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Management Control Systems and Strategy: A Resource based Perspective. Evidence from Greece

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ARTICLE INFO	ABSTRACT
<p>Article History Received 5 March 2017; Accepted 25 June 2017</p> <hr/> <p>JEL Classifications M49, M19.</p>	<p>Purpose: The purpose of this paper is to empirically examine from the resource-based perspective, the relationship between the use of management control systems (MCS) and organisational capabilities in the Greek context.</p> <p>Design/Methodology/Approach: The study follows Henri's (2006) methodology and explores the relationships between the diagnostic and interactive uses of performance measurement systems (PMS) and the five capabilities (e.g. market orientation, organisational learning, entrepreneurship, innovativeness and market responsiveness) leading to strategic choice. Structural equation modelling represents the relationships between the variables and data collected from the survey, which was analysed as a statistical tool with AMOS.</p> <p>Findings: Results revealed that diagnostic use of PMS negatively influence only the organisational learning, while the interactive use positively interacts with most of the capabilities.</p> <p>Research limitations/implications – This study can be further extended by incorporating more factors in the proposed model, such as environmental uncertainty, size and organisational culture, and examine their possible effect on the relationship between PMS uses, organisational capabilities and performance.</p> <p>Originality/Value: There is no similar empirical research in the context of Greece.</p>
<p>Keywords: Management Control Systems (MCS); Strategy; Capabilities; Business Performance; Confirmatory Factor Analysis and Structural Equation Modelling.</p>	

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1.Introduction

Danneels (2002) argues that since the business environment is rapidly changing in terms of customers, technologies and competition, firms should continuously renew themselves if they want to survive and succeed, both in the short and long term. Hurley and Hult (1998) believe that innovation, market-orientation and organisational learning are the primary capabilities that lead a company to competitive advantage and the creation of wealth. Ireland *et al.* (2001) add one more; entrepreneurship. All of these ideas come out of the so-called resource-based view (RBV) of the firm which has its roots in the theory of the growth of the firm developed by Penrose in 1959. Since then, many writers contributed to the development of this theory, which has become a very powerful theoretical framework and one of the most prevailing theories in the field of strategic management (Wernerfelt, 1984; Barney, 2001; Barney, Wright and Ketchen, 2001; Fahy, 2002; Hoopes, Madsen and Walker, 2003; and Chuang, 2004). RBV is based on the principle that competitiveness is a function of distinctive and valuable resources and, especially,

capabilities controlled by a firm (Henri, 2006).

Up to now, the vast majority of management accounting and strategy literature has examined either the effects of strategy on management control systems (MSCs) or, to a lesser extent, the effects of MSC on strategy (Langfield-Smith, 1977). Both directions of research found, in many instances, ambiguous and contradictory results. According to Simons (1990) and Langfield-Smith (1977) these contradictory results are mainly due to the variety of definitions, conceptualisations and operationalisations used for the measurement of the complicated constructs of MCSs and strategy. Henri (2006) adds two more reasons for these contradictory results: first, the absence of a theoretical background which tries to explain these relationships and especially the non use of the prevailing strategy theory based on the RBV, and second, the rather small attention that is paid to the dynamic tension steaming from the different uses or roles of MCS.

Ittner and Larcker (2001) suggest that one key point that must be considered when one tries to study the relationship between MCSs and strategy, is the determination of all those factors that lead to strategic success. According to the RBV approach, the

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relationship between MCSs and strategy should be examined at the capabilities level rather than the strategic choice level, since the RBV is based on the principle that competitiveness is a function of the strength, expert exploitation, and leveraging of specific internal resources and capabilities controlled by a firm (Lengnick-Hall and Wolff, 1999).

On the other hand, based on Simons' work (1990; 1991; 1994; 1995), many studies explored the role of MCSs in terms of strategy-formulation and the strategic change implementation (see: Chenhall and Langfield-Smith, 2003; and Bisbe and Otley, 2004 among others).

Others examined how the organisations balance the traditional and more active roles of MCSs (see: Dent, 1987; and Ahrens and Chapman, 2004).

However, up to now, the effects of dynamic tension resulting from the balanced use of MCSs in different ways have not yet extensively examined (Henri, 2006). He (Henri, 2006) suggests that a more complete understanding of the link between MCSs and strategy requires the integration of the theoretical and empirical analyses of both traditional and more active roles of MCSs, and also the tension/interaction resulting from those uses.

The present study, following Henri's design (2006) for comparison purposes, explores only one component of MCSs, namely the performance measurement system (PMS), which represents a group of measures (financial or non-financial, internal or external, short or long terms, etc.) used to quantify actions (Neely, Gregory and Platts, 1995).

It aims to examine, from a resource-based perspective, how the use of PMS by top management teams can act as an antecedent to organisational capabilities leading to strategic choices. It focuses on the traditional feedback role of PMS to support the implementation of strategy ('diagnostic use') and the more active role of PMS associated with the signals sent throughout the firm to focus organisational attention, stimulate dialogue and support the emergence of new strategies ('interactive use'). Moreover, these two types of use work simultaneously but for different purposes. However, collectively, their power lies in the tension generated by their balanced use which simultaneously reflects a notion of competition and complementarity. Consequently, it also explores the influence of the dynamic tension emerging from the joint use of PMS in a diagnostic and interactive mode on *capabilities* leading to strategic choices (Henri, 2006).

The rest of the paper is organised as follows. Section two briefly discusses the use of MCS and the resource-based view and capabilities. Accordingly, the research model is presented, followed by the hypotheses development. Section three refers to methodology, while the results coming from the structural equation modelling analysis are presented and discussed in section four. Section five concludes the study.

2. Theoretical Background

2.1. Constructs definition

2.1.1. Use of Management Control Systems

Management control systems are viewed typically as tools of strategy implementation (Simon, 1991). More

analytically, MCSs are broadly defined as 'the formalised routines and procedures using information to maintain or alter patterns in organisational activity, and include formalised information-based processes for planning, budgeting, cost control, environmental scanning, competitor analysis, performance evaluation, resource allocation, and employee rewards' (Simon, 1987a, p. 49). Simons' (1987a, 1990, 1991, 1994, and 1995) studies on the levels of controls focus mainly on the concept of *tension*, which in turn, conceptualise that the aim of MCSs is to manage the inherent organisational tension between creative innovation and predictable or pre-established goal accomplishment. Consequently, management teams use MCSs either as positive or negative forces to produce dynamic tension that may deal with the inherent organisational tension (Henri, 2006).

The broad literature on MCSs (see: Simons, 1991, 1994, 1995; Langfield-Smith 1997; Haas and Kleingeld, 1999; and Kaplan and Norton, 2001, among others) distinguish the use of MCSs in *diagnostic* and *interactive* use. According to Green and Welsh (1988) MCSs are described as information feedback systems, where goals are set in advance, outcomes are compared with preset objectives, and important variances are given to management teams for amendments, adjustments and follow-up (Anthony, Dearen, and Bedford, 1989). Since this type of systems is considered as the primary tool for management-by-exception, the literature characterises them as *diagnostic control systems* (Simon, 1991).

Moreover, *diagnostic use* of control systems represents a negative force mainly for two reasons: (a) it is focused on mistakes and negative variances, and (b) the derived sign of the deviation when outcomes and preset goals are compared is reversed in the feedback signal to adjust the process (Henri, 2006). Simons (1991) mentions that MCSs are not always used to manage by exception. In many cases, top management uses MCSs for day-to-day issues to support organisational decision making. Thus, MCSs can be characterised as *interactive* when top management teams use them to 'personally and regularly involve themselves in the decisions of subordinates' (Simons, 1999, p. 49). The *interactive use* of MCSs represents a positive force, since they are utilised to encourage opportunity-seeking and learning throughout the firm (Henri, 2006).

The *diagnostic* and *interactive uses* of MCSs, including the PMS, form two complementary and nested uses. Although they function simultaneously, they are focused on different purposes. The diagnostic use constrains the role of PMS to a measurement tool, while the interactive use expands its role to a strategic management tool (Kaplan and Norton, 2001). On the other hand, according to Simons (1990, 1991, 1994, and 1995) framework, diagnostic and interactive uses of MCSs represent countervailing forces used to balance the inherent organisational tension. Thus, as Lewis (2000) argues, the joint use of MCSs in a diagnostic and interactive manner to manage inherent organisational tensions creates *dynamic tension*.

In the present study, following Henri's design (2006) for comparison purposes, only one component of MCSs is explored, namely the performance measurement system (PMS), which represents a group of measures (financial or non-financial, internal or external, short or

long terms, etc.) used to quantify actions (Neely, Gregory and Platts, 1995). In other words, the present study explores the influence of the dynamic tension emerging from the joint use of PMS in a diagnostic and interactive mode on *capabilities* leading to strategic choices (Henri, 2006).

2.1.2. Resource-based view and capabilities

According to Amit and Schoemaker (1993) the resource-based view-RBV considers firms as bundles of resources heterogeneously distributed across firms, and that resource differences remain over time. Barney (1991) stresses that resources that are valuable, rare, difficult to imitate, and, moreover, non-substitutable, almost certainly lead to the achievement of competitive advantage, that cannot be copied and adopted by competitors. Resources include different components that can be utilised to apply wealth-creating strategy. These might be: (a) specific physical assets, (b) organisational assets, (c) human resources, and (d) competencies (Eisenhardt and Martin, 2000).

Day (1994) argues that capabilities create a link between resources and allow their deployment. Moreover, dynamic organisational capabilities illustrate the ability of an organisation to implement repeatedly, or replicate productive activities that encourage an organisation's capacity to generate value by influencing the transformation of inputs into outputs (Teece, Pisano and Shuen, 1997).

Market orientation, *organisational learning*, *innovativeness*, *entrepreneurship*, and *market responsiveness* are recognised as primary capabilities to gain competitive advantage and create market change. However, although each capability can to positively contribute, it is not sufficient to develop competitive advantage.

Market orientation is regarded as a common way of satisfying market demand and originating superior value for customers. It is described as a complex of beliefs that evolves long-lasting profit, taking firstly the customers' interests and secondly that of stakeholders' into great consideration. Narver and Slater (1990) and Kohli and Jawoski (1990) discuss the importance of market-orientation, clearly linking it with business performance. According to Fiol and Lyles (1985) *organisational learning* develops insights, knowledge and links among past actions. Moreover, it refers to the efficacy of these actions, and, in turn, to future actions. Organisational learning is considered as a very important factor of strategic management in terms of gaining competitive advantage, since it aids in enhancing the information processing activities within a firm in a faster way than the competitors, and thus, it's strongly associated to the firms' performance (Baker and Sinkula, 1999).

Hurley and Hunt (1998) argue that *innovativeness* is the firm's positive attitude towards new ideas, processes and products, and its focus on innovation. Moreover, they stress that innovative firms can easily gain competitive advantage and consequently achieve high levels of performance.

Naman and Slevin (1993) and Daily *et al.* (2002) consider *entrepreneurship* as a firm's ability to constantly renew, innovate and take risks in its area of operation. Many other studies discuss the *entrepreneurship's* strengths and clearly point out its contribution to firm's

survival and performance (see: Miller, 1983; Hitt *et al.*, 2001, among others).

Finally, *market responsiveness*, refers to the firm's capability to change its attitudes in a speedy manner, due to the appearance of market demand shifts. As a result, market responsiveness happens in cases the organisation not only regards the necessity but also is able to act, relying on market stimuli. This may lead to competitive advantage and enhance the firm's performance (De Geus, 1988; Slater and Narver, 1999; Griffith, Noble and Chen, 2006; Garrett, Covin and Dennis, 2008).

Many scholars (see: Ireland *et al.*, 2001; Hult and Ketchen, 2001; Bhuian, Menguc and Bell, 2005) argue that capabilities, only when acting collectively, can make an organisation unique and competitive.

2.2. Theoretical model and hypotheses

Consequently, the theoretical model of the present study is formed as in Figure 1. It reflects the relationships among two PMS use (diagnostic and interactive), five capabilities (market orientation, organisational learning, innovativeness, entrepreneurship, and market responsiveness), and organisational performance.

Diagnostic use of PMS supports the attainment of pre-established goals and is described as a negative force that creates constraints and ensures compliance with orders (Simons, 1995; Henri, 2006). According to Simons (1995) diagnostic systems constrain innovation and opportunity-seeking to ensure predictable goal achievement needed for intended strategies. Diagnostic use of PMS is used to signal when productivity and efficiency have fallen, and when innovation needs to be curbed (Miller and Friesen, 1982). Hence, PMS is used diagnostically to limit the deployment of the five capabilities by providing boundaries and restrict risk-taking. Hence:

Hypothesis 1: A diagnostic use of PMS tends to negatively influence capabilities of market orientation, entrepreneurship, innovativeness, organisational learning and market responsiveness.

On the other hand, interactive use of PMS supports the development of ideas and creativity. It has the power to represent a positive impetus that fosters creative and inspirational forces. 'Senior managers use interactive control systems to build internal pressure to break out of narrow search routines, stimulate opportunity-seeking, and encourage the emergence of new strategic initiatives' (Simons, 1995, p.93). Relying on organisational dialogue and signalling, interactive use of PMS represents an adequate means to foster the five aforementioned capabilities because it reflects two important features associated with organic controls: (a) loose and informal control reflecting norms of cooperation, communication and emphasis on getting things done, and (b) open channels of communication and free flow of information throughout the organisation (Burns and Stalker, 1961). Globally, there is a natural fit between the requirements of the five capabilities and organic use of control systems (Chenhall and Morris, 1995; Van de Ven, 1986). Hence:

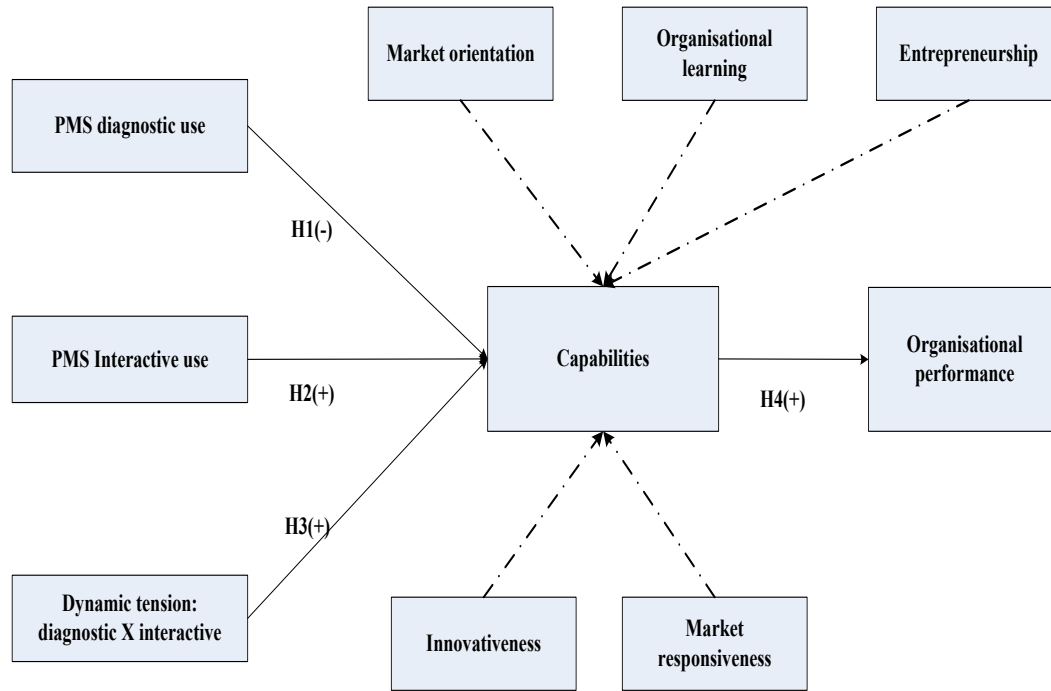


Figure 1: The theoretical model

Hypothesis 2: An interactive use of PMS tends to positively influence capabilities of market orientation, entrepreneurship, innovativeness, organisational learning and market responsiveness.

Together, diagnostic and interactive uses create a dynamic tension which has two effects: (a) ensuring that positive effects of interactive use on capabilities will be achieved; and (b) expanding these positive effects of interactive use (Henri, 2006).

In some circumstances, the potential benefits of interactive use may disappear due to insufficient diagnostic use to set boundaries and to highlight effectiveness issues. This can produce a loss of direction, wasted energy and a disruption of continuity (Chenhall and Morris, 1995). Similarly, the potential benefits of interactive use can be lost due to excessive diagnostic use, which constraints innovation and risk-taking. This can produce stagnation, loss of energy and declining morale (Chenhall and Morris, 1995). More importantly, a diagnostic use of PMS helps to increase the positive effects of an interactive use on capabilities: Beyond the underlying assumptions that conflict and tension are negative and destructive, growing evidence from the conflict literature suggests that they may be beneficial to individual and organisational performance, and that avoiding and suppressing conflict reduces creativity, decision quality, product development, and communication (DeDteu, 1991; Nicoreta, 1995 in Henri, 2006). Hence:

Hypothesis 3: The dynamic tension resulting from a balanced use of PMS in a diagnostic and interactive

fashion tends to positively influence capabilities of market orientation, entrepreneurship, innovativeness, organisational learning and market responsiveness.

According to the RBV of the firm, valuable, rare, inimitable, and non-substitutable resources and capabilities lead to a sustained competitive advantage, which in turn contributes to performance differences among firms (Wernerfelt, 1984; Barney, 1991). Market orientation, market responsiveness, organisational learning, innovativeness, and entrepreneurship constitute five capabilities that have all the above-mentioned attributes. They are considered to be key drivers of organisational transformation and strategic renewal, by manipulating resources into new value-creating strategies (Bhuian *et al.* 2005; Eisenhardt and Martin, 2000; Ireland *et al.* 2001). Empirically, previous studies provide evidence showing that these five capabilities contribute positively to performance (Hult and Ketchen, 2001; Lee, Lee, and Pennings, 2001; Naman and Slevin, 1993; Narver and Slater, 1990; Spanos and Loukas, 2001; Garrett, Covin and Dennis, 2008).

The diagnostic and interactive uses of PMS, as well as the dynamic tension resulting from their balanced use have been already linked to the five capabilities (Hypotheses 1-3). Also, these five capabilities are expected to lead to positive organisational performance. Hence, the diagnostic and interactive use of PMS and the dynamic tension resulting from their balanced use influence the five capabilities, which in turn increase performance. Therefore, the following two hypotheses are put forward:

Hypothesis 4a: The diagnostic and interactive use of PMS has an indirect effect on organisational performance via their contribution to capabilities of market orientation, entrepreneurship, innovativeness, organisational learning and market responsiveness.

Hypothesis 4b: The dynamic tension resulting from a balanced use of PMS in a diagnostic and interactive fashion has an indirect effect on organisational performance via its contribution to capabilities of market orientation, entrepreneurship, innovativeness, organisational learning and market responsiveness.

3. Methodology

3.1. Measurement of constructs - the questionnaire

This study adopts the questionnaire used by Henri (2006), adds one more capability (market responsiveness), and adjusts it to the Greek context by translating it into the Greek language.

Henri (2006) developed his instrument based on (a) an adapted version of Vandebosch (1999) to measure *diagnostic* and *interactive* uses of PMS, (b) a well-established MKTOR instrument of Narver and Slater (1990) to measure *market orientation* (c) an instrument proposed by Naman and Slevin (1993) to measure *entrepreneurship*, (d) a framework suggested by Hult (1998) to measure *organisational learning*, and (e) the instrument proposed by Burke (1989) to measure *innovativeness*.

In the present study *market responsiveness* is measure based on the argumentation of Griffith, Noble and Chen (2006). Finally, *organisational performance* is measured with an instrument using five indicators: (a) sales volume, (b) ROI, (c) profitability, (d) market share, and (e) meeting budget targets.

Content validity is ensured using existing and validated scales and by the pre-test of the first draft of the questionnaire. Three academics were asked to scan the questionnaire, several CEOs contributed by adjusting the questions to their 'language' and more than ten M.Sc. students tried to answer the questions. *Convergent validity* was established via confirmatory factor analysis (CFA). The detailed results are shown in Appendix 1.

3.2 Research design and the sample

A survey was undertaken to gather all the appropriate data by use of a structured questionnaire. The design of the survey follows that of Henri (2006), who developed his instrument based on (a) an adapted version of Vandebosch (1999) to measure *diagnostic* and *interactive* uses of PMS, (b) a well-established MKTOR instrument of Narver and Slater (1990) to measure *market orientation* (c) an instrument proposed by Naman and Slevin (1993) to measure *entrepreneurship*, (d) a framework suggested by Hult (1998) to measure *organisational learning*, and (e) the instrument proposed by Burke (1989) to measure *innovativeness*. In the present study *market responsiveness* is measured based on the argumentation of Griffith, Noble and Chen (2006). Finally, *organisational performance* is measured using five indicators: (a) sales volume, (b) ROI, (c) profitability, (d) market share, and (e) meeting budget targets.

In order to achieve sufficient sample size and generalizability of the result, the target population consisted of all 157 large-size Greek manufacturing companies that employed at least 250 people. The population was drawn from a database compiled by ICAP, which is a well-known and reliable source of data for Greek companies. The size-limitation was introduced for the reason that small and medium firms present some difficulties and mostly, these companies do not have the appropriate management accounting tools (Chenhall and Langfield-Smith, 1998). Especially in those small firms, information is rare, and in some cases, is far from reliable. In Greece, as anywhere else, larger companies are expected to use most of the tools and proposed practices. The questionnaire items used in this survey are exactly the same with those used by Henri (2006).

The survey was implemented in four steps: pre-notification, initial mailing, first follow up, and second follow up. In the first step, and to generate early interest, the respondents were notified in the form of a letter, phone call or e-mail. A mail-out package including a cover letter, the questionnaire and a business reply envelope was then sent to every contact name. In a few cases, the questionnaire was sent by fax or e-mail. The first follow up consisted of a postcard reminder that was sent to every respondent, while the second was a phone call or replacement questionnaire sent only to those who had not answered. From the 157 firms conducted only 120 accepted to participate in the survey. The rest CEOs were either too busy to participate or didn't participate because of company privacy policies.

A total of 103 questionnaires were finally completed, generating a response rate of 85.83%. After excluding four questionnaires with missing data, the final sample decreased to 99 responses, corresponding to a response rate of 82.50%.

Generally speaking, researchers normally work to 95% certainty. This actually means that, with a total population of 157 firms, the minimum sample size should be around 108 instead of 99 firms (Saunders, Lewis and Thornhill, 2000: 156) a small difference of 9. Although the smaller size could be considered as one of the limitations of this research, we could defend it on the grounds stated by the famous scholar, Shelby Hunt: 'No manuscript should be rejected on the basis of potential nonresponse bias—no matter what the response rate is—unless there is good reason to believe that the respondents do in fact differ from the nonrespondents on the substantive issues in question and that these differences would make the results of the study unreliable' (Hunt, 1990: p.174).

To test whether our respondents were different from the non-respondents, we examined if there are any differences in the mean of all variables used in this study, between early and late respondents. The rationale behind such an analysis is that late respondents (i.e. sample firms in the second mailing) are more similar to the population, from which they were drawn, than the early respondents (Armstrong and Overton, 1977). No statistically-significant differences were found, thus suggesting that non-response bias is not a serious issue in the study.

The demographic features of the respondents and their firms are analyzed in the following Table 1:

Table 1: Demographic Data

	Number	%
Listed in Athens Stock Exchange		
Listed	69	70
Non Listed	30	30
Total sample	99	100
Size of Organizations:		
<i>Turnover - m Euro</i>		
<100	24	24
>101-200	33	33
>201-301	23	23
>301	19	20
Total sample	99	100
Position of Respondent		
CEO	45	45
CFO	43	43
COO	8	8
Senior Vice-President	3	4
Total sample	99	100
Size of Organizations:		
<i>Manpower – employees</i>		
250-500	41	41
501-1000	36	36
> 1000	22	23
Total sample	99	100

3.2.1 Measurement of the constructs

Descriptive statistics and Pearson correlation matrix are presented in tables 2 and 3 respectively.

Table 2: Descriptive Statistics

	No of Items used	Minimum	Maximum	Mean	Std. Deviation					
						learning	1	2.00	6.25	4.24
						Market	4	2.00	6.75	4.46
						responsiveness				1.429
Diagnostic use	4	2.25	6.75	4.77	1.200	Organisational	5	2.00	5.60	3.98
Interactive use	7	3.00	5.57	4.36	0.640	performance				1.099
Dynamic tension		-1.47	2.10	0.28	0.077					

Table 3: Pearson correlation matrix

	Diagnostic use	Interactive use	Dynamic tension	Market orientation	Entrepreneurship	Organi- Innova- tiveness	Market sational respon- siveness	Organi- Market sational perfor- mance
Diagnostic use	1							
Interactive use	.283**	1						

Dynamic tension	-.360**	-.128*	1						
Market orientation	.656**	.248**	-.098	1					
Entrepreneurship	.614**	.047	-	.888**	1				
Innovativeness	.303**	.267**	.033	.683**	.755**	1			
Organisational learning	.075	.544**	.183*	.510**	.434**	.642**	1		
Market responsiveness	.677**	.196**	-.053	.938**	.870**	.635**	.450**	1	
Organisational performance	.662**	.171*	-	.746**	.789**	.529**	.097	.779**	1

* Significant at the 0.05 level; ** Significant at the 0.01 level.

We notice the following from the Pearson correlation matrix : (a) diagnostic use is positively correlated with all capabilities at the 0.01 significance level (except organisational learning); (b) interactive use is positively correlated with all five capabilities at the 0.01 significance level (except entrepreneurship); (c) dynamic tension is negatively correlated with one capability; entrepreneurship, at the 0.01 level and positively also with one capability, organisational learning, at 0.05 level, and (d) diagnostic use is positively correlated with organisational performance at the 0.01 level, interactive use is also positively correlated with performance at the 0.05 level, but dynamic tension is negatively correlated with three of the five capabilities and also with organisational performance. However, no conclusions can be drawn from such univariate statistical analysis.

Results from the confirmatory factor analysis are presented in Appendix 1. The questionnaire items, Cronbach Alpha for each construct, and other statistics (Goodness-of-fit of the model, non-normed fit index – NNFI, comparative fit index – CFI, and root mean square error of approximation –RMSEA) are emerged. According to the literature (see: Browne and Cudeck, 1993; Hu and Bentler, 1995; and, Tabachnick and Fidell, 2001) the recommended thresholds are: (a) NNFI >0.90; (b) CFI>0.95; and (c) RMSEA<0.10.

Examining the *diagnostic* and *interactive uses*, CFA revealed that all first and second order loadings are significant ($p<0.01$ and in some cases $p<0.05$), the Cronbach Alpha exceed 0.70 (see: Nunnally, 1967) and the goodness-of-fit indices are in accordance with recommended threshold values. Similar, if not better, are the results for the five capabilities. As for the organisational performance, we see a rather high Cronbach Alpha, significant χ^2 and remaining indices, with respect to the recommended threshold values.

4. Results from the structural equation models (SEM)

Table 4: Structural Equation Models - Results

	Model A		Model B	
	Path Coefficients	p-value	Path Coefficients	p-value
PMS diagnostic use → Market Orientation (-)	.688	***	.688	***
PMS diagnostic use → Entrepreneurship (-)	.657	.128	.657	***
PMS diagnostic use → Innovativeness (-)	-.357	.952	-.364	.953
PMS diagnostic use → Organisational learning (-)	-.05	***	-.05	***

Structural equation modelling represents the relationships between the variables (see figure 1), and data collected from the survey, and analysed with AMOS as a statistical tool. Table 4 shows the results from the two SEM. All five hypotheses are tested via the models A and B, where model A is similar to that of Henri (2006) while model B incorporates the market responsiveness in the organisational capabilities, increasing them from four to five. For both models, goodness-of-fit indices are consistently within the recommended thresholds.

4.1. Hypotheses tests

PMS diagnostic uses and capabilities: *Hypothesis 1* (H1) is partially supported since, as revealed in table 4, only innovativeness and organisational learning are negatively influenced by PMS diagnostic uses (in both A and B models), with only *organisational learning* showing statistically significant values. On the other hand, significant results ($p<0.01$) are drawn for market orientation in both models and market responsiveness in model B. However, the positive signs do not support *H1*, which expects negative signs. These results are not consistent with those of Henri (2006), which fully supported H1 in the Canadian context.

PMS interactive uses and capabilities: *Hypothesis 2* (H2) is also partially supported since, as shown in table 4, in both models, market orientation ($p<0.01$), organisational learning ($p<0.01$) and innovativeness ($p<0.10$) are positively influenced by PMS interactive uses. Entrepreneurship shows a negative sign, although statistical significant at 10%, while market responsiveness with a positive sign is statistically insignificant ($p=0.880$). The partial support of this hypothesis is also not consistent with the results of Henri (2006), which also fully supported H2.

PMS diagnostic use → Market Responsiveness (-)	n/a	n/a	.746	***
PMS interactive use → Market Orientation (+)	.073	***	.073	***
PMS interactive use → Entrepreneurship (+)	-.137	*	-.137	*
PMS interactive use → Innovativeness (+)	.156	*	.154	*
PMS interactive use → Organisational learning (+)	.565	***	.565	***
PMS interactive use → Market Responsiveness (+)	n/a	n/a	***	.880
Dynamic tension → Market Orientation (+)	.162	**	.162	**
Dynamic tension → Entrepreneurship (+)	.028	.740	.028	.740
Dynamic tension → Innovativeness (+)	.237	***	.244	***
Dynamic tension → Organisational learning (+)	.254	***	.254	***
Dynamic tension → Market Responsiveness (+)	n/a	n/a	.220	***
Market Orientation → Org. Performance (+)	.139	.507	.026	.931
Entrepreneurship → Org. Performance (+)	1.708	***	1.706	***
Innovativeness → Org. Performance (+)	-1.560	***	-1.589	***
Organisational learning → Org. Performance (+)	.287	.019	.301	.013
Market Responsiveness → Org. Performance (+)	n/a	n/a	.136	.621
Diagnostic Use → Org. Performance (-)	.663	***	.664	***
Interactive Use → Org. Performance (+)	-.306	***	-.229	***
Dynamic Tension → Org. Performance (+)	-.227	***	-.229	***

Fit indices of the model

Chi-square	15.808	16.87
DF	4	4
NFI	.991	.993
CFI	.997	.997
RMSEA	.068	.086

Note *Significant at the 0.10 level; ** Significant at the 0.05 level; ***Significant at the 0.01 level

Dynamic tension and capabilities: *Hypothesis 3* (H3) is also partially supported, however, with stronger relationships compared to the previous two hypotheses. In both models, dynamic tension positively influences all capabilities except entrepreneurship, which although having a positive path coefficient, its p-value is not statistical significant ($p=0.740$) in both models. Thus, the collective use of both diagnostic and interactive uses provides a better relationship with organisational capabilities. Alternatively, Henri (2006) didn't find any significant relationship between dynamic tension and the four tested organisational capabilities.

PMS and organisational performance through capabilities: *Hypothesis 4a* (H4a) examines the indirect effects of diagnostic and interactive uses of PMS on organisational performance. The results, in line with those of Henri (2006), do not support this hypothesis. Although the values are statistically significant at 1%, the signs in path coefficients are the reverse of those hypothesised; diagnostic use was expected to be negative and is revealed to be positive, while interactive use was expected to be positive and is revealed as being negative.

Dynamic tension and organisational performance through capabilities: Results from *Hypothesis 4b* (H4b)

are also discouraging and *H4b* is also rejected. Analytically, despite the statistically-significant values at 0.01 level in both models, the sign in the path coefficient is negative, unlike the positive sign that was hypothesised. Henri (2006) also rejected this hypothesis.

5. Conclusions

Firstly, the results of the present study partially support that the diagnostic use of PMS negatively affect organisational capabilities (only *organisational learning* is negatively affected – with significant and negative path coefficient).

Secondly, the positive effect of interactive use of PMS on organisational capabilities is also partially supported, since only *market orientation* and *organisational learning* reveal significant and positive path coefficients.

Thirdly, the results suggest that the diagnostic and interactive use of PMS contribute both specifically and collectively to capabilities; the balanced use of both diagnostic and interactive use of PMS creates a dynamic tension that positively affects the five organisational capabilities. Finally, no indirect relationship between PMS use and organisational performance was found.

To sum up, it is important for managers to know the agents of value creation in business and the causal relationships enabling them to reach that value. This study revealed that capabilities play the role of agents, leading to value and, moreover, the ability of PMS to contribute to these capabilities. In addition, capabilities can be deployed with PMS without constraint within the evolution and performance of financial and non-financial indicators.

This study can be further extended by incorporating more factors in the proposed model; environmental uncertainty, size and organisational culture, and by examining their possible effect on the relationship between PMS use, organisational capabilities and performance.

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Appendix 1 – Confirmatory Factor Analysis Performance measurement systems use

Please rate the extent to which your top management team currently uses performance measures to:

Scale: 1 = not at all to 7 = to a great extent

Constructs and items	Confirmatory factor analysis		Cronbach alpha
	First-order loadings	Second-order loadings	
Diagnostic use		.848**	.888
Track progress towards goals	.830**		
Monitor results	.908**		
Compare outcomes to expectations	.839**		
Review key measures	.698**		
Interactive use		-.155*	
Enable discussion in meetings of superiors, subordinates and peers	.508**		.702
Enable continual challenge and debate underlying data, assumptions and action plans	.807**		
Provide a common view of the organisation	.157*		
Tie the organisation together	.755**		
Enable the organisation to focus on common issues	.740**		
Enable the organisation to focus on critical success factors	.339**		
Develop a common vocabulary in the organisation	.059*		
Goodness-of-fit of the model: $\chi^2(30) = 44.14$; $p < .046$; NNFI = .930; CFI = .975; RMSEA = .069			

Note: *Significant at the 0.05 level; ** Significant at the 0.01 level

Internal capabilities

Please rate the extent to which the following items describe your organisation

Scale: 1 = not descriptive to 7 = very descriptive

Constructs and items	Confirmatory factor analysis		Cronbach alpha
	First-order loadings	Second-order loadings	
Market orientation		.957**	.942
Communicate information about customer experience	.930**		
Understanding of customer needs	.699**		
Commitment and orientation to serving customers' needs	.984**		
Integration of functions to serve the needs of markets	.896**		
After-sales service	.894**		
Share of information concerning competitors' strategies	.795**		
Customer satisfaction	.950**		
Managers understand how everyone can create value	.213*		
Target customers where we have competitive advantage	.712**		
Discussion about competitors' strengths and strategies	.913**		
Creation of greater value for customers	.455**		
Visit of current and prospective customers	.803**		

Entrepreneurship		.967**	.918
Wide-ranging acts are necessary to achieve objectives	.946**		
Strong proclivity for high risk projects	.753**		
First business to introduce new products, techniques, etc	.973**		
Cautious, "wait and see" posture	.714**		
Adopt a very competitive, "undo-the-competitors" posture	.909**		
Gradually explore the environment, cautious behavior	.740**		
Innovativeness		.888**	.513 ^(a)
Innovation is readily accepted in program/project management	.915**		
Technical innovation (research results) is readily accepted	.661**		
(32) <i>Innovation is perceived as too risky and is resisted</i>	-.300*		
Management actively seeks innovation and ideas	.946**		
Organisational learning		.577**	.820
Ability to learn is the key improvement	.703**		
Basic values include learning as a key to improvement	.524**		
Once we quit learning we endanger our future	.641**		
Employee learning is an investment, not an expense	.827**		
Market Responsiveness		.957**	.925
Your company is much better than competitors in relation to responding to new customer needs in a speedy manner	.905**		
Your company is much better than competitors in relation to tailoring products/services to individual customer needs	.953**		
Your company is much better than competitors in relation to the speed at which new markets can be entered	.743**		
Your company is much better than competitors in relation to the rate of introduction of new product/services	.866**		

Goodness-of-fit of the model: $\chi^2(342) = 906.987$; $p < .001$; NNFI = .903; CFI = .917; RMSEA = 0.0878

Note: *Significant at the 0.05 level; **Significant at the 0.01 level

(a) When item 32 removed from the construct. Cronbach's alpha = .847

Organisational performance

Please rate the performance of your organisation against initial expectations on each of the following dimensions for the past 12 months

Scale: 1 = not at all satisfactory to 7 = outstanding

Constructs and items	Confirmatory factor analysis		Cronbach alpha
	First-order loadings	Second-order loadings	
Organisational performance		.898**	.913
(42) Sales volume	.737		
(43) Return on investment	.979		
(44) Profitability	.955		
(45) Market share	.860		

(46) Meeting budget targets

.630

Goodness-of-Fit of the model: $\chi^2(5) = 7.064^{**}$; NNFI = .984; CFI = .995; RMSEA = 0.065

Note: * Significant at the 0.05 level; **Significant at the 0.01 level