Management Accounting System in Public Healthcare Entities: Evidence from Vietnam

ABSTRACT

Objective: This study aims to examine the influence of contingency factors as market competition and organisational size on the effectiveness of the management accounting system (MAS) design in Vietnamese public healthcare entities.

Method: Data were collected from 165 respondents working in Vietnamese public healthcare entities. PLS-SEM techniques were used to test the proposed model. Besides, the common method bias was assessed by employing the one single factor test and marker variable technique.

Originality/Relevance: A previous study shows that healthcare managers in Vietnam find MAS information to improve performance in several aspects. However, this study does not indicate whether or not MAS has an impact on managerial performance. Besides, according to contingency theorists, MAS should be designed in line with contextual factors to enhance performance. This study aims to address these gaps.

Results: The results reveal that market competition is positively associated with four characteristics of MAS design as scope, timeliness, integration, and aggregation. The size of healthcare entities only positively correlates with two characteristics as integration and aggregation. All these four characteristics allow an increase in managerial performance.

Theoretical/Methodological contributions: With respect to the literature on healthcare sectors in Vietnam, this study extends the works of Pomberg et al. (2012) and Fung (2012) by indicating market competition and organisational size driving MAS to design more sophisticated in order to improve managerial performance. Besides, this paper contributes to the literature on public sectors by following a suggestion of Van Helden (2005), who urges the researcher should focus more on other management accounting topics than budgeting and performance evaluations, and use survey-based methods in public-sector research. Lastly, this study is the first study examining the impact of contingency factors as the organisational size on the effectiveness of MAS design, which is the assumption of most studies on management accounting.

Keywords: Competition; Healthcare sectors; Management accounting system; Managerial performance; Public sectors.

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1 INTRODUCTION

A substantial body of accounting literature suggests that a management accounting system (MAS) induce performance in healthcare entities (Campanale et al., 2014; Hammad et al., 2013; Macinati & Anessi-Pessina, 2014; Pizzini, 2006). However, lack of attention has been paid to the public healthcare sectors in an emerging economy like Vietnam. Vietnamese healthcare context provides a unique researched opportunity, which is no longer existed in emerged economy, because of the changes in the regulatory framework in recent years. It drives Vietnamese healthcare entities to respond quickly by developing MAS, which promises cost-saving and improve performance (Pomberg et al., 2012). However, it is not clear whether or not MAS has positive effects on managerial performance (Fung, 2012). Also, contingency theorists strongly suggested that MAS design should fit with contextual factors to foster its positive effects on managerial performance (Mia & Chenhall, 1994; Soobaroyen & Poorundersing, 2008).

Thus, addressing these gaps is necessary to shed light on this issue. The paper aims to examine the impact of contextual factors on the design of MAS and its effects on managerial performance. Particularly, drawing from contingency theory, this paper proposes that market competition and organisational size drive healthcare entities design MAS in the extent to which this system provides more board scope, timely, aggregated, integrated information. In turn, these allow users to improve their performance.

Compared to previous studies, this paper provides some crucial contributions to the literature threefold. First, in the contributions to management accounting research in emerging economies, the results of this study extend the knowledge in Vietnamese healthcare contexts. In particular, Fung (2012) suggested that future studies should examine whether or not MAS affects managerial performance in the Vietnamese healthcare sectors. By indicating that four types of MAS information foster managerial performance, the results overcome this gap. Besides, he also suggested future studies should indicate a specific force, which is resulted from the regulation changes, triggers the development of management accounting information system for improvements.

Second, the literature in public-sectors management accounting is benefited from this study. Particularly, Van Helden and Uddin (2016) argued that although the literature in public-sector management accounting is well established, there are lack studies conducted in emerging countries. As a result, it hinders the extension of the developing management accounting practices in public sectors in these economies. By focusing on MAS in public healthcare entities in Vietnam, this study enlightens this literature body by showing that the fit between MAS design and contextual factors (e.g., market competition and the size of healthcare entities) induces managerial performance. Besides, this study complements with Van Helden (2005) by using survey method to collect data and focusing on the topic relating to MAS design.

Third, with respect to contingency-based research in management accounting, this study highlights the role of organisational size as a crucial contextual factor in MAS design. Chenhall (2003) argued that although typical assumptions are that a large organisation is more likely to adopt a more sophisticated MAS for control, there is a lack of study explicitly considering this variable as a contextual variable. By showing that organisational size is correlated with the sophisticated of MAS design, this paper highlights the crucial role of the contextual factor as organisational size in the contingency study.

The structure of this paper is organised as follows. In the next section, this paper reviews the literature and develops hypotheses. The data collection, variable measurements, and

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methodology used were presented after. The subsequent sections show the results of this study. The last two sections indicate the discussion and conclusion of this study.

2 THEORETICAL BACKGROUNDS

2.1 Vietnamese Healthcare Backgrounds

Before *Doi Moi*, an economic policy, the Vietnamese healthcare system is under the control of the Vietnamese Ministry of Health. After that, the degree of this control is declining due to the implementation of serials of the health reforms. These reforms consist of three non-exclusive phrases (see Ramesh, 2013 for more insight into the Vietnamese healthcare system). These reforms have a dramatical impact on the Vietnamese healthcare market, particularly public healthcare entities. One notable impact is that the source of financing in the healthcare entities is mainly from on out-of-pocket payments. One reason is that public healthcare entities are no longer received funds from the government due to the autonomisation regulated by the decree (London, 2013).

The reforms also lead to drastic competition among healthcare entities in Vietnam. In recent years, due to the legalisations allowing the participation of private sectors, the competitive pressure pressurises the operations of public healthcare entities (World Bank, 2001). Besides, public healthcare entities at the provincial levels need to compete with ones at the central levels to keep and attract patients (Ramesh, 2013). Thus, public healthcare entities are under pressure of competition while they have a lack of funding from the governments.

2.2 MAS and MAS Design

MAS refers to the embracement of structure, form, and information to assist managerial decisions (Chenhall, 2003). As such, a system as MAS is expected to provide useful information for decision-makers. It should be noted that the two terminologies, like MCS and MAS, are used interchangeably (Chenhall, 2003, p. 129). In order to provide useful information for decision-makers, MAS should be adequately designed. Four characteristics of information, including scope, timeliness, aggregation, and integration, represents the sophistication of MAS design (Chenhall & Morris, 1986). The first characteristic is the coverage of the focused dimensions, qualifications, and time horizons. The second characteristic describes the speed of informational provisions upon requests. The third characteristic is the informational categorisation by functional areas or periods, and as such, this categorisation allows information to be used for formal decision models or analytical models. The last characteristic refers to information which reflects a precise target for activities, the interrelationship between departments within an organisation as well as the interaction between these departments.

2.3 Contextual Factors

Contingency theorists argue that the design of MAS cannot be applied universally to all organisations (Emmanuel et al., 1990). It is suggested that MAS design depends on specific contexts, in which the organisation operates. Pomberg et al. (2012) revealed that the perceived usefulness of MAS information is different between small and large healthcare entities in Vietnam. Besides, this study also argued that the Vietnamese healthcare market is more and more competitive, and as such, encourages the use of MAS for performance

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improvement purposes in these entities. And, it is addressed that the MAS design needs to be aligned with market competition (Ghasemi et al., 2016; Patiar & Mia, 2008), and organisational size (Haldma & Lääts, 2002). Therefore, this study takes into account these two factors when examining the impact of them on MAS design in Vietnamese public healthcare entities (see Figure 1).
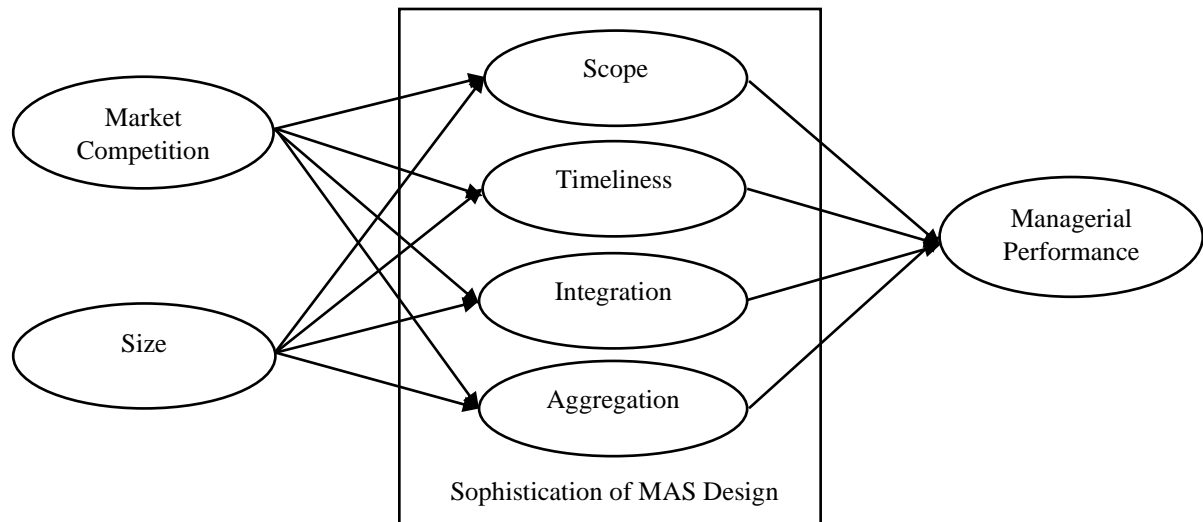

Figure 1. Research Framework

2.4 The Relationship between Market Competition and MAS Design

Market competition intensively increases when competitors' products and services are offered at competitive rates, and as a result, creates pressure on organisations. Previous studies suggest that a high degree of market competition demands a high use of MAS (Hill, 2000; Khandwalla, 1972; Mia & Clarke, 1999)

Ghasemi et al. (2016) found that market competition induces organisations to design more sophisticated MAS. In particular, these results reveal that when the external environment is competitive, decision-makers require some crucial characteristics of MAS assisting the daily operations such as scope, timeliness, integration, and aggregation. Similarly, it is expected the similar effects in Vietnamese healthcare entities. More specifically, the staff members working in these entities are more likely to require the MAS design in the extent to which it provides more board scope, timely, integrated, and aggregated information, to deal with high forces of market competition. This argument allows the proposal of the following hypothesises.

H1a: Market competition positively affects board scope MAS information.
H1b: Market competition positively affects high timely MAS information.
H1c: Market competition positively affects high integrated MAS information.
H1d: Market competition positively affects high aggregated MAS information.

2.5 The Link Between the Size of Healthcare Entities and MAS Design

The size of healthcare entities may have an impact on MAS design in Vietnamese healthcare entities. More specifically, the growth in size requires these healthcare entities to decentralise their decision-making authority (e.g., the right, power or obligation to make the

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decision) (see Lal, 1991). When healthcare entities become larger, there is more department, and as such leads to the decentralisation of decision-making authority (see Meyer, 1968). It implies that the decision-making authority is delegated to the lower management levels of healthcare entities when these entities has decentralised structure (see Kelley, 1993). As a consequence, this structure allows the managers of these entities to have more right, power or obligation to independently make a decision regarding their areas of responsibility (e.g., planning, evaluating, coordinating, etc.) and to be responsible for the success or failure of these such decisions. Hence it drives these managers to require more information to make decisions effectively. A sophisticated MAS, providing more board scope, integrated, timely, and aggregated information, allows high performance in decentralised organisations (see Chia, 1995). Thus, the decentralised structure requires healthcare entities to design more sophisticated MAS (see Ern et al., 2016), and this system provides more board scope, integrated, timely, and aggregated information to enhance the quality of decisions of the managers (Ghasemi et al., 2016). Taken together, the size of healthcare entities has a positive impact on the sophistication of MAS design. This argument allows the development of the next hypothesis as follows.

> *H2a: The size of healthcare entities positively affects board scope MAS information.*
> *H2b: The size of healthcare entities positively affects timely MAS information.*
> *H2c: The size of healthcare entities positively affects integrated MAS information.*
> *H2d: The size of healthcare entities positively affects aggregated MAS information*

2.6 The Role of MAS Design on Managerial Performance

The results from previous studies strongly demonstrate the positive impact of each characteristic of MAS on managerial performance (Chong, 1998; Chong & Eggleton, 2003; Etemadi et al., 2009; Ghasemi et al., 2016; Ghasemi et al., 2019; Soobaroyen & Poorundersing, 2008). In a healthcare context, MAS information may enhance healthcare managers' performance. It is suggested managers can find improvements in their performance if the organisation focuses on enhancing the extent of four characteristics such as scope, timeliness, integration, and aggregation (Hammad et al., 2013; Hammad et al., 2010). Thus, it is expected the same effects in public healthcare entities in Vietnam. In a specific way, in these entities, the managers can find their performance enhancement thank the sophisticated MAS design. This argument leads to the third hypothesis was proposed as follows.

> *H3a: Broad scope MAS positively affects managerial performance.*
> *H3b: Timely MAS information positively affects managerial performance.*
> *H3c: Integrated MAS information positively affects managerial performance.*
> *H3d: Aggregated MAS information positively affects managerial performance.*

3 RESEARCH METHODS

3.1 Sampling and Data Collections

Because there is not publicity data, this study relies on the convenience sampling technique, which allows data to be collected from the provincial healthcare entities (see Le et al., 2010 for more details of the levels of public healthcare in Vietnam) located around *Can Tho city*, one of the biggest cities in the south of Vietnam. Particularly, personal networking with a student from the master of accounting class allows this paper to conveniently collect the data for the analysis. This student has strong networking with a person working in the

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health department of *Can Tho city*. This person is currently working in an important position in the health department. This person agreed to assist the data collection by sending emails to public healthcare entities located in *Can Tho city*. Thus, the population of the sample (e.g., the number of managers working at the healthcare entities) is unknown to this study. Besides, due to the difficulty in data collection, this study does not use the pilot test before sending the survey to target respondents.

Data collection was from 1st of June to 15th of July of 2019. Similar to Hammad et al. (2013) and Radford et al. (2007), the target respondents are the managers working at the hospitals and healthcare centres. A constrained question was inserted into the survey to request the respondents to indicate their management position (e.g., Are you in charge of managerial positions? Yes/No) to ensure the appropriateness of target respondents. In total, 165 observations were collected and used for the analysis.

This study only focuses on public healthcare entities rather than private ones due to the following reasons. First, there are only two private hospitals, and there is no private healthcare centre in *Can Tho city*. Hence, this study focuses on public healthcare entities due to the domination of public healthcare entities in Vietnam (Ramesh, 2013). Second, because one of the purposes of this is to seek for the answer of Fung (2012) who indicated that whether or not information from MAS allows the improvement of managerial performance in Vietnamese healthcare entities.

3.2 Measures

This study relies on the measure adopted from previous studies. Due to the original instruments written in English, a translation to Vietnamese is necessary. After translation, these instruments were examined carefully by a chief accounting, who has rich experiences with MAS in public healthcare entities. Hence, this assistance allows the minimum noise during the translation. There are seven measures used in the main analysis and two measures in the additional analysis (see Appendix).

3.2.1 Market Competition (COM)

The instrument measuring market competition was adapt from the study of Mia and Clarke (1999). According to the pilot test of this study (e.g., interviewing with managers), unit managers perceive the pressure of market competition, and as such, individuals who are in charge of managerial position are capable of rating these items regarding this instrument. Since the sample of this study consists of respondents, who are responsible for the managerial position, there is no issue regarding the appropriateness of respondents. There are seven items in this measure.

3.2.2 Healthcare Entity's Size (SIZ)

In previous studies on MAS in healthcare industries, organisational size is commonly measured by numbers of beds or employees (see Agarwal et al., 2016; Kocisova et al., 2019; Poba-Nzaou et al., 2014). Because this study's sample includes respondents working in not only hospitals but also other healthcare organisations, the number of beds is infeasible to measure the size of healthcare entities. Johnston and Warkentin (2008) used the numbers of employees to measure the size of healthcare organisations as the hospital, clinic, and other medical practice organisations. In this study, employees were asked to indicate the number of employees working in their organisations. Thus, employee numbers are an appropriate measure in this study. Similar to the study of Holm and Ax (2020), the natural logarithm of the number of employees was used to measure the size of healthcare entities. Because the

sample of this study includes employees who are in charge of management levels, there is no concern with the appropriateness of respondents who filled the survey. There is one item in this instrument.

3.2.3 The Sophistication of MAS Design

This study relies on the instrument from the study of Chenhall and Morris (1986) to capture the sophistication of MAS design. Besides, according to them, this instrument is compatible with these respondents, who are responsible for management levels because managers are more likely to use MAS information for making decisions. This instrument consists of 19 items measuring four characteristics of MAS information. Particularly, there are five items measuring scope (SCO), four items measuring timeliness (TIM), three items measuring integration (INT), and seven items measuring aggregation (AGG).

3.2.4 Managerial Performance (PER)

Similar to the study of Hammad et al. (2013), to operationalise this instrument, it is advised to adapt the instrument from the study of Mahoney (1963). There are nine items in this measure.

3.3 Assessment of Normality

The results of the Kolmogorov-Smirnov and Shapiro-Wilk test show a deviation from normality (Ali et al., 2018). Thus, partial least square structural equation modelling (PLS-SEM) does not require the data to be normally distributed and large sample size (Cassel et al., 1999; Hair et al., 2017) and capable of handling a single- item construct as the size of healthcare entities (see Bontis et al., 2007).

3.4 Assessment of Common Method Bias

Due to all measures collected from the same survey, it may subject to common method bias. However, this study is no longer subject to common method bias because of the two following assessments. First, the results from Harman's single-factor test reveal that total variance, which is explained by a single factor, is less than 50% (e.g., 24.212%). Second, the results from Pearson's correlation indicates marker variable (MKR) (see Appendix) has no significant relationship with other main variables of this study (see Lindell & Whitney, 2001).

3.5 Analytical Procedures

This study used SmartPLS version 3.2.7, a PLS-SEM tool, to test the proposed hypothesis. First, it evaluates the measurement model by assessing the psychometric properties of these measures. Second, it examines the structural model by estimating the structural parameters of the model.

Regarding measurement models, this study firstly evaluates the unidimensionality of constructs by using principal axis factoring with Oblimin rotation (see Fabrigar et al., 1999). Using SPSS allows this paper to perform this test. Next, this study assesses convergent validity, discriminant validity, internal consistency of measures and multicollinearity among items using SmartPLS. The validity of the measurement model is established when these criteria are satisfied.

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For structural models, this study evaluates multicollinearity between latent variables, the predictive validity of the parameter estimates, and predictive power by using SmartPLS before assessing the significant degree of hypotheses.

Last but not least, it is suggested that MAS design should be fit with contextual factors to foster its effectiveness (see Otley, 2016). Thus, this paper follows the cartesian contingency approach to assess the fits. This approach requires the examination of the mediating effects of MAS design on the relationship between two contextual factors and managerial performance (seeGerdin & Greve, 2004). The mediating effects, which represent the Cartesian contingency fits, require rigid statistical procedures to evaluate (Burkert et al., 2014). Thus, this study relies on the statistical procedure illustrated by Zhao et al. (2010). SmartPLS is suitable for assessing the mediating effects (see Hair et al., 2017 for more details).

4 RESULTS

4.1 Descriptive Statistic of the Respondents

The most important is the appropriateness of target respondents. The results reveal that 165 respondents rate themselves as in charge of the management level of the healthcare entities. Thus, these data can be used for further analysis. Table 1 displays the respondents' and healthcare entities' characteristics. Panel B demonstrates the characteristics of the respondents' working places.

Table 1
Respondents' and healthcare entities' characteristics

Panel A: Respondents' characteristics	Frequency	%
Management level		
Lower managers	75	45.45
Middle managers	51	30.91
Top managers	15	9.09
Not specified	24	14.55
Experience at the current position		
Less than one year	4	2.42
1-5 year	70	42.42
6-10 year	59	35.76
11-15 year	29	17.58
15-20 year	3	1.82
Panel B: Characteristics of the respondents' working places		
Type		
Hospitals	144	87.27
Healthcare centres	21	12.73
Number of employees		
<150	65	39.39
150-250	40	24.24
250-350	21	12.73
350-450	10	6.06
>450	29	17.58

4.2 Hypothesis Testing
4.2.1 Evaluating Measurement Model

The results from the unidimensionality analysis show six components extracted, which correspond to the number of intended constructs except for four items, such as AGG_3, AGG_6, COM_5, and COM_6. These items have to be removed because their loadings are below the 0.50 threshold value suggested by Hair et al. (2006). The removal is due to that a valid item is needed to have a good loading (e.g., over 0.5) on its respective factor to represent well this factor.

Table 2 shows that the average variance extracted (AVE) of all of the constructs was higher than the 0.50 threshold. The result also indicates that all items load to their respectively intended constructs. These loadings are from the lower bound of 0.76 to the upper bound of 0.895 (excluding the single item construct as SIZE). Thus, it confirms the convergent validity of all constructs (Fornell & Larcker, 1981).

The assessment of discriminant validity requires the assessment of the square root of the AVE. Table 3 shows this value of each latent variable is necessarily higher than any correlation between this variable and other latent variables (Fornell & Larcker, 1981). Therefore, discriminant validity is established (Chin, 1998).

Table 2
Dillon-Goldstein's rho, Composite Reliability, AVE, and $\sqrt{AVE}$ of constructs

	Dillon-Goldstein's rho	CR	AVE	$\sqrt{AVE}$
AGG	0.915	0.936	0.744	0.863
COM	0.921	0.925	0.713	0.844
INT	0.806	0.872	0.694	0.833
PER	0.942	0.949	0.675	0.822
SCO	0.854	0.895	0.630	0.794
SIZ	1.000	1.000	1.000	1.000
TIM	0.893	0.922	0.748	0.865

Table 2 shows that composite reliability (CR) values and Dillon-Goldstein's rho (or Jöreskog's ϱ) are both higher than the 0.70 threshold value (Hair et al., 2011; Henseler et al., 2009). Thus, internal consistency is well established.

Table 3
Discriminant validity of constructs

	AGG	COM	INT	PER	SCO	SIZ	TIM
AGG	**0.863**						
COM	0.243	**0.844**					
INT	0.420	0.178	**0.833**				
PER	0.293	0.042	0.350	**0.822**			
SCO	-0.019	0.198	0.021	0.361	**0.794**		
SIZ	0.299	0.006	0.263	0.104	0.106	**1.000**	
TIM	-0.011	0.299	0.035	0.338	0.451	0.117	**0.865**

Lastly, the results indicate that the VIF values of the items are less than the threshold value of 5. Thus, multicollinearity among both the measurement items is absent (Hair et al., 2011).

4.2.2 Estimating Structural Model

In the next step, it is necessary to estimate the structural model when the validity of the measurement model is established. Following the suggestion of Hair et al. (2011), this study uses a bootstrapping procedure with 5,000 replacements to assess the significance of parameter estimates.

Table 4
R^2, Q^2, and VIFs between latent variables

	R^2	Q^2	VIFs						
			AGG	COM	INT	PER	SCO	SIZ	TIM
AGG	0.147	0.098	-	-	-	1.215	-	-	-
COM	-	-	1.000		1.000	-	1.000		1.000
INT	0.100	0.055	-	-	-	1.216	-	-	-
PER	0.313	0.191	-	-	-	-	-	-	-
SCO	0.050	0.026	-	-	-	1.255	-	-	-
SIZ	-	-	1.000	-	1.000	-	1.000	-	1.000
TIM	0.103	0.068	-	-	-	1.256	-	-	-

Table 4 shows that these VIF values less than the threshold value of 5, and thus multicollinearity between latent variables is not present (Hair et al., 2011). According to Table 4, Stone-Geisser Q^2-test (Geisser, 1974; Stone, 1974) are all higher than zero, and predictive validity of the parameter estimates is sufficient (Chin, 1998; Hair et al., 2011). It establishes the model fit. Besides, Table 4 reports the R-square value of endogenous latent variables in the model. Particularly, the R-square value of PER is 31.3%. It means that 31.3% of the variance in the small businesses' performance is explained by the four characteristics of MAS design (e.g., board scope, integrated, timely, and aggregated information) (see Chin, 2010). This value is sufficient because Sanchez (2013) considered R-square value between 0.3 and 0.6 as moderate.

Finally, the magnitude and strength of the paths were examined (see Figure 2). The results show that market competition is positively and significantly associated with broad scope (β=0.198, p=0.014), timely (β=0.299, p<0.001), integrated (β=0.176, p=0.023), aggregated (β=0.241, p=0.002) MAS information. Thus, hypothesis H1a, H1b, H1c, and H1d are all supported respectively. Additionally, the size of healthcare entities also is positive and have a significant correlation with integrated (β=0.262, p<0.001), and aggregated (β=0.297, p<0.001) MAS information. However, this variable is not significantly associated with broad scope (β=0.104, p=0.175) and timely (β=0.116, p=0.131) MAS information. Therefore, it only provides evidence supporting hypotheses H2c and H2d. Lastly, there are positive and significant relationship between managerial performance and broad scope (β=0.263, p<0.000), timely (β=0.212, p=0.002), integrated (β=0.256, p=0.001), aggregated (β=0.193, p=0.013) MAS information respectively. As a consequence, it supports hypothesis H3a, H3b, H3c, and H3d.

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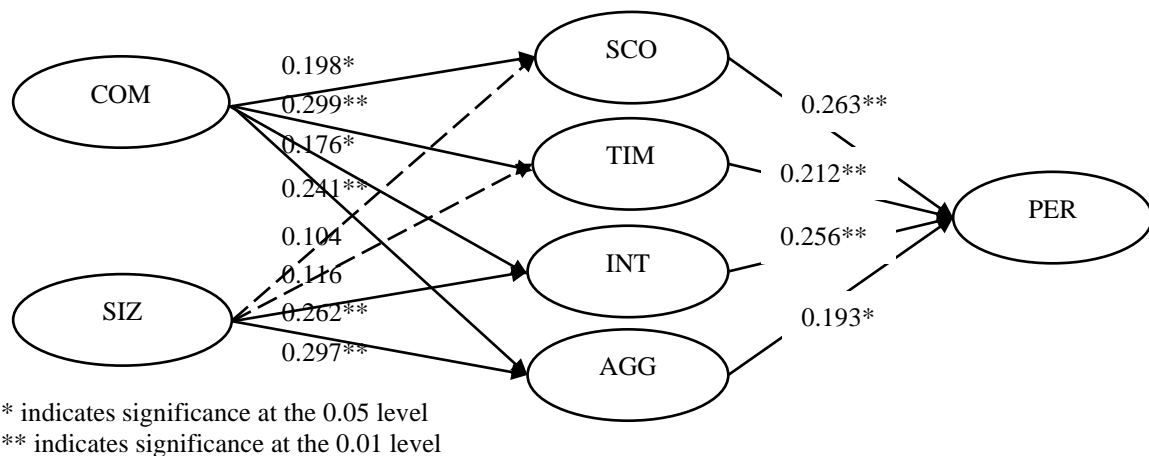
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Figure 2. Results of the structural model

4.2.3 Assessing Mediating Effects

Table 5 shows the results of the mediating assessments. This table shows that broad scope is the mediator of the relationship between market competition and managerial performance because of the satisfaction of three conditions. First, the path between market competition and broad scope is significant (a_{c1}=0.197, p=0.013). Second, the path between broad scope and managerial performance is also significant (b_1=0.288, *p*<0.001). Third, the indirect path (COM -> SCO -> PER) is significant (0.057, *p*=0.046), and the confidence interval of this path is between 0.011 and 0.122, which excludes zero. Therefore, the scope is the mediator. Furthermore, the direct path between market competition and performance is significant (c_1=-0.217, p=0.001). Therefore, broad scope partially mediates the relationship between market competition and managerial performance.

The same analysis reveals timeliness and aggregation both partially mediates the relationship between market competition and managerial performance. It also indicates integration and aggregation both partially mediates the relationship between the size of healthcare entities and managerial performance. Thus, the Cartesian contingency fit between timeliness, aggregation and market competition allows the improvement of managerial performance, while the Cartesian contingency fit between integration, aggregation and the size of healthcare entities induces managerial performance.

4.3 Additional Analysis

This study employs two more tests to examine the robustness of the results. First, due to the sample of this study consisting of hospitals and healthcare centres, this study re-runs the analysis again with the sample, including only hospitals. The results show some consistencies with the findings from Hammad et al. (2013). Second, due to the criticism of the use of self-rating measuring managerial performance, this study includes one variable measuring past formal performance evaluation in the model. The results indicate a significant positive correlation between managerial performance and this variable. Hence, it is safe to conclude that the results are robust.

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Table 5
Results from mediating evaluations

	Path coefficients					Indirect effects		
	To PER	To SCO	To TIM	To INT	To AGG	Estimate	SE	Bootstrap 95% CI
From COM	$c_1=-0.217$	$a_{c1}=0.197$	$a_{c2}=0.298$	$a_{c3}=0.175$	$a_{c4}=0.240$			
	p=0.001	*p=0.013*	*p<0.001*	*p=0.026*	*p=0.002*			
From SIZ	$c2=-0.128$	$a_{s1}=0.104$	$a_{s2}=0.121$	$a_{s3}=0.272$	$a_{s4}=0.303$			
	p=0.048	*p=0.176*	*p=0.110*	*p<0.001*	*p<0.001*			
From SCO	$b_1=0.288$							
	p<0.001							
From TIM	$b_2=0.279$							
	p<0.001							
From INT	$b_3=0.295$							
	p<0.001							
From AGG	$b_4=0.272$							
	p=0.001							
COM -> SCO -> PER						0.057	0.059	[0.011; 0.122]
						p=0.046		
COM -> TIM -> PER						0.083	0.086	[0.031; 0.156]
						p=0.010		
COM -> INT -> PER						0.052	0.054	[0.005; 0.114]
						p=0.059		
COM -> AGG -> PER						0.065	0.066	[0.020; 0.128]
						p=0.023		
SIZ -> SCO -> PER						0.030	0.031	[-0.012; 0.083]
						p=0.216		
SIZ -> TIM -> PER						0.034	0.034	[-0.004; 0.090]
						p=0.147		
SIZ -> INT -> PER						0.080	0.082	[0.030; 0.151]
						p=0.009		
SIZ -> AGG -> PER						0.082	0.082	[0.032; 0.159]
						p=0.010		
Total: COM -> PER						0.257	0.265	[0.154; 0.352]
						p<0.001		
Total: COM -> PER						0.226	0.229	[0.119; 0.342]
						p<0.001		

5 DISCUSSIONS

As indicated by Pomberg et al. (2012), the healthcare market in Vietnam is more and more competitive. In the same vein, Ramesh (2013) revealed that Vietnamese hospitals are more likely to be driven by the revenue due to the high pressure of competition. As a result, healthcare entities consider MAS to create completive advantages (see Kaplan, 2006). However, there is not clear how this competitive force influences the sophistication of MAS design. The results of this paper shed lights on this issue. Particularly, a high degree of market competition is positively associated with the sophistication of MAS design, which is represented by four characteristics like scope, timeliness, integration and aggregation. This finding implies that healthcare entities in Vietnam design their MAS sophisticatedly because of the increasing pressure of market competition. It is in line with previous findings. For example, Hoque (2011) showed that one of the forces driving the change of MAS is the intensity of competition. This change demands organisations to adopt a more sophisticated MAS design (Ern et al., 2016). In the same vein, Ghasemi et al. (2016) found that market competition has a positive correlation with four MAS characteristics as scope, timeliness, integration, aggregation.

Besides, Pomberg et al. (2012) observed that informational users working at the small hospitals perceive the usefulness of management accounting information for the measurement of costs of medical treatments different from the users working at the large entities and only a few small entities consider accounting information to be useful for the decision-making process. The results of this study seem to support this observation because the entities' size is positively associated with integrated and aggregated MAS information, respectively.

The reason, which the size of healthcare entities is only two characteristics of MAS design as integration and aggregation, is that these characteristics have crucial when the structure of these entities changes from centralisation to decentralisation due to the growth in size. A larger entity tends to adopt a more decentralised structure (see Chenhall, 2003; Merchant, 1981). According to Soobaroyen and Poorundersing (2008), the integrated information is the information categorised by functional areas or periods, and as such, this categorisation allows information to be used for formal decision models or analytical models. Besides, the aggregated information refers to information which reflects a precise target for activities, the interrelationship between departments within an organisation as well as the interaction between these departments. These two characteristics of MAS design were shown to be crucial to decentralised organisations because these characteristics are important to support the managers to recognise the complexities and interdependencies resulted from decentralisation to fulfil their tasks (see Chenhall & Morris, 1986). Thus, it implies that when healthcare entities increase in size, they are more likely to follow decentralised structure, which in turn, the managers perceive these types of information to be useful for the decision-making process. It explains a positive correlation between the size of healthcare entities and two characteristics of MAS design as integration and aggregation.

The results also indicate that managerial performance is positively associated with the sophistication of MAS design. This implies that the managers find four characteristics of MAS as scope, timeliness, integration, and aggregation to be crucial for performance improvement. This may be caused by the unique characteristics of the healthcare market in Vietnam, which cannot be found in other countries. It is argued that unlike other typical public healthcare entities in other countries (e.g., Thailand and Hongkong), which receive fund from their government, Vietnamese healthcare entities behave differently (Ramesh, 2013). Particularly, these entities in Vietnam are driven by the revenue due to the lack of

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funding from government (London, 2013; Ramesh, 2013). This situation drives the managers to optimise their task to find performance. As the role of MAS to provide useful information for decision-making, they find this system to be useful to improve their performance. This is in line with Soobaroyen and Poorundersing (2008), who found a positive correlation between the sophistication of MAS design and managerial performance.

The results indicate that the Cartesian contingency fit between market competition and three characteristics of MAS design as scope, timeliness, and aggregation respectively induces managerial performance of the managers in healthcare entities in Vietnam. It implies that when the pressure of market competition increases, broad scope, timely, and aggregated information is crucial for the improvement of managerial performance. Particularly, high market competition poses a high degree of uncertainty in the decision-making process. High certainty requires managers to search for information, and as such, enhances their effectiveness of the decision-making process to find performance improvement. Since broad scope information relates to the external environment, and timely information refers to the speed of information supply, these two characteristics allow the managers to quickly reduce uncertainty by continuously scanning and monitoring competitors' behaviour to develop action plans. Besides, aggregated information is particularly useful when there is high uncertainty regarding external environment because this improves the effectiveness of decision-making by enhancing the ability to use intuition and judgement (see Ashill & Jobber, 1999). As a result, these characteristics allow the managers to reduce uncertainty in decision-making resulted from market competition to improve their performance. These results are in line with Ghasemi et al. (2016), who found scope, timeliness and aggregation mediate the relationship between market competition and managerial performance.

Finally, the results reveal that the Cartesian contingency fit between the size of healthcare entities and two characteristics of MAS design (e.g., integration and aggregation) allows the enhancement of managerial performance. It is interpreted that when the healthcare entities grow in size, the managers perceive integrated and aggregated information to be useful. As mentioned above, managerial tasks in a large healthcare entity require the managers to seek information to recognise the complexities and interdependencies resulted from decentralisation. Thus, these managers value integrated and aggregated information in assisting their tasks to find performance improvement rather than broad scope and timely information when they work in large healthcare entities.

6 CONCLUSIONS

This paper aims to gain insights into the influences of market competition and the size of healthcare entities on MAS design as well as the impact of this design on managerial performance in public healthcare entities in Vietnam. The results show that a high degree of market competition demands MAS to be sophisticatedly designed in the extent to which it provides more broad scope, timely, integrated, and aggregated information. Additionally, the size of healthcare entities influences only the sophistication of MAS design in these entities in the extent to which it provides more integrated and aggregated information. Finally, four characteristics of sophisticated MAS design have a positive influence on managerial performance in these entities.

Similar to any research, the results of this study should be interpreted with some limited concerns. First, the convenience sampling technique allows this paper's data to be collected by sending the survey to the respondents working in healthcare entities located at *Can Tho City*. Hence, it is problematic to generalise these results to other areas in Vietnam

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because this technique allows the paper to collect data conveniently without taking into account rigorous criteria of statistical sampling theory (Gobo, 2008). Second, missing the pilot test may pose a bias in the findings because the translated questionnaire may be complicated for some respondents. However, this bias is at the minimum because this questionnaire was carefully examined by chief accountants, who have rich experiences with MAS in public healthcare entities.

Despite some limitations, this study provides a fruitful avenue for future studies. First, the future study can examine the impact of MAS design on technology efficiency in provincial and district hospitals to gain more insight into the issue suggested by Fung (2012). Second, in the extension of this study, future studies should investigate the impact of MAS design on organisational outcomes such as efficiency and effectiveness Abernethy and Lillis (2001). In this way, it improves our understanding of the use of MAS information for organisational improvement.

APPENDIX

Market Competition (COM)
Please indicate the extent to which you agree with the following statements
  1. The number of major competitors in the industry
  2. The frequency of technological changes in the industry;
  3. Competitors' assessment of marketing channels in the industry
  4. Competitors' package deals to customers in the industry
  5. Price manipulation of competitors in the industry
  6. The frequency of new products/services introduction in the industry
  7. The frequency of governmental changes regarding policy and regulations in the industry

Five point-scale Likert is applied for this instrument ranging from 1 ("very low") to 5 ("very high")

Healthcare Entity Size (SIZ)
   Please indicate the number of full-time employees in your entities: ....

Scope (SCO)
Please indicate the extent to which you agree with the following statements:
  1. Information that relates to possible future events.
  2. Quantification of the likelihood of future events occurring.
  3. Non-economic information.
  4. Information on broad factors external to your organisation.
  5. Non-financial information that relates to the efficiency, output rates, employee absenteeism, etc.

Five point-scale Likert is applied for this instrument ranging from 1 ("highly disagree") to 5 ("highly agree")

Timeliness (TIM)
Please indicate the extent to which you agree with the following statements:
  1. Requested information to arrive immediately upon request.
  2. Information supplied to you automatically upon its receipt into information systems or as soon as processing is completed.
  3. Reports are provided frequently on a systematic, regular basis.
  4. There is no delay between event occurring and relevant information being reported to you.

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Five point-scale Likert is applied for this instrument ranging from 1 ("highly disagree") to 5 ("highly agree")

Aggregation (AGG)

Please indicate the extent to which you agree with the following statements:

1. Information provided on the different sections or functional areas in your organisation.
2. Information on the effect of events on particular time periods.
3. Information that has been processed to show the influence of events on different functions.
4. Information on the effect of different sections' activities on summary reports for your department and the overall organisation.
5. Information in forms that enable you to conduct "what-if" analysis.
6. Information in format suitable for input into decision models.
7. Costs separated into fixed and variable components.

Five point-scale Likert is applied for this instrument ranging from 1 ("highly disagree") to 5 ("highly agree")

Integration (INT)

Please indicate the extent to which you agree with the following statements:

1. Information on the impact that your decision will have throughout your department, and the influence of other individuals' decisions on your area of responsibility.
2. Information on precise targets for the activities of all sections within your department.
3. Information that relates to the impact that your decisions have on the performance of your department.

Five point-scale Likert is applied for this instrument ranging from 1 ("highly disagree") to 5 ("highly agree")

Managerial performance (PER)

Please indicate your own performance regarding to the following functional dimensions:

1. Planning
2. Investigating
3. Coordinating
4. Evaluating
5. Supervising
6. Staffing
7. Negotiating
8. Representing
9. Overall performance

Five point-scale Likert is applied for this instrument ranging from 1 ("well below average") to 5 ("well above average")

Perceived Usefulness of Travelling (MRK)

Please indicate the extent to which you agree with the following statements:

1. Travelling helps people to learn more about local culture
2. Travelling helps people to reduce stress
3. Frequent travelling is necessary
4. Overall, travelling is good

Five point-scale Likert is applied for this instrument ranging from 1 ("highly disagree") to 5 ("highly agree")

Formal Performance Evaluation (EVA)

Please indicate your formal performance evaluation in last year:

Four point-scale is applied for this instrument ranging from

1. *Non-accomplishment of tasks*

2. *Accomplishment of tasks with limited capability*
3. *Good accomplishment of tasks*
4. *Excellent accomplishment of tasks*

(This measure is based on the Article 58 of the Law of Cadres and Civil Servants No. 22/2008/QH12)

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Sistema de Contabilidade Gerencial em Entidades de Saúde Pública: Evidências do Vietnã

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RESUMO

Objetivo*: Este estudo tem como objetivo examinar a influência de fatores de contingência, como concorrência no mercado e tamanho organizacional, na eficácia do* design *do sistema de contabilidade gerencial (SCG) em entidades de saúde pública vietnamitas.*

Método*: Os dados foram coletados de 165 entrevistados que trabalham em entidades de saúde pública vietnamitas. Técnicas de PLS-SEM foram utilizadas para testar o modelo proposto. Além disso, a tendência do método comum foi avaliada por meio do teste de fator único e da técnica variável de marcador.*

Originalidade/Relevância*: Estudo anterior mostra que os gerentes de saúde do Vietnã acreditam que as informações do SCG podem melhorar o desempenho em vários aspectos. No entanto, este estudo não indica se o SCG tem ou não impacto no desempenho gerencial. Ademais, de acordo com os teóricos de contingência, o SCG deve ser projetado de acordo com fatores contextuais para melhorar o desempenho. Este estudo visa abordar essas lacunas.*

Resultados*: Os resultados revelam que a concorrência no mercado está positivamente associada a quatro características do* design *do SCG: escopo, oportunidade, integração e agregação. O tamanho das entidades de saúde apenas se correlaciona positivamente com duas dessas características: integração e agregação. Todas essas quatro características permitem o aumento do desempenho gerencial.*

Contribuições teóricas/metodológicas*: Respeitando a literatura sobre os setores de saúde no Vietnã, este estudo estende os trabalhos de Pomberg* et al. *(2012) e Fung (2012), inserindo a concorrência no mercado e os tamanhos organizacionais, o que leva o SCG a projetar de forma mais sofisticada, para melhorar o desempenho gerencial. Além disso, esta pesquisa contribui para a literatura sobre setores públicos, seguindo uma sugestão de Van Helden (2005), que recomenda que o pesquisador se concentre mais em outros tópicos de contabilidade gerencial do que em avaliações de orçamento e desempenho, e que use métodos embasados em pesquisas no setor público. Por fim, este estudo é o primeiro a examinar o impacto de fatores de contingência, como o tamanho organizacional, na efetividade do* design *do SCG, que é o pressuposto da maioria dos estudos sobre contabilidade gerencial.*

Palavras-chave*: Competição; Setores de saúde; Sistema de contabilidade gerencial; Desempenho gerencial; Setores públicos.*

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