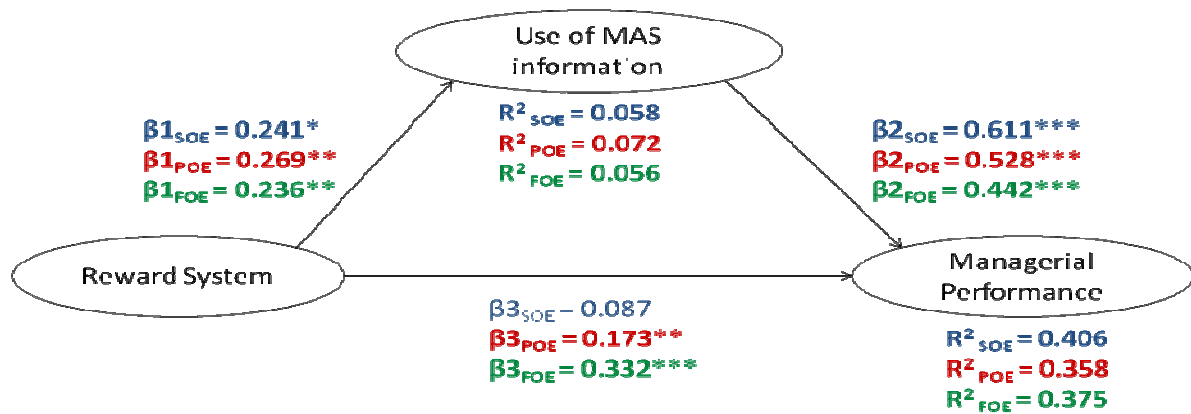
Note: \*\*\*Significant at the .01 level (one-tailed)

Figure 2 Measurement (Outer) and Structural (Inner) Models



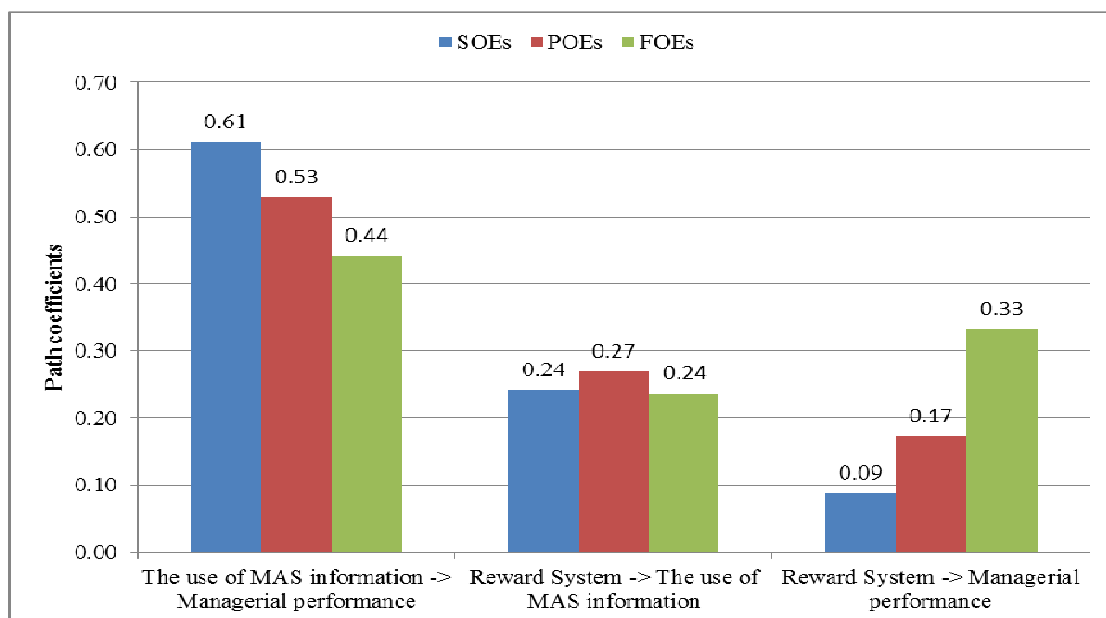
Note: \*\* Statistically significant differences at the .05 level (one-tailed)

Figure 3 Comparing Mean Values of the Constructs among Groups



Note: \*\*\*, \*\*, \* Significant at the .01, .05, .10 level (one-tailed), respectively

Figure 4 Structural Model with Standardized PLS Path Coefficients and R<sup>2</sup> among Groups



Note: Differences are not significant at the 0.01, 0.05 and 0.1 level, one-tailed

All relationships are significant except for the relationship between reward system and managerial performance in SOEs

Figure 5 Comparing Path Coefficients among Groups

TABLE 1 SAMPLE DEMOGRAPHICS

<i>Categories</i>		<i>Total (N=182)</i>		<i>SOEs (N=38)</i>		<i>POEs (N=84)</i>		<i>FOEs (N=60)</i>	
		<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Region	North & Central	59	32	18	47	25	30	16	27
	South	28	15	6	16	8	10	14	23
	Ho Chi Minh City	95	52	14	37	51	61	30	50
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Industry	Manufacturing	93	51	17	45	36	43	40	67
	Trading & Service	89	49	21	55	48	57	20	33
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Firm Size	Medium	78	43	11	29	51	61	16	27
	Large	104	57	27	71	33	39	44	73
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Department managers	Production	43	24	10	26	12	14	21	35
	Marketing	55	30	13	34	28	33	14	23
	Operation	42	23	4	11	26	31	12	20
	Others	42	23	11	29	18	21	13	22
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Experience	< 3 years	57	31	15	40	24	29	18	30
	3 to < 6years	61	34	12	32	29	35	20	33
	6 to < 9years	18	10	4	11	11	13	3	5
	≥ 9years	41	23	7	18	19	23	15	25
	No answer	5	3			1	1	4	7
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Gender	Female	52	29	8	21	28	33	16	27
	Male	125	69	29	76	54	64	42	70
	No answer	5	3	1	3	2	2	2	3
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Education	College	11	6			10	12	1	2
	Bachelor	120	66	23	61	57	68	40	67
	Master	45	25	12	32	15	18	18	30
	PhD	2	1	1	3	1	1		
	No answer	4	2	2	5	1	1	1	2
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>
Age	21-30	34	19	9	24	13	16	12	20
	31-40	107	59	19	50	57	68	31	52
	41-50	24	13	6	16	4	5	14	23
	>50	15	8	3	8	10	12	2	3
	No answer	2	1	1	3			1	1.7
	<b>Subtotal</b>	<b>182</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>84</b>	<b>100</b>	<b>60</b>	<b>100</b>

Note: <sup>a</sup> Operations Managers are often responsible for multiple functions, such as financial, human resource, production, sale and marketing

TABLE 2 FACTOR LOADING

Construct	Item	Mean	Std. Deviation	Loadings	T Statistics	
Reward System (Cronbach's Alpha = 0.93)	RS1: rewards are based on performance	4.92	1.89	0.92	56.11	***
	RS2: rewards for managers increase as their performance improves	5.09	1.87	0.93	52.91	***
	RS3: rewards are directly tied to performance	5.16	1.76	0.93	61.85	***
	RS4: rewards for the top 25% in performance higher than for the bottom 25%	4.95	2.00	0.87	28.21	***
The use of MAS information (Cronbach's Alpha = 0.86)	MAS1: future events	5.44	1.40	0.70	10.96	***
	MAS2: probability estimated information	5.37	1.45	0.79	13.92	***
	MAS3: non-economic information	5.31	1.36	0.68	14.04	***
	MAS4: broad factor external information	5.09	1.43	0.85	34.46	***
	MAS5: non-financial production	5.04	1.47	0.75	18.91	***
	MAS6: non-financial market information	5.20	1.33	0.80	24.53	***
Managerial performance (Cronbach's Alpha = 0.92)	MP1: planning	5.49	1.25	0.86	34.56	***
	MP2: investigating	5.34	1.30	0.84	33.51	***
	MP3: coordinating	5.69	1.26	0.88	33.32	***
	MP4: evaluating	5.37	1.19	0.86	34.43	***
	MP5: supervising	5.52	1.26	0.85	27.73	***
	MP6: staffing	5.43	1.27	0.82	26.33	***

\*\*\*Indicates that an item is significant at the .01 level (one-tailed)

TABLE 3 MEASUREMENT (OUTER) MODEL WITH RELIABILITY, VALIDITY AND CONSTRUCT CORRELATIONS

Construct	Mean	Standard deviation	Reliability		Validity				
			CR	$\alpha$	Convergent		Discriminant		
					CM	AVE	RS	MAS	MP
Reward System (RS)	5.03	1.71	0.95	0.93	0.83	0.83	0.91		
Use of MAS information (MAS)	5.24	1.08	0.89	0.86	0.58	0.58	0.26***	0.76	
Managerial performance (MP)	5.47	1.07	0.94	0.92	0.72	0.72	0.34***	0.56***	0.85

Note: CR: composite reliability;  $\alpha$ : Cronbach's alpha; CM: communality; AVE: average variance extracted; the square root of AVE for reflective constructs on the diagonal.

Reliability: CR > 0.7 or  $\alpha$  > 0.7

Validity: Loading factor > 0.70

\*\*\* Correlations are significant at the .01 level, one-tailed

Convergent validity: CR > AVE > 0.5; CM > 0.50

Discriminant validity: Square root AVE > correlation

TABLE 4 STRUCTURAL MODEL (INNER MODEL)

Path from	Path to	
	<i>The use of MAS information</i> ( $R^2 = 0.068$ )	<i>Managerial performance</i> ( $R^2 = 0.357$ )
The use of MAS information		0.507***
Reward systems	0.260***	0.211***

Note: \*\*\*Significant at the .01 level (one-tailed)

TABLE 5 STRUCTURAL MODEL (INNER MODEL)

Path (1)	Latent variable correlations (2)	Full model			Total effects (6)
		Direct effects (3)	Indirect effects (4)	Unanalysed relation (5)	
β1) Reward System -> Use of MAS information	0.260***	0.260***			0.260***
β2) Use of MAS information -> Managerial performance	0.562***	0.507***			0.507***
β3) Reward System -> Managerial performance	0.343***	0.211***	0.132	0.000	0.343***

Note:

\*\*\*Significant at the .01 level (one-tailed), using bootstrapping of 5000 resamples in SmartPLS  
 Column (4): Indirect effect result from multiplying significant path coefficients (0.260 x 0.507)  
 Column (5): Unanalysed relation: Differences between Total effects, Direct effects and Indirect effects (0.343– 0.211 – 0.132)

TABLE 6  
 EFFECT SIZE OF THE CONSTRUCT FOR MANAGERIAL PERFORMANCE

Exogenous (independent) variable	Endogenous (dependent) variable: Managerial performance			
	$R^2_{included}$	$R^2_{excluded}$	$R^2_{included} - R^2_{excluded}$	$f^2$
The use of MAS information	0.357	0.121	0.236	0.367
Reward System	0.357	0.318	0.039	0.061

Note: The  $f^2$  of 0.02, 0.15 and 0.35 indicates that the effect of a predictor latent variable is small, medium and large, respectively, at the structural level (Chin, 2010; Cohen, 1988)

TABLE 7  
 TESTING GROUP DIFFERENCES

Panel A: Path( $\beta$ )	SOEs	POEs	FOEs
Reward System -> The use of MAS information	0.24*	0.27**	0.24**
The use of MAS information -> Managerial performance	0.61***	0.53***	0.44***
Reward System -> Managerial performance	0.09	0.17**	0.33***
Panel B: Calculate z value: $z = 0.5[\ln(1+\beta) - \ln(1-\beta)]$	SOEs	POEs	FOEs
Reward System -> The use of MAS information	0.25	0.28	0.24
The use of MAS information -> Managerial performance	0.71	0.59	0.47
Reward System -> Managerial performance	0.09	0.17	0.35
Panel C: Calculate observed value of z ( $z_{obs}$ ) $= (z1-z2)/SQRT[1/(N1-3)+1/(N2-3)]$	SOE vs POE	SOE vs FOE	POE vs FOE
Reward System -> The use of MAS information	-0.15	0.03	0.20
The use of MAS information -> Managerial performance	0.61	1.10	0.66
Reward System -> Managerial performance	-0.43	-1.20	-0.99

\*\*\*, \*\*, \* Significant at the .01, .05, .10 level (one-tailed), respectively