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Understanding the impact of Management Control Systems over capabilities and organizational performance, under the influence of perceived environmental uncertainty

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by

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UNDERSTANDING THE IMPACT OF MANAGEMENT CONTROL SYSTEMS OVER CAPABILITIES AND ORGANIZATIONAL PERFORMANCE, UNDER THE INFLUENCE OF PERCEIVED ENVIRONMENTAL UNCERTAINTY.

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Dedicated to my family

Table of contents

List of figures

List of tables

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Abstract

Management Control Systems (MCS) literature states that firms believe that MCS help them to deliver value (Ittner et al., 2003) by facilitating strategy implementation and enhancing organizational performance (Franco-Santos, et. al., 2012). The overall research results are valuable but ambiguous, inconclusive, and often contradictory. In general, prior research suggests that capabilities are shaped by MCS (Henri, 2006a; Koufteros et al. 2014). However, there are important questions that remains unclear, e.g. A manager using a MCS understand the reason for using it? or how does MCS enable a company to get the desired results? Will using a MCS in different ways have an impact on its results?. Little is known about how the MCS use can impact on organizational capabilities that trigger performance. Furthermore, does the environment influence this relationship? are these results applicable in a context of uncertainty? (Khandwalla, 1977; Chenhall, 2003).

Based on empirical data collected from 644 planning directors of companies of various sizes and sectors, the main purpose of this doctoral thesis is to examine how MCS uses can act as an antecedent to organizational capabilities and lead to superior performance, while recognizing that the context of every control takes place under conditions of uncertainty, and different perceptions of this can have different effects (Otley 2016). A topic which has been little studied.

In order to contribute to the literature that investigates performance determinants, we use four lines of study as a framework for this thesis: The Resource-Based View (RBV) theory (Barney 1991; Teece et al. 1997), MCS literature (Simons 1995; Vandenbosch 1999), performance literature (Ittner & Larcker 2003; Jaworski & Kohli, 1996) and contingence theory of organizations (Burns & Stalker 1961; Lawrence & Lorsch 1967; Otley, 1980, 2012, 2016). Especially, RBV & MCS literature can offer useful theoretical frameworks and only on few occasions have been integrated within the contingence theory.

MCS practices have been widely studied and demonstrate how an effective use of them affects organizational performance (Simons, 1995; Henri, 2006a; Bisbe & Malagueño 2012; Koufteros et al. 2014). Nevertheless, there is little evidence to show the effects they can have on organizational capabilities. The results show that when an entrepreneurial orientation (EO) has been installed as an organizational capability, it implies a competitive advantage that contributes to better results (Covin & Slevin 1991; Lumpkin & Dess 1996; Ripollés & Blesa 2005). In the other hand, learning orientation capability (LO) gives a company an advantage that others do not possess and can thereby lead to better results (Slater & Narver 1995). However, little has been documented about the relationship between MCS – capabilities – performance, and thus this work seeks to contribute to this line of knowledge. Finally, to see how the relationships raised above, behave depending on the context, the model was extended to include the uncertainty variable, thus offering a contextualized view of how MCS can be used in diferent ways in order to obtain different results, enabling a better understanding of the context importance for research in this field.

Our findings suggest a positive and significative relationships between MCS uses and capabilities. Contrary to previous studies (Henri 2006a), but in line with Koufteros et al. (2014), our results show a direct, positive and significant relationship between MCS diagnostic use and both of the constructs studied, capabilities and performance. In addition, EO has a significant effect on performance on companies of any size, but this is not the case of LO. This thesis concludes by discussing theoretical and practical implications derived from the findings. Limitations and future research directions are also offered in each essay.

Resumen

La literatura de los sistemas de control administrativo muestra que en general las empresas creen que los sistemas de control administrativo ayudan a entregar valor (Ittner et al., 2003), facilitando la implementación de la estrategia y mejoras en el desempeño organizacional (Franco-Santos, et. al., 2012). Los resultados globales en este ramo son valiosos pero ambiguos, no concluyentes y a menudo contradictorios. Investigaciones anteriores sugieren que las capacidades organizacionales en gran parte están determinadas por los MCS (Henri, 2006a; Koufteros et al. 2014). Sin embargo, aun existen preguntas importantes que no quedan claras: Cuando un administrador está usando un MCS, ¿entiende las razones para usarlo? ó ¿cómo lo va a utilizar para generar el resultado deseado?. Usarlos de una manera u otra, ¿tendrá un impacto diferente en los resultados?. Poco se sabe acerca de cómo los MCS impactan las capacidades y el rendimiento. Por otra parte, ¿existe una influencia del entorno en estas relaciones?, ¿son aplicables los resultados ante incertidumbre? (Khandwalla, 1977; Chenhall, 2003).

Con base en datos empíricos recogidos de 644 directores de planeación, el objetivo principal de esta tesis doctoral es examinar cómo los diversos usos de los MCS pueden actuar como un antecedente de las capacidades organizacionales y dar lugar a un rendimiento superior, al tiempo que reconoce que el contexto de cada control se lleva a cabo en condiciones de incertidumbre (Otley 2016). Un tema que ha sido poco estudiado. En el desarrollo de esta tesis, utilizamos cuatro líneas de estudio como marco de referencia: La teoría de los recursos y capacidades (Resorurce-based view, RBV) (Barney, 1991; Teece et al 1997), la literatura de sistemas de control administrativo (MCS) (Simons 1995; Vandenbosch 1999), literatura de desempeño (Ittner & Larcker 2003; Jaworski & Kohli, 1996) y la teoría de la contingencia en las organizaciones (Burns & Stalker 1961; Lawrence & Lorsch 1967; Otley, 1980, 2012, 2016). Especialmente RBV y la literatura de MCS, son considerados como marcos teóricos útiles, pero hasta ahora no se han integrado con la teoría de la contingencia.

El estudio de los MCS demuestran la importancia de su uso sobre el desempeño organizacional (Simons, 1995; Henri, 2006a; Koufteros et al. 2014), pero es poca la evidencia que muestre los efectos que pueden tener en las capacidades organizacionales. Los resultados muestran que cuando la orientación emprendedora (EO) se instala como una capacidad organizacional, representa una ventaja competitiva que permite obtener mejores resultados (Covin y Slevin 1991; Lumpkin y Dess 1996; Ripollés y Blesa 2005). Por otro lado, la orientación al aprendizaje (LO), ofrece a las empresas una ventaja que otros no tienen y con ello tambien obtener mejores resultados organizacionales (Slater y Narver 1995). Sin embargo, poco se ha documentado acerca de la relación entre los MCS, las capacidades y el desempeño. Finalmente, para observar cómo se comportan las relaciones anteriores en función del contexto, el modelo incluyó a la incertidumbre, ofreciendo así una visión contextualizada sobre cómo los MCS se pueden utilizar en formas diferentes, con el fin de obtener resultados diferentes.

Nuestros resultados sugieren una relacion positiva y significativa entre los usos de los MCS y las capacidades. Contrario a estudios anteriores (Henri 2006a), y en línea con Koufteros et al. (2014), nuestros resultados muestran una relación directa, positiva y significativa entre el uso diagnóstico de los MCS y las capacidades y el desempeño. Además, la orientación emprendedora (EO) tiene un efecto significativo y positivo en el desempeño, pero no es el caso para la orientación al aprendizaje (LO), que no tiene ningún efecto directo. Esta tesis concluye con un análisis de las implicaciones teóricas y prácticas derivadas de los hallazgos. Las limitaciones y futuras líneas de investigación también se ofrecen en cada ensayo.

Chapter 1: Introduction of the dissertation

1.1. Problem statement: Research topic and its location in the academic field

This study is based on the research literature in strategic management (Mintzberg 1973, 1978, 1994; Mintzberg & Waters 1985; Porter 1980), strategic capabilities (Barney, 1991; Day, 1994; Wernerfelt, 1984) and management control systems (Simons 1990; 1995; Vandenbosch 1999, Henri 2006a, 2006b) that have been developed in an accounting-based framework (Otley, Broadbent, & Berry, 1995). This type of framework shows how strategic management and especially strategic process are supported by control and information systems, and helps us to identify and analytically describe how the way such systems are used can impact on capabilities and better results (Grant, 1991; 1996). Furthermore, this thesis seeks to identify the impact of some contingence variables (Burns & Stalker, 1961; Lawrence & Lorsch, 1967) that could affect these relationships. Since in numerous studies it is the contingency variables that are primarily responsible for the results, we decided to make our analysis based on the interactions previously raised.

Although the topic of Management Control Systems (MCS) is approximately 30 years old, in the last 15 years its development has been exponential, due mainly to three issues which have had a considerable impact on performance control practice:

1) The development of new technologies with the advent of powerful computers and high-speed software which has allowed access and dissemination of more and better data.

2) Fast changes due to increased competition for clients, developing and using technology in a globalized world with greater complexity, uncertainty and risk, with the need to renew and change structures.

3) Increasing corporate control in multinational organizations and a global trend toward accountability and value creation, in different perspectives, brought about by the development of concepts such as financial and nonfinancial indicators, tangible and intangible benefits, and competitive differentiators.

These issues have detonated the need for a paradigm shift in the design and use of MCS from a focus on business planning to a wider focus on business strategy and strategic control processes. They have highlighted the importance of optimizing business practices and securing the results. But to do this, the task requires having a better understanding of MCS role and how they can better meet managerial needs.

It is widely believed that MCS are tools that can help to identify weaknesses, clarify strategies and objectives defined to deliver value, by facilitating strategy implementation and by enhancing organizational performance in today's competitive environment (Ittner et al. 2003; Widener 2007). Nevertheless, in general, studies on the relationship between MCS - Capabilities – Performance, have yielded ambiguous, inconclusive, or sometimes contradictory results. Specifically, we have identified three gaps in the literature that deserve investigation, and on that basis will develop the chapters of this thesis.

The first gap shows that MCS research has focused on its relation to design, purpose, types, and factors influencing its adoption and use, but without dealing with MCS impact on organizational capabilities. As we can see in the literature review, except for the work done by Henri (2006a) and Koufteros et al. (2014), little is known about how MCS use can impact

organizational capabilities, or what variables affect these relationships. There are very few studies linking the various uses of the MCS and their impact on the strategic capabilities of firms. Furthermore, there were no specific studies that tested entrepreneurial orientation empirically.

The second gap is related to organizational performance, related to criticism that a more comprehensive approach to forms of MCS and its impact on performance should be studied (Otley 1980; Fisher 1995; Milgrom & Roberts 1995). As explained by Otley (2014, 2016) among others, although organizations believe that MCS can help them in the task to deliver value, some researchers, such as Henri (2006a), claim that the specific relationship between MCS and performance is ambiguous and that there is insufficient evidence to suggest a direct relationship between MCS and organizational performance. In the opposite direction, Koufteros et al. (2014) argue that there is a gap in the literature on how specific uses of MCE affect performance (p. 315); they emphasize the importance for a business to explore this effect in order to direct resources and maximize returns. There is, however, very little broad-based empirical research examining the role that MCS can play in shaping organizational performance. In this line, Pavlov and Bourne (2011) added that since MCS relationship to performance has not been clearly analyzed, little is known about the mechanisms that link this relationship between MCS impact and performance, directly or indirectly through the organizational capabilities that trigger performance in different kind of firms. Thus, this suggests an unresolved area for study.

The third gap is a response to Otley's and Soin's (2014) calls for researchers to "develop better ways of describing likely sources of uncertainty and their possible impacts," in particular related to the use of MCS. The research found that the way the results are dependent on the degree of certainty a firm holds about its current and future business operations (Chenhall & Morris 1986; Mia 1993). Still the environmental context has been one of the issues that have not been developed in the literature. Management Control studies need to recognize that all control takes place under conditions of uncertainty: this is true today and always was (Otley & Kim 2014). Thus, given that the effect of some environmental factors is unclear, this gap concerns to what extent a perceived environmental uncertainty will influence (PEU) (Govindarajan, 1984; Hoque, 2004) decision makers, and mediate the relationships previously studied between MCS uses, capabilities (EO & LO), and performance.

In general, our study contributes knowledge to the research frontier with respect to these relationships. It is important to understand and identify uses and ongoing management processes associated with MCS administrative practices that can enable and enhance strategic firm capabilities and thus, the emergence of new strategies and performance.

1.2. Objective of the dissertation and research questions

The general objective of this doctoral thesis is to identify and analytically describe the role played by the MCS in the development of strategic capabilities impacting on performance from RBV perspective and MCS literature. Taking into consideration the importance of context and that there are no studies that have evaluated whether these relationships are

maintained under different contexts or circumstances, the initial model is complemented with the PEU variable, to analyze it under the influence of uncertainty as perceived by decision makers.

To accomplish this, it is first necessary to analyze in the strategic management process literature [1], how MCS are part of the research environment and their relationship to performance. After that, we view in MCS literature how this concept was defined and operationalized, the reasons or purposes sought by managers using MCS, as well as the dimensions of information used and the type of use applied. This allows us to develop relationships proposed in this thesis, including MCS - Capabilities – Performance. The relationships between MCS uses – capabilities and MCS uses – performance, have been addressed in the literature, but as shown in this work, the operationalization of the various uses (e.g., monitoring, attention focusing, strategic decision-making and legitimization) or purposes (e.g., diagnostic or interactive) and the relation to the capabilities and performance have yielded ambiguous, inconclusive or sometimes contradictory results. Besides that, there are no studies that have evaluated whether these relationships are maintained under different contexts or circumstances, such as uncertainty. Typically, control practices seem to function as if uncertainty does not exist, and thus, a common misconception is that previous studies of control systems tend to implicitly assume conditions of certainty (Otley 2012).

Once the principal features of this thesis have been described, the main objectives in each chapter of this investigation are presented below. Furthermore, we have specific objectives to be met throughout this research. This doctoral work consists of three essays which make up the main body of this thesis.

In this first paper entitled **"Examining the impact of Management Control Systems use on the development of firm capabilities",** the general objective is to examine: the impact of MCS uses on the development of firm capabilities; and the specific objective is: How MCS uses determine capabilities (LO and EO). As a check of strength, this work also seeks to investigate the role-played by the firm characteristics (size, age, and industry) in MCS uses – Capabilities relationship.

In the second paper, called **"Impact of Management Control Systems uses on performance: Direct or Indirect effect?",** the overall objective is to answer the following questions: To what extent does MCS use affect performance? Is this effect direct or indirect through capabilities? In other words, is there a mediating effect of organizational capabilities (LO and EO) among the MCS uses and performance? Also to strengthen the results obtained and to analyze the effect of the size of the organizations concerned, also relevant in previous studies, we attempt to answer the following question: Does the size of the company matter in this relationship? In other words, is the effect the same in a business of any size?

Finally, the third paper called **"Management Control Systems, Capabilities and Performance: The influence of the Environmental Uncertainty"**, goes a step further and looks at the impact of external organizational context. From a contingency perspective (Burns & Stalker, 1961; Lawrence & Lorsch, 1967), the general objective is to identify the impact of the environmental context that may discourage or enhance the relationships studied. Specifically, the objective is to examine the extent to which decision makers perceive the influence of environmental uncertainty (PEU) (Govindarajan, 1984; Hoque, 2004), and if this influence mediate the relationships between MCS uses, capabilities (EO & LO), and organizational performance. Literature suggests that somehow the contradictory results that have been found could be attributed to the context

[1] Especially in the step of evaluation and control, where MCS take shape and activities & performance results are monitored: (Figure 2.1 Strategic Process)

in which the research was conducted (Otley 2012). Hence, by the inclusion of the variable PEU into the model, we seek to learn if two variables, e.g., MCS uses (independent variable) and PEU (potentially mediating variable), influence capabilities (the dependent variable). Thus the specific objectives are:

- To what extent does PEU play a mediating role between MCS and capabilities? (MCS - PEU - Capabilities)

- To what extent does PEU play a mediating role between capabilities and performance? (Capabilities - PEU - Performance)

This last study illustrates the importance of the context variables in order to understand the relationships between MCS uses, capabilites and performance.

As you can see, we have several objectives in the form of research questions that stem from the general objectives. Then, a synthesis of the research questions, the theoretical framework, the research methodology as well as key findings of each chapter are presented in table 1.1: Dissertation approach.

1.3. Theoretical background

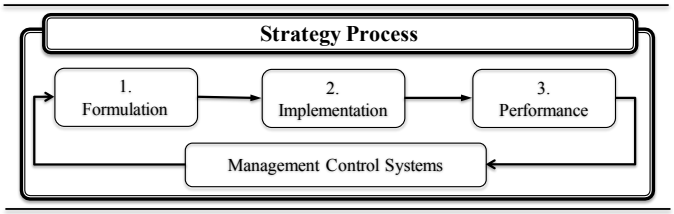
Next we present a brief explanation of the theories used in this thesis to understand the role played by the MCS uses in relation to organizational capabilities and performance, and finally we analyze how the context of organizations can influence the relations created.

1.3.1 Strategic management

Strategic management is the conceptual framework for making decisions that are considered strategic in an enterprise. Strategic management is "The major intended and emergent initiatives…… taken by general managers on behalf of owners……involving utilization of resources …. To enhance the performance…..of firms……in their external environments" (Nag, Hambrick, & Chen, 2007). There is general agreement that strategic management is concerned with the strategic processes that can generate a competitive advantage to allow better performance. This process commonly consists of four phases (formulation-implementation-outcomes-evaluation and control). The last phase is that which has been the least developed. Management Control Systems (MCS) are the models and systems that could support the integration of all the strategic process in this fourth stage. MCS comprise the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives (Anthony, 1965)[2]. Therefore, the information provided from this system is relevant in all phases of the strategic process (Figure 1.1). In general, MCS or also called PMS´s help translate strategy into objectives and measures that can be clearly communicated, thus facilitating the closure of the gap between the strategic vision of the firm and the management of its operating activities (Bisbe & Malagueño 2012). Strategy as a research program has two broad approaches: content and process. Both types are important for this research. Content research studies present and evaluate strategic options that companies follow, arguing two principal causes.

[2] The term "management control systems, MCS" was brought into general use by Professor Robert Anthony of Harvard University in his seminal book published in 1965.

Figure 1.1: Strategic Process



Source: Self-devised

The first is external (i.e. factors where the industry structure determines the rules of competitive play (Porter, 1980). The second is internal (i.e. factors where strategy and competitive advantage depends on the firm resources and capabilities (Barney, 1991; Teece, Pisano, & Shuen, 1997; Wernerfelt, 1984)), that allow the company to build competitive advantage and achieve better results than the competition. In this line, MCS are used to implement the strategy within the organization (Gates, 2001) by providing the information necessary to challenge the content and validity of the strategy (Ittner et al. 2003) and set the conditions for the creation or development of the strategic capabilities in organizations through the routines they stimulate (Franco-Santos et al. 2012). From the point of view of process research, investigators have focused mainly on two lines: deliberate and emergent. The deliberate line refers to strategy as an analytical approach that is developed in a planned and rational way (Ansoff, R. L. Hayes, & Declerck, 1976)). The emergent line refers to the strategy that arises from the collective organization through patterns of behavior which are not intentional but rather involve a social process, an interaction of the organization with its environment, not in the strategist's mind (Mintzberg, 1987; Mintzberg & Lampel, 1999). Both deliberate and emergent lines are related to MCS: an interactive MCS use is eminently social; while a diagnostic MCS use is completely rational.

Content (internal and external) and process (deliberate and emergent) strategy researchers are still separated by structural holes, and some authors argue for the need to integrate both branches (Cuervo, 1996; Mellahi & Sminia, 2009). Greater knowledge from research can help us understand how MCS use can assure the two areas (content & process) of the entire strategic process.

1.3.2 Theory of Resource-Based View (RBV)

The principal theoretical framework of this research is the Resource-Based View (RBV) theory, also called the theory of resources and capabilities, and its relationship to the study of management control systems. The RBV of the firm was originally developed in the field of strategic management with the aim of explaining the reasons why firms obtain different results (Barney, 1991; Wernerfelt, 1984) and how firms achieve sustainable competitive advantages. These reasons are based on the fact that some firms are able to control and use different tangible and intangible assets or resources (Lengnick-Hall & Wolff, 1999) which enable them to have some capabilities that provide sustainable competitive advantage and earn superior returns (Grant, 1996). Capabilities are a link between resources and their deployment, because they are organizational processes and routines to integrate, reconfigure, gain and release resources, to match and even create market change (Eisenhardt & Jeffrey, 2000; Grant, 1996). MCS research has used an explicit or implicit RBV approach (Barney, 1991; Teece et al., 1997; Wernerfelt, 1984) and together with Simons' levers of control framework (Simons 1995) shows that MCS influence the strategic capabilities in firms through the routines they stimulate (Franco-Santos et al. 2012).

Market orientation, learning orientation, entrepreneurship, and innovation are the capabilities most studied in the literature.

In this study we will focus on the capabilities of learning orientation and entrepreneurial orientation for various reasons. Elements of entrepreneurship and innovativeness studied in previous MCS works are included to some extent by the construct known as entrepreneurial orientation (Lumpkin, et. al,. 2009). MCS use is ssociated with superior performance in firms which have an entrepreneurial orientation (Chenhall & Morris, 1995).

Learning Orientation (LO) capability is considered an important facilitator of competitive advantage (Baker & Sinkula, 1999). The use of MCS supports a holistic look at all the strategic process, resulting in organizational learning (Slater & Narver, 1995; Speckbacher et. al., 2003).

Entrepreneurial orientation capability (EO) is a permanent attitude of a company (Covin & Slevin, 1991) that is proactively seeking new business opportunities (Zahra & Garvis, 2000). This capability favors the generation of competitive advantage and better results (Ripollés & Blesa, 2005). Empirical evidence has found a positive direct relationship between EO and results (Wiklund, 1999; Wiklund et. al., 2007; Zahra, 1991; Zahra & Covin, 1995) for companies of all sizes: small, medium and large (Rauch, et. al., 2009; Wiklund & Shepherd, 2003; 2005).

The literature supports the theory that organizational learning (Widener, 2007) and entrepreneurial orientation (Ripollés & Blesa, 2005) are two capabilities positively associated with performance, while other capabilities are not clearly affected this way.

1.3.3 Management Control Systems (MCS)

Management control systems (MCS) are formalized procedures and systems that use information to maintain or alter patterns in an organizational activity (Simons, 1987). MCS is comprised of multiple control systems that work together (Widener, 2007); providing the information necessary to challenge the content and validity of the strategy (Ittner et al., 2003). MCS have evolved from a purely financial approach to more comprehensive business characteristics (Kaplan & Norton, 1992), from business planning to a wider focus on business strategy (Berry et. al., 2009). It is widely accepted that a firm's MCS is designed to support its strategy (Widener, 2004), but MCS should be tailored explicitly to support such strategies (Langfield Smith, 1997) in order to achieve superior performance (Dent, 1990). MCS does not automatically improve performance; rather, performance is intimately related to how systems are designed, developed and used. It should be noted, though, that MCS use can be more significant than formal design. The use made of information and controls is a cornerstone of MCS (Ferreira, 2002). Therefore, to study MCS, it is important to start with the different uses that are given to those who apply them (Langfield Smith, 1997). Our study proposes a combination of two classifications of MCS use that have been used separately in previous studies, and this combination creates a new model that allows us to observe the phenomenon of study in a more holistic manner. These classifications are the theoretical proposition about levers of control (LOC) (Simons, 1995) and the Vandenbosch executive support systems classification proposal (Vandenbosch, 1999).

Levers of control (LOC) (Simons, 1995)

Simons (1995) argues that MCS are used with different purposes in four different ways: beliefs (commitment towards goals and inspiration, values, vision, direction, core values), boundary (administrative controls hierarchically based, guidelines for behavior, behavioral constraints), diagnostic use (control over organizational goal, monitoring), and interactive use (the ability

to search opportunities, solve problems or forward- looking and make decisions with management involvement).

In this study we focused on diagnostic and interactive uses because MCS are related with them (Simons, 1990, 1995). Specifically, Diagnostic MCS use refers to monitoring of organizational performance against important dimensions, to "justify, monitor and reward" goals, used to compare actual performance against pre-set targets to identify exceptions and deviations from plans (Mundy, 2010; Navarro & Guerras Martín, 2001). Diagnostic use constrains innovation / opportunities and weakens capabilities (Simons 1995) in the firm, because the proposed routines send a negative signal (Henri, 2006a; 2006b). On the other hand, interactive MCS use is forward-looking and characterized by active and frequent dialogue among top managers and employees (Naranjo-Gil & Hartmann 2007a). This stimulates dialogue, participation, and involvement, and thus detonates new strategies (Simons 1995). This type of use supports the emergence of new bottom–up strategies (Henri 2006a; Mellahi & Sminia 2009) and the development of strategic capabilities by fostering innovative practices, developing entrepreneurship (Ahn, 2001; Bisbe & Otley, 2004; Cruz, et. al, 2011; Henri, 2006a; Marginson, 2002) and facilitating organizational learning by providing information intelligence, generation, dissemination, and responsiveness (Kohli & Jaworski 1990),

The main difference between diagnostic and interactive use is that the former focuses on actual results evaluation, the latter on the formulation and use of predictions.

Executive support systems classification (ESS) (Vandenbosch, 1999)

The second classification used in this study is based on the proposal made by Betty Vandenbosch (1999), which identifies a typology with four categories for management information systems use: 1) Score keeping (monitoring); 2) Legitimizing decisions; 3) Focusing organizational attention and learning; and 4) Problem solving (Vandenbosch, 1999).

- Score keeping (monitoring) is characterized by comparisons in time periods, responding to the question: How am I doing? (Simon et. al., 1954). MCS are used to provide feedback regarding expectations.

- Legitimizing decisions (Legitimization): This refers principally to justify and validate past actions or a decision that has been made, increasing and ensuring the legitimacy of future actions. The information use of the entire firm in a MCS, gives them the authority and credibility to provide legitimacy of activities (Vandenbosch, 1999).

- Focusing organizational attention (Attention focusing) contributes to the emergence of new strategies within the organizations (Mintzberg, 1978; Simons, 1990; 1995) by responding to the questions: What problems must we focus on? What opportunities are there? (Simon et al., 1954).

- Problem solving (Strategic decision making) refers to a non-routine activity of senior management strategic decision-making, which is based on data analysis processes. Simon et al. (1954) stressed the importance of information to improve these processes and several studies found that information is the key to success.

On one hand, monitoring and legitimization MCS uses proposed by Vandenbosch (1999) are similar to diagnostic use proposed by Simons (1990, 1995). However, strategic decision-making and attention focusing (Vandenbosch, 1999) are similar to interactive use (Simons, 1995). Based on the previous statements, this proposal seeks to analyze the existence of a

second-order construct that allows us to observe how the different indicators can interact in a single measurement, to create a more specific observation of how they can interact together and produce different results. Since most of literature in this area was done using case studies and less frequently empirical analysis, there is a lack of coherence, creation and accumulation of knowledge on this subject.

Over all, this framework shows that MCS uses, through the routines they stimulate, influence or inhibit strategic capabilities in organizations (Franco-Santos et al. 2012).

1.3.4 Performance

Performance in the entire strategic process refers principally to the various consequences in the organization, commonly called value creation. According to RBV, performance is a function of a firm's ability to exploit its capabilities (Barney, 1991; Grant, 1991) to establish a competitive advantage that is required to sustain both current and future performance (Grant, 1996). The consequences of capabilities could be organized in four categories: organizational performance, customer consequences, innovation consequences, and employee consequences (Kohli & Jaworski 1990; Kohli & Jaworski 1993; Jaworski & Kohli 1996; Kirca et al. 2005). A long debate has focused on identifying the variables that make up the performance of a firm (Rumelt et al., 1991) and there have been explicit requests to include outcomes in some other shape or form because the tendency to think in terms of financial parameters limits their perspective (Mellahi & Sminia 2009). MCS encompass multiple measures (Kaplan & Norton 1996) and are not limited to only the financial aspect (Henri & Journeault, 2010). In this line, MCS is an important firm resource that facilitates decision making and evaluation and control processes impacting performance (Ittner & Larcker 2003; Chenhall 2005; Kaplan & Norton 1996).

Performance has been analyzed from two perspectives: reported performance (financial, stock market & non-financial performance) and perceived performance (perceived financial and non-financial performance, etc.). Both reported and perceived performance apparently achieved inconsistent results, positive or negative or mixed. Given this, research along these lines is still considered important.

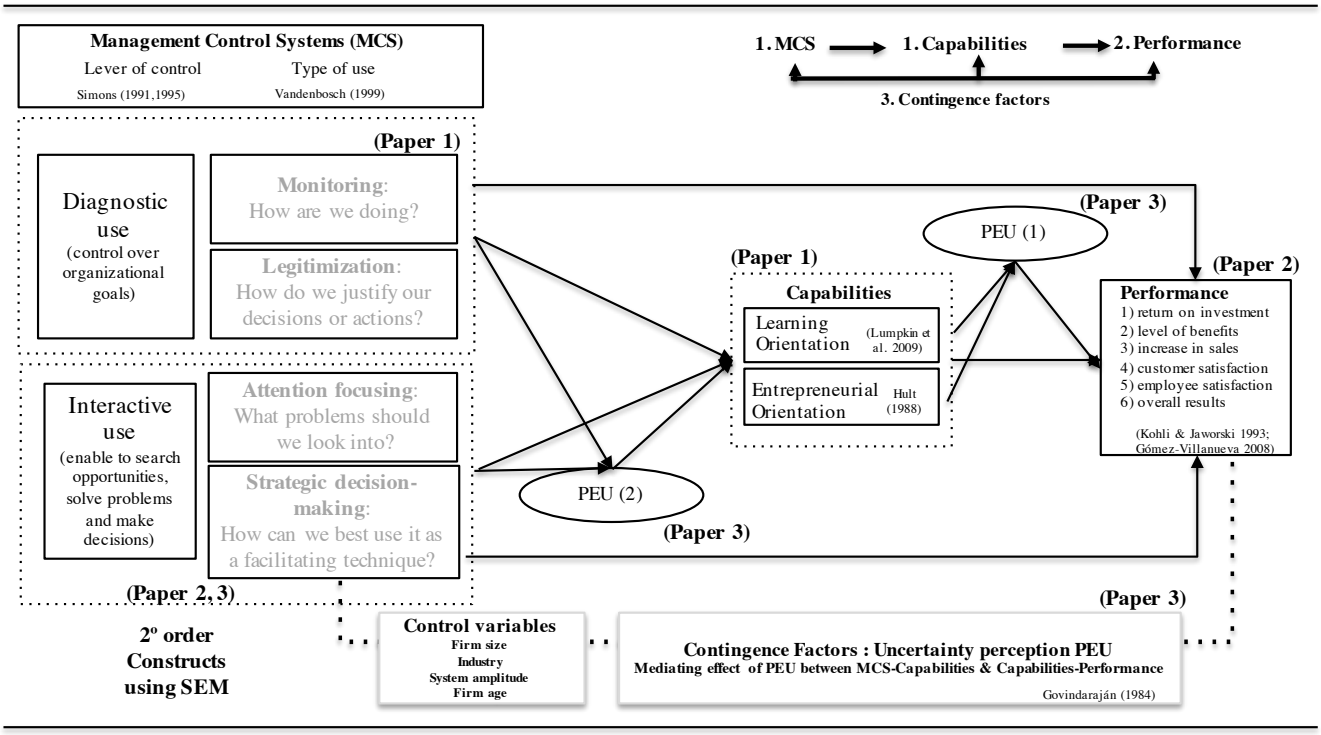
1.3.5 Contingency theory of organizations

The concept of uncertainty refers to the difference between the amount of information required to perform a task and the amount of information already possessed by an organization, a gap between the information known and desired (Galbraith, 1973). Contingency theory (Burns & Stalker, 1961; Lawrence & Lorsch, 1967) predicts that the relationship between an organization's characteristics (such as its MCS, orientations or capabilities) and organizational performance depends upon specific contingencies or situations (Hayes, 1977; Otley, 1980). We find that numerous contingencies can influence the impact of these MCS. Contextual factors as environmental uncertainty might play an important role in the impact of MCS and capabilities. Since the inconsistencies found in the literature could be explained by looking at the context in which the studies were conducted, the contingency approach is highly recommended (Lind & Kraus, 2010). Some of the most studied variables in contingency works are: strategic orientation (e.g., Ittner et al., 2003), environmental uncertainty perception PEU (e.g., Govindaraján, 1984, Hoque, 2004), comprehensive/diversity MCS (Hall 2008; Chenhall, 2005), access to human capital employees (Chandler and Hanks,1994) or human capital background (Naranjo-Gil & Hartmann 2007a, 2007b).

1.4. Theoretical model

This structured research, as mentioned above, is divided into three main parts according to the objectives: In the first essay, we explicitly examine the relationships among four MCS uses (monitoring, legitimization, attention focusing, and strategic Ddecision-making) (Vandenbosch, 1999) and two organizational capabilities (Entrepreneurial & Learning Orientations). The relationships proposed are based on the theoretical framework, where the major premise is that monitoring and legitimization uses negatively influence capabilities because they are acting in a diagnostic mode (Simons 1991, 1995; Henri 2006a). It should be mentioned, however, that Koufteros et al. (2014) have recently found that diagnostic use has a positive impact on the development of organizational capabilities.[3] Likewise, it is expected that attention focusing and strategic decision-making uses are positively related to capabilities because they are acting in an interactive manner (Simons 1991, 1995).

Figure 1.2: Complete project theoretical model



Source: Self-devised

It is important to note that in this first approach, as control variables, we also compare the differences of how a firm uses the diverse MCS by industry and firm size. In a second essay, this work expands Vandenbosch (1999) and Simons (1995) classifications of MCS uses and both are related in to a 2nd order constructs to examine the extent to which MCS uses impact a firm's capabilities and performance directly or indirectly through capabilities. In other words, is there is a mediating effect of organizational capabilities (LO and EO) among the various MCS uses and performance? At this stage, the role played by the firm size will not only be a control variable, it will be an integral part of the study because we seek to know whether the effect obtained is the same in businesses of different sizes. Finally, in the third essay of this research, the set of constructs

[3] Koufteros et al. (2014) found that there is sufficient evidence to suggest that MCS uses (diagnostic and interactive) leads to improved capabilities, which then impact performance.

(MCS – Capabilities - Performance) and their proposed relationships (MCS - Capabilities & Capabilities - Performance) will be tested by relating them to perceived uncertaintiy, in order to discover if both relationships are mediated by the inclusion of the variable PEU (MCS-PEU-Capabilities and Capabilities-PEU-Performance) in a complete form of the model presented below.

Thus, by linking MCS, capabilities, and performance in a context of uncertainty, this dissertation attempts to shed light on some issues that are still unexplained, as well as to strengthen the existing literature. Therefore, it is very important to provide a holistic view of the effect of the MCS and capabilities on a company's performance. Figure 1.2 presented above, shows the conceptual model of this work and also represents the major relationships that we seek to demonstrate in each essay.

1.4 Dissertation approach

After reviewing the principal theories of of this research: Resource Based View, Organizational Capabilities, Contingence, Theory of Organizations, Management Control Systems and Performance literature, this structured investigation is based on the above objectives and research questions. The literature reports the need for quantitative research that provides insights into different MCS uses and their interrelations with other constructs (Ahrens & Chapman, 2007; Henri, 2006a; Henri & Journeault, 2010) and this study responds to that need.

This work was designed as a quantitative study, based on data collected from primary sources in the form of structured surveys from a list of business managers of firms in the manufacturing, trade, banking, and service sector in Mexico. The objective population consisted of 4750 companies belonging to the DENUE 2012 database of the Instituto Nacional de Estadística y Geografía (INEGI). Participanting firms were selected according to the primary and secondary SIC codes related to the manufacture, trade, banking, and services (Appendix A shows the data fields in the directory SCIAN México 2012). We use the firm classification of the Official Journal of the Mexican Federation published on June 2009 to categorize firms by size, so that the number of workers in the firm determines the size of the company. Thus, 1-50 workers composed a small firm, 51–250 a medium-sized firm, and >250 employees is categorized as a large company. Information was collected over the course of eight weeks using online and offline surveys. There were a total of 644 units (13.56% of the sample). 323 completed surveys (50.2%) were collected through online participation and 321 (49.8%) were performed offline, with a response rate of 13.56%. Analyses were performed using SPSS (V.21.0) software and structural the equation modeling software program SPSS-AMOS (V.21.0) to estimate structural equation modelling. In a first stage, we conducted several procedures and tests to establish database and construct validity and reliability[4]; The scales used in this study were founded on the review of the most relevant literature ensuring the content validity of the measurement instrument (See table 1.1: Dissertation approach and appendix B. Survey instrument).

Each paper includes various methods of analysis as detailed below:

For the 1st paper (chapter II in this thesis) we use multiple linear regressions and analysis of variance (ANOVA) to give

[4] Survey content and face validity and pre-test in three steps, convergence and discriminant validity tests, exploratory and confirmatory factor analyses, assessment of interraterTOTAL reliability and normality test) (appendixes C, D, E, F)

robustness to the model and to verify whether the relationships are maintained in companies of different sizes and industries. We conducted a multiple regression analysis dividing the sample into subgroups by size and industry.

In the second paper (chapter III) we use Structural Equation Modelling (SEM) with multi-group analyses. It was found to be appropriate to distinguish between companies of different sizes, so the structural equation model was used in multi-group form by splitting the sample to assess the influence of the size factor and take into consideration one of the dominant focal points for analyzing the multi-group data using SEM, the measurement invariance (Hair et al. 2006). This procedure is neccesary because we must ensure that our instrument does not vary with different groups of answers in order to compare the groups (Steenkamp & Baumgartner 1998); in other words, we needed to assure the *measurement invariance* of the measurement instrument (Hair et al. 2006). We chose to use the Structural Equation Modelling approach (SEM), for several reasons: First of all, SEM analyses are appropriate when the theory sets out to explain the role of variables that intervene in the studied relationship (Luft & Shields, 2003). Secondly, this approach assumed contextual factors such as noise within the models and did not consider how the results might be modified by these contextual factors (Chenhall, 2005), unless the theory and model explicitly support it. SEM methodology allows researchers to be able to incorporate the influence of various factors under the theory that supports it and provides an evaluation of the entire model at a macro-level perspective (Kline, 1998) as a whole, rather than simply its parts. Finally, structural equation models eliminate measurement error bias, but require large samples (Bisbe et al. 2006), feature that perfectly fulfills our database. Also, in this second paper, structural Equation Modelling (SEM) was used for the development and testing of the 2nd order constructs related to the combination of the two classifications: the theoretical proposition of levers of control (LOC) (Simons 1995) and the proposal of the four MCS uses called "executive support systems classification" (Vandenbosch 1999).

In the third paper (Chapter IV) we use Structural Equation Modelling (SEM) to test the hypotheses about the relationships between MCS uses-PEU-Capabilities & Capabilities-PEU-Performance, and how these relationships are impacted by the PEU variable inclusion in the model in two different positions.

Control variables used in the doctoral dissertation are: System amplitude, firm size (10-50 small; 51-250 medium; > 250 Large), firm age and industry. Some variables were asked with a flipped scale (reverse-scored, †EO4 †EO13 †EO14)†, to ensure the absence of bias in responding. Thus Table 1.1 Dissertation approach, shows a summary of all the above.

Table 1.1 Dissertation approach

Essay (chapter)	One (Ch. II)	Two (Ch. III)	Three (Ch. IV)
Research question	What is the impact of MCS uses on the development of firm capabilities? Specific objective is: How does MCS uses determine capabilities (LO & EO). As a robustness check, we investigate the role-played by the firm characteristics (size, age, and industry) in MCS uses – Capabilities relationship	To what extent has MCS uses had an effect contributing to performance? It is direct or indirect through capabilities? - Is there a mediating effect of organizational capabilities (LO & EO) among the various MCS uses and performance? - To strengthen the obtained results and to analyze the effect of the size: Is the effect the same in business of any size?	To what extent does perceived environmental uncertainty (PEU) for decision makers, influence the relationships between the MCS uses, capabilities (EO & LO) and performance. - PEU plays a mediator role between MCS and Capabilities? - PEU plays a mediator role between Capabilities and Performance?
Theoretical Framework	Resource Based View Organizational capabilities Management control systems Literature	Resource Based View Organizational capabilities Management control systems Performance Literature	Resource Based View Organizational capabilities Management control systems Performance Literature Contingence theory of organizations
Research Design Quantitative study Survey from 644 Mexican firms (population 4750; response rate =13.56%) Control variables: System amplitude, firm size (10-50 small; 51-250 medium; > 250 Large), firm age and industry Some variables were asked flipped	**Analyses performed:** Construct validity/reliability; Analysis of variance (ANOVA); Multiple Linear Regressions; Structural Equation Modelling (SEM): Multi-group analyses (size); Measurement invariance **MCS: 27-item (Henri, 2006) in four dimensions: monitoring; focusing attention; strategic decision-making; legitimizing** **Learning Orientation: 4-item (Hult, 1998)** **Entrepreneurial Orientation: 14-item (Lumpkin et al. ,2009)**	MCS: 27-item in two 2nd order constructs: Diagnostic & interactive uses (Simons, 1995; Vandenbosch 1999) Learning Orientation: 4-item Entrepreneurial Orientation: 14-item **Performance: 6-item (Jaworski & Kohli, 1993,1996) adapted (Gómez-Villanueva, 2008)**	MCS: 27-item in two 2nd order constructs: Diagnostic & interactive uses Learning Orientation: 4-item Entrepreneurial Orientation: 14-item Performance: 6-item **Perceived environmental uncertainty (PEU): 8-item Govindarajan (1984)**
Key findings	- Large firms use MCS as monitoring more than small - Smaller companies presents greater learning orientation than large firms - Manufacturing, and services firms, have higher entrepreneurial orientation that trade and banking - The four MCS uses have a positive and significant impact on both capabilities (LO & EO) - The variable of greatest impact in LO is legitimizing use and that of the least impact is monitoring use - The variable of greatest impact in EO is focusing attention and that of least is strategic decision-making - Monitoring and legitimizing uses (Diagnostic) do not necessarily inhibit capabilities in the organization	- In firms of all sizes, diagnostic MCS use shows a positive and significative relationship with LO & EO capabilities, but in the opposite (+) direction than we expected (-). - Interactive MCS use shows positive and significative relationship with capabilities in the full, middle and large sample, not in small businesses. - MCS has a direct effect on organizational performance, only if it was used diagnostically, in any size company - EO capability has a mediating effect; Total on Interactive use-performance (except for small companies) and partial in Diagnostic use-Performance - LO capability has no mediating effect on the relationship between MCS uses & Performance	- PEU variable, between MCS and capabilities (PEU 2), does not have a mediating effect as we originally proposed. - PEU variable, between capabilities and performance (PEU 1), show a significative and positive result, but different effect is observed. - PEU in LO-performance relationship shows a total mediating effect - PEU in EO-Performance relationship shows a partially mediating effect

Source: Self-devised

1.5. Anticipated contributions

By achieving the specific objectives and reaching the overall purpose of the doctoral thesis, the anticipated contribution of the present study is threefold:

This study contributes to the research boundary by building insights about the MCS-capabilities-performance relationships, to shed understanding the role of MCS and how it can act as an antecedent of organizational capabilities and performance. Thus, MCS use can be seen as a source of competitive advantage by its contribution to the development of strategic capabilities and results in the organization. In the literature there is a paucity of studies that explore the results of MCS influence (Bisbe & Otley, 2004; Chenhall, 2003). Moreover, as Henri (2006a) suggests, a more detailed understanding of the MCS role as an antecedent to the development of organizational capabilities is needed. This study may help to resolve some of the ambiguous findings from literature. There are very few empirical and comprehensive studies to address these questions and there is no study like this for Mexican companies.

Our work makes contributions with respect to the initial proposal of Henri (2006a), linking two proposals that have been tested separately. The first is the executive support systems (ESS) classification of Vandenbosch (1999), and the second is Simons (1995) proposal for the Levers of Control (LOC). This research makes an empirical application of the levers of control (Simons, 1990) and Vandenbosch (1999) models together in firms of different sizes (small, medium and large firms). Such studies have not been performed in SMEs nor compared to large firms. In fact, we have not yet found such an investigation related to MCS in sectors other than manufacturing.

The results obtained in this work highlight how to improve management practices related to MCS uses. Our contribution will be relevant to design and deployment processes of MCS and for identifying some practices related to the development of strategic capabilities impacting organizational performance.

Certainly, we believe that the results derived from this doctoral thesis can be useful in furthering our understanding in this field and they will enrich the current research stream of MCS and Performance. Moreover, our results are based on a large sample of different firm sizes, including four sectors -manufacturing, trade, banking and services- and covering a wide range of variables, as suggested by Hall and Wahab (2007).

Table 1.1 Dissertation approach, provides a brief of the findings in each chapter of this thesis.

1.6. Structure of the Doctoral Thesis

Consistent with the objectives of the dissertation, we structured our report by developing three empirical chapters (essays). In each empirical essay we delineate a theoretical framework by doing a literature review and we also present a theoretical model and hypotheses; then we develop a research design, followed by the results findings, conclusions, discussion and managerial implications. Each chapter has a summary of the limitations and possible future research directions identified in the final section.

Hence, chapter II contains an essay related to the first question: What is the impact of Management Control Systems use on the development of firm capabilities? Here the key concepts and theoretical frameworks of the thesis are reviewed. The primary focus of this chapter is to provide empirical evidence of the relationship between the four different MCS (Vandenbosch, 1999) uses and organizational capabilities (LO & EO). This paper was presented in several conferences as CLADEA (The Latin American Council of Management Schools) 2013 XLVIII Annual Assembly in Río de Janeiro, Brasil in October, 2013 obtaining the recognition as the Best Paper of the conference in the Strategy, Corporate Governance and Sustainable Development stream; the XIX Congreso Internacional de Contaduría, Administración e Informática de ANFECA en la Universidad Autónoma de México, UNAM in October 2013, in México City, and achieved very good reviews. The work was also was presented in the AIMS (Association Internationale de Management Stratégique) XXIII Conférence in Rennes France in May 2014.

In chapter III, the second essay provides evidence for the next objective in this thesis: Do MCS uses have a direct or indirect effect on performance through capabilities? The purpose was to analyze whether this effect is the same for any size company. This second paper was accepted for presentation at the 8th Iberoamerican Academy of Management conference in December 2013, in Sao Paolo Brasil, and again at the 7th Annual New Zealand Management Accounting Conference (NZMAC) in September, 2014, in New Zealand.

Chapter IV, the third essay incorporates the preceding results into a contingency framework; we remake the model in a different context, seeking to examine the extent to which the influence of the environment, specifically, the perceived environmental uncertainty (PEU) for decision makers, mediates the relationships between the various MCS uses, organizational capabilities (EO & LO) and organizational performance. An initial draft of this paper was accepted for presentation in the European Institute for Advanced Studies in Management (EIASM) in the 8th conference on performance measurement and management control in Nice, France in October 2015.

Finally, this doctoral dissertation concludes by presenting in a chapter V the summary with the study's results and contributions, as well as theoretical and practical implications. In the Chapter VI, there is the appendix, and in the chapter VII, the references.

Chapter II: Examining the impact of Management Control Systems use on the development of firm capabilities

2.1 Abstract:

Changes in individual expectations, social and economic environment and technological capacity have transformed management control practices over the last 40 years. Organizations, under great pressure to deliver value, believe that Management Control Systems (MCS) can help them in this task (Ittner & Larcker 2001; Ittner et al. 2003). The use of MCS is frequently seen as facilitating strategy to enhance organizational performance. Research in MCS has been done regarding the design criteria, purposes, types, and other factors that influence the adoption and use, but less is known about MCS impact on the organizational capabilities that trigger performance. Resource-based theory (RBT) (Barney et al. 2011) and management control literature (Simons 1995; Vandenbosch 1999) provide the context needed to explain the role of MCS and its relation to organizational capabilities.

The research question in this work is: How does MCS use impact the generation of capabilities in a firm? This work also seeks to investigate how MCS uses determine capabilities of Entrepreneurial Orientation (EO) and Learning orientation (LO) and the role-played by firm characteristics (size, age, and industry) in this relationship. The hypothesized relationship was supported by evidence from a study of 644 firms in Mexico, and provides results supported by the theory. Some possible causes are discussed. The main findings show that the type of use (Monitoring, Legitimizing, Attention Focusing or Strategic Decision-Making) is directly related to the strategic capabilities of Entrepreneurial Orientation and Learning Orientation in firms independently of size, to a greater or lesser extent, depending on the industry in which they reside, but in all cases with a positive and significative relation.

Keywords: Management Control Systems (MCS), Performance Measurement Systems (PMS), Strategic Management and Capabilities.

2.2 Introduction

Strategic Management, as a set of functions and processes [5]; is the conceptual framework for decisions that are considered strategic in a firm (Rialp 2003). It covers all matters that are of primary interest to the general direction (Rumelt et al. 1991). There is general acceptance that strategic management is concerned with the strategic processes, whose fundamental purpose is to generate a competitive advantage, typically based on the creation, use, and exploitation of resources and capabilities (Wernerfelt 1984; Barney 1991; Teece et al. 1997) that will allow better performance.

The strategic process is usually represented by three main stages (Rumelt et al. 1991; Ittner & Larcker 2001; Ittner et al. 2003; Hitt et al. 2011; Hutzschenreuter & Kleindienst 2006). First, the "formulation" phase is when the analysis of internal and external business environment and the strategic intent (mission, vision, purpose) is performed. The "implementation" phase is when plans and activities are realized, and the "performance" phase is when the implementation results are identified and evaluated. Besides these, there is an activity common to all phases, usually not specified, but that plays an important evaluation and control role, when activities and results are monitored, so that actual performance can be compared to desired performance. If the desired performance is not achieved, managers can take corrective actions (Rumelt et al. 1991; Hitt et al. 2011). It is during this activity that Management Control Systems (MCS) are responsible for creating and reviewing the models and systems to support the strategic process. MCS are defined by Anthony as the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives (Anthony 1965). The information provided from these systems is relevant in all strategic process phases (Widener 2007): in the formulation stage for exploring and evaluating alternatives (Naranjo-Gil & Hartmann 2007); in the implementation stage to support financial analysis, to monitor results and information; and in the final performance and feedback stage, to provide information on the drivers of success and causes of failures (Mintzberg 1994; Simons 1995). This is why MCS have moved from a purely financial focus to include more comprehensive business characteristics (Kaplan & Norton 1992), from a focus on business planning to a wider focus on business strategy (Berry et al. 2009) trying to cover the complete strategic process.

Over the last two decades, the development of the MCS in firms has been exponential due to the increase of various factors: I) Fast changes in the world due to increased competition in a globalized world with a strong sense of uncertainty and associated risks, with companies still needing to show excellent performance. II) New technologies with the advent of powerful computers and high-speed software that has allowed access and dissemination of more and better data and III) Increasing corporate control in multinational organizations and a global trend toward accountability and value creation. These issues, among others, have triggered the need for a paradigm shift in the design and use of MCS and also require a better understanding of the role of MCS and how to meet managerial needs. Nevertheless, little has been studied. It is widely believed that MCS can help to identify weaknesses, clarify objectives and strategies and greatly help improve management processes (Ittner & Larcker 2001) and the success of firms (Widener 2007) in today's competitive environment.

Our approach agrees that MCS should be more than mechanical tools to support strategy implementation, and in fact can become powerful tools to stimulate and manage the emergence of strategies. Based on the model proposed by Simons (1995) and Vandenbosch (1999), this research focuses on the relationship of four MCS uses (Monitoring, Legitimizing, Attention

[5] Generally, the term strategic management is used to refer to the entire scope of strategic decision-making activities performed within an organization (Hitt et al. 2011)

Focusing, Strategic Decision-Making) and firm organizational capabilities (Entrepreneurial and Learning Orientations). Both types of capabilities are related to superior performance of firms (Ripollés & Blesa 2005). The literature shows that Learning Orientation (LO) capability seems to be an effective facilitator of competitive advantage (Hult 1998; Baker & Sinkula 1999) and in the same manner, Entrepreneurial Orientation (EO) favors the generation of competitive advantage and better results (Lumpkin et al. 2009). Some studies have analyzed these relationships and suggest that capabilities are shaped by MCS, but how? The results have been inconclusive or in some cases, contradictory. For example we can see relationships between MCS and capabilities that are positive (Simons 1990; Simons 1991; Simons 1995; Cruz et al. 2011) or negative (Bisbe & Otley 2004); MCS relationships with organizational learning (Ahn 2001; Johnston et al. 2002; Godener & Söderquist 2004; Chenhall 2005); MCS as a learning machine (Abernethy & Brownell 1999); MCS as a performance capability (Hall 2008), MCS as a decision-making patterns (Wiersma 2009; Grafton et al. 2010), MCS as strategic capability (Marginson 2002). We can also find mixed results depending on how the MCS are used. For example, Henri (2006a), previous studies and the seminal work of Simons (1995) found results positively related with capabilities when MCS are used interactively or negatively when used for diagnostics. Although, Koufteros et al. (2014) argue that Henri´s (2006a) univariate statistics reveal a positive relation between diagnostic controls and learning. In this line, the work of Koufteros et al. (2014) hypothesizes that diagnostic use can positively impact the development of organizational capabilities. But it is important to note a discrepancy between these two studies: the way to measure diagnostic use in both cases is quite different. Finally, Henri (2006a) measures diagnostic use based only on indicators of use as a monitoring tool. Widener (2007) and Koufteros et al. (2014) claim that Henri (2006a) found a negative relation between diagnostic and organizational learning because he used a narrow definition of diagnostic use; instead, these authors measure diagnostic MCS use with three sets of indicators. In addition to the use of 1) monitoring, they also include 2) legitimization, an issue raised by Vandenbosch (1999) before, and without further arguments, his proposal also includes 3) focusing attention on MCS use as diagnostic use. Worth mentioning that attention focusing proposal by Vandenbosch (1999) resembles a more interactive use because it involves a dialogue between people; the main feature of interactive use as interpreted by Simons (1995) and Henri (2006a).

Continuing with the studies results, we can also find research on this interaction of both uses (diagnostic and interactive) as a capability in itself (Mundy 2010). Despite all these studies, there is still a need to better understand the impact of the various MCS uses on organizational capabilities that trigger performance, in different kind of firms, e.g., SME's or services.

As we can see in our literature review, except for the work done by Henri (2006a) and Koufteros et al. (2014) there are no studies linking the various uses of the MCS and their impact on firm strategic capabilities. Even more, we found no studies that specifically tested entrepreneurial orientation empirically. Koufteros et al. (2014) focus on three organizational capabilities (strategic management capability, operational capability and external stakeholder relations capability), but we should point out that the literature does not provides solid arguments for the development of these three organizational capabilities, nor does it identify the scales previously used for the measurement. Hence, to resolve some of the ambiguous findings, the literature suggest that a more detailed understanding of the MCS role as a determinant of organizational capabilities is needed.

Based on the studies insights and the fact that the impact of MCS on some capabilities remains unclear, this work argues that the different uses of MCS (Monitoring, Legitimization, Attention Focusing, and Strategic Decision-Making) could encourage

the utilization and development of strategic firm capabilities such as organizational learning and entrepreneurship. Specifically, the research question in this work is: What is the impact of MCS use in generating capabilities in the firm?. Our study will also investigate how MCS uses determine capabilities of EO and LO in the firm, and the role-played by the firm characteristics (size, age, and industry) in this relationship.

We hope that this paper will make several contributions. First of all, this study explores how the MCS uses impacts on the way firms achieve strategic capabilities and contribute to the research boundary by building in-sights into these relationships. In this sense, we seek to improve understanding of how the various uses of the MCS can be a source of competitive advantage by their contribution to the creation and development of the organization's strategic capabilities. Prior research on MCS use and capabilities has yielded valuable, but ambiguous, inconclusive or sometimes contradictory results. A major contribution of this study is to perform an empirical application of the Executive Support Systems classification (ESS) (Vandenbosch 1999) and the levers of control (LOC) model (Simons 1990), in a large sample of different sectors (Manufacturing, Services, Trade and Banking). Previous applications have been applied to samples of 100-300 and focused only on manufacturing firms (Bisbe & Otley 2004; Henri 2006a; Henri 2006b; Theriou et al. 2009; Cruz et al. 2011). Such studies were not performed in SMEs or new firms, nor was there a comparison with large firms. This is especially important because information of SMEs can allow us to design models, tools and processes according to their reality. There are very few empirical and comprehensive studies to address these questions and there is no study like this for Mexican companies. Moreover, this study goes beyond the initial proposal of Henri (2006a), including other MCS uses, not only monitoring (as a diagnostic MCS use) or attention-focusing (as interactive MCS use), as well as other capabilities like Entrepreneurial Orientation. Finally, this research combines arguments from international business literature, management accounting research and management control systems in order to improve hypothesis development and discussion of the results. Finally, survey data from 644 Mexican firms from different sectors were analyzed with ANOVAs and multiple linear regression models to provide empirical evidence.

After this introduction, the remainder of this paper is organized as follows. Section 2.3 defines the theoretical framework behind this research, composed mainly of the resources-based theory (RBT) (Barney et al. 2011), the levels of control (LOC) framework developed by Simons (1995) and the Executive Support Systems classification (ESS) (Vandenbosch 1999) of the type of MCS uses. Section 2.4 presents the theoretical model and hypotheses of the research. Section 2.5 shows the research methods, sampling procedures, data collection and measurement of variables. Section 2.6 shows the results of the study using factor analysis, ANOVA and multiple regressions. Section 2.7 reports our conclusions, and and finally section 2.8 the limitations and suggests avenues for future research.

2.3 Theoretical framework: RBV, Organizational Capabilities - MCS

Resource-Based Theory (RBT)

This work draws on the principles of Resource Based View (RBV) and the Dynamic Capabilities (DC) literature (Wernerfelt 1984; Barney 1991; Day 1994; Teece et al. 1997). The RBV of firms was originally developed in the field of strategic management with the aim of explaining the reasons why firms obtain different results (Wernerfelt 1984; Barney 1991) and how firms achieve sustainable competitive advantages. RBV rests on the principle that competitiveness is a function of the strength, exploitation, and leveraging of specific internal resources and capabilities controlled by a firm (Lengnick-Hall &

Wolff 1999) and conceptualizes firms as a group of resources heterogeneously distributed, whose resource differences persist over time (Barney 2001). In other words, resources are tied semi-permanently to the company and the sources of sustainable competitive advantage are specific and idiosyncratic resources (rare, valuable, imperfectly imitable and non-replaceable or substitutable) that cannot be easily duplicated (Wernerfelt 1984; Barney 1991). Although in words of Porter, competitive advantage[6] depends on firms' ability to position and differentiate themselves in their industry (Porter 1980), some studies provided evidence to suggest that firm-level resources and capabilities, not industry characteristics, are the primary determinants of firms' performance (Hoskisson et al. 1999). It is worth mentioning that resources do not generate rents per se, but rather are a function of the way in which they are used (Penrose 1995). Capabilities are a link between resources and their deployment, because they are organizational processes and routines to integrate, reconfigure, gain, and release resources, to match and even create market change (Grant 1996; Eisenhardt & Jeffrey 2000). According to RBV principles, firms must pay special attention to identifying, developing, protecting and using those resources and capabilities that assure the achievement of a sustainable competitive advantage (Santos et al. 2005).

The most recognized and researched organizational strategic capabilities are: entrepreneurship, innovativeness, market orientation, and organizational learning (Covin & Slevin 1991; Lumpkin & Dess 1996; Ripollés & Blesa 2005; Henri 2006a; Henri 2010). In this study we will focus on the capabilities of entrepreneurial and learning orientation for various reasons. Although the beneficial effect of market orientation on results has been extensively studied (Narver & Slater 1990), other studies have questioned this effect, suggesting several limitations to a market orientation.[7] Therefore, learning processes may be critical in creating competitive advantages in the firm (Baker & Sinkula 1999). On the other hand, the studied characteristics of innovativeness and the classical elements of entrepreneurship, among others, are included to some extent in the construct known as entrepreneurial orientation. Business literature supports that learning (Widener 2007) and entrepreneurial orientations (Ripollés & Blesa 2005) are positively associated with performance.

Learning Orientation (LO)

LO is considered an important facilitator of competitive advantage by improving a firm's information processing activities at a faster rate than rivals do (Baker & Sinkula 1999), but is necessary to have frequently updated information (Simons 1987). LO was defined as the development of ideas, knowledge and relations among past actions and future actions (Fiol & Lyles 1985). Some studies report that high performing firms rely on the information provided by frequently updated formal control systems to drive organizational learning (Simons 1987), and argue that MCS have a significant positive impact on staff perceptions about learn capability (Yuan et al. 2008). The use of MCS supports a holistic view at all the strategic processes, resulting in organizational learning (Slater & Narver 1995; Speckbacher et al. 2003) through the operationalization of the four

[6] Day (1994) distinguishes two related sources of advantage: assets (e.g., scale economies, locations, distribution system or brand value) and capabilities (complex set of knowledge and abilities accumulated throughout time) that allow the firm to coordinate and make use of its assets.

[7] Hamel and Prahalad (1991) suggest that market oriented firms may suffer from the "tyranny of the served market", ignoring or missing markets and competitors (Hamel & Prahalad 1991). Many times, market oriented firms may fail to identify and capitalize on the latent needs of customers, due to their excessive focus on expressed needs (Slater & Narver 1995). The same studies suggest that organizations should aim to become learning oriented if they look to achieve a sustainable competitive advantage, because market orientation can be copied but the learning environment cannot.

steps of the organizational learning process[8] (Slater & Narver 1995).

Entrepreneurial Orientation (EO)

EO captures specifically the entrepreneurial aspects of the firm's strategies (Covin & Slevin 1989; Lumpkin & Dess 1996; Covin & Lumpkin 2011). EO is defined as the set of processes, practices and decision-making activities undertaken to successfully manage the entry of a new company into the market (Lumpkin & Dess 1996). It is a permanent attitude of the company (Covin & Slevin 1991) that is proactively seeking new business opportunities (Zahra & Garvis 2000). From the standpoint of the RBV, the entrepreneurial orientation can be identified as a high-level organizational routine, durable, and difficult to imitate or transfer (Gómez-Villanueva et al. 2010). Literature on entrepreneurship emphasizes the importance of EO as a determinant of business performance (Ripollés & Blesa 2005). Entrepreneurial orientation can be seen as the intangible ability of the company's strategic position, difficult to replicate, and related to superior results (Wiklund & Shepherd 2005). There is a growing interest in literature to identify and define the determinants of organizational capabilities (such as EO and LO). MCS play an important role here because, as discussed above, they have a direct impact on the perceptions related to learning and they can support strategic decision making in the company related to the market, opportunities, and results.

MCS use: The levers of control framework

Management control was defined by Anthony (1965) as the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives. MCS seek to influence human activity within the company; they are formal or informal procedures and systems that can be identified by common management practicest in a business that use information to maintain or alter patterns in an organizational activity (Mintzberg & Waters 1985). MCS are comprised of multiple control systems that work together (Widener 2007); for example, Performance Measurement Systems (PMS) are one important aspect of MCS and represent the process and the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely et al. 1994) by providing the information necessary to challenge the content and validity of the strategy (Ittner et al. 2003). Some MCS are formal such as planning, budgeting or reporting systems, monitoring procedures, project management systems, human resource systems, cost accounting systems or support decision making systems like SAP platforms or informal as weekly meetings, daily checks, emails, etc. (Simons 1991). There is general agreement that MCS does not automatically improve performance, rather, performance is totally related to how systems are designed, developed and used. Langfield Smith (1997) argues that the best way to approach the study of administrative controls is by looking at the different uses by those who apply them (Langfield Smith 1997).

This study combines two MCS classification of uses and relates both to identify the expected relationships: The theoretical proposition of Simons (1995) about levers of control (LOC) and Vandenbosch's (1999) executive support systems classification (ESS).

Simons (1995) proposed a framework that has been used extensively. The central point of the Levers of Control framework

[8] Learning process: Information acquisition (How am I doing), information dissemination (communication), shared interpretation (what does it mean) and organizational memory (How I Do it) (Slater & Narver 1995).

(LOC) is that control of business strategy is achieved by balancing the forces of four different levers of control: beliefs control and values, boundary control, diagnostic control and interactive control. The power of these four levers, it is argued, does not lie in how each is used individually, but rather in how they work together and complement each other, and how they achieve balance (Kruis et al 2015).

Beliefs and values are systems to secure commitment towards goals and to inspire employees in their search for opportunities and solutions. Belief systems are an explicit set of organizational definitions or procedures, that can be used by top management (Marginson 2002) to formally communicate the organization's basic values, purpose vision and direction (Simons 1995). Belief systems are: communication channels, formal mission statements, credos, statements of purpose, email, meetings, (un)written codes of conduct, strategic planning systems, and formal rules and procedures.

The boundary lever of control is an explicit set of organizational definitions and parameters; administrative controls which are hierarchically based (Marginson 2002), expressed in negative or minimum terms (Simons 1995). Any system that sets out minimum standards or guidelines for behavior can be used by managers as a boundary lever of control (Pun & White 2005; Mundy 2010). For example, boundary processes aim to prevent employees from wasting the organization's resources.

The Diagnostic MCS use (control over organizational goals), refers to the use of MCS, including PMS (performance measurement systems) or KPIs (key performance indicators), to monitor organizational performance against important dimensions of a given strategy, with a broad range of metrics in key areas (Marginson 2002) used to compare actual performance against pre-set targets (Simons 1995) and to identify exceptions and deviations from plans (Navarro & Guerras Martín 2001; Mundy 2010).

Interactive MCS use consists of formal two-way processes of communication between managers and subordinates, where employee participation is encouraged in a formal process of debate (enable employees to search for opportunities, solve problems, and make decisions). In this use, managers involve employees in the objective design to find relationships within and performance measurement, as a form to share information (Simons 1995; Henri 2006a; Mellahi & Sminia 2009; Mundy 2010). An example of this practice is creation process of a Balanced Scorecard (Kaplan & Norton 1992).

Simons (1995) suggests that the four levers create tension: two of the levers, the beliefs and interactive control system, create positive energy; while the remaining two levers, boundary systems and diagnostic control, create negative energy.

It should be mentioned that the notion of balance, a fundamental idea, has been criticized in the LOC framework because of its ambiguity. It is argued that the various controls must be balanced in order to manage competing tensions, such as the achievement of predictable objectives on the one hand, and innovation on the other (Kruis et al. 2015); but the model does not specify how to achieve this or even where to observe. However, this framework shows that MCS uses influence or inhibits strategic capabilities in organizations through the routines they stimulate (Franco-Santos et al. 2012). In this study we focused on these last two uses (diagnostic and interactive) because MCS are present and related with them (Simons 1990).

The second classification of MCS use was proposed in an empirical analysis between MCS and organizational competitiveness (Vandenbosch 1999). Described below are four major categories of management information systems use: 1. Score keeping;

2. Problem solving; 3. Focusing organizational attention and learning; and 4. Legitimizing decisions.

Score Keeping (Monitoring): Score keeping refers to standardized processes that evolve over long periods of time within an organization. Monitoring use responds to the question: How am I doing? (Simon et al. 1954). Here MCS are used to provide feedback regarding expectations: a feedback system where goals are previously defined, outcomes are measured and compared with the goals, thus providing feedback that enables the necessary corrections. Monitoring is characterized by consistency between time periods so that comparisons are easy to make (Vandenbosch 1999). This type of use is similar to diagnostic control (Simons 1990).

Problem solving (Strategic decision making): Problem solving concerns a non-routine issue that requires top managers' commitment and requires information to support the analytical processes of strategic decision-making. Fast decision makers use more information and develop more alternatives than slow decision makers (Eisenhardt 1989). This type of use is similar to an interactive control (Simons 1990).

Focusing organizational attention (Attention focusing): The organizational learning associated with an attention-focusing MCS use contributes to the emergence of new strategies within the organizations (Mintzberg 1978; Simons 1990; Simons 1995) by responding to the question: What problems must we focus on? (Simon et al. 1954). The above question implies an active and regular dialogue between senior managers and their subordinates (Widener 2007). Thus, because this type of use is forward-looking, it is similar to interactive control system (Simons 1990).

Legitimizing decisions (Legitimization): Refers to justifying a decision that has been made and is a major reason for the use of a decision support system (Vandenbosch 1999). MCS can be used to justify and validate past actions and increase and ensure the legitimacy of future actions. MCS use information of the entire firm, which gives them the authority and credibility to provide legitimacy of activities. Thus, this type of information use is similar to diagnostic control (Simons 1990).

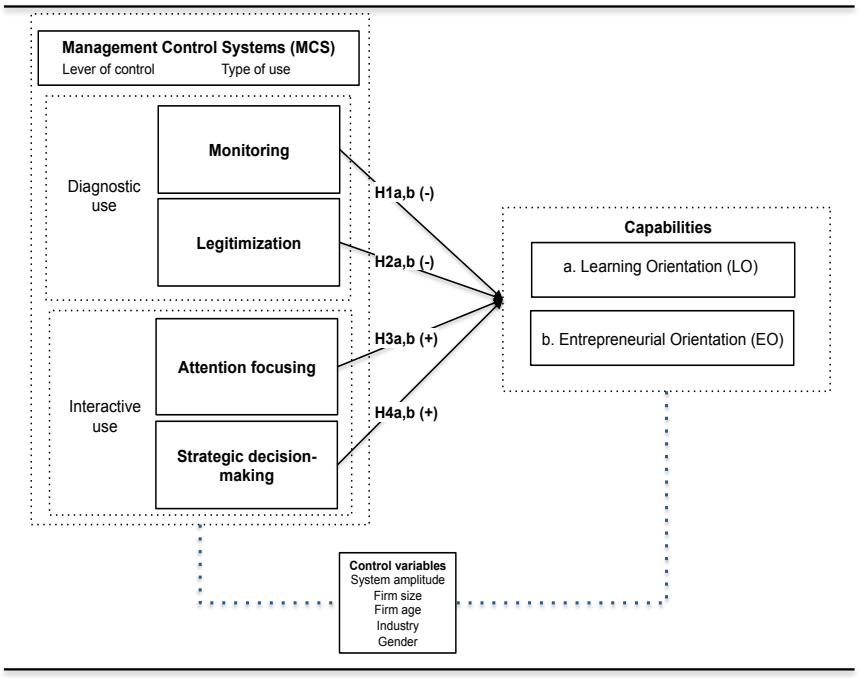
2.4 Theoretical model and research hypotheses

2.4.1 Theoretical model

Figure 2.1 presents the conceptual model and also represents the major relationships that we seek to demonstrate. In this structured investigation we explicitly examine the relationships among the four MCS uses (Monitoring, Legitimization, Attention Focusing, Strategic Decision-Making) and two organizational capabilities (Entrepreneurial & Learning Orientations).

Based on the theoretical framework, a major premise behind the development of this model is that monitoring and legitimization uses influence capabilities negatively because they are acting in a diagnostic mode. Likewise, it is expected that attention focusing and strategic decision-making uses can help to improve capabilities positively because they are acting in an interactive manner.

Figure 2.1: Theoretical model and hypothesis: H1 (a & b) to H4 (a &b)



Source: Self-devised

2.4.2 Hypotheses

Monitoring & Legitimizing uses (Diagnostic use):

In a LOC approach (Simons 1995), monitoring and legitimizing uses (Vandenbosch 1999) are related to diagnostic MCS use, to "justify, monitor and reward" the achievement of pre-established goals. Simons (1995) argues that when MCS is for diagnostics, it is seeking primarily to achieve objectives and thus can constrain innovation and the search for opportunities; therefore a negative input signal is sent because it is based on a negative sense of deviations search. In the same line, Henri (2006a) argues that these systems represent a negative force because typically this use focuses on review, finding "errors" and seeing what was not achieved, when productivity and efficiency have fallen (Theriou et al. 2009), implying that innovation needs to be curbed (Miller and Friesen 1982). Also Widener (2007) asserts that diagnostic MCS work as negative force which influences behavior, to constrain the space that employees have to explore, and anly to ensure compliance with organizational objectives, in negative form. Tt is noteworthy that in recent studies (Koufteros et al. 2014) has identified a positive relationship between the diagnostic use of MCS and organizational capabilities, but as explained above, have included attention focusing on diagnostic use makes us doubt its foundation.

Monitoring use: In the original conceptualization, MCS are considered part of the strategy-implementation process. This traditional feedback role of MCS to support the implementation of strategy is related to monitoring or diagnostic use (Simons 1995) and comprises the review of critical performance variables to monitor and coordinate the implementation of intended strategies in a routine process. These MCS are usually tied to a division and specialized work, and control values like stability,

enforced roles and bureaucracy (Hofstede 1978). Previous studies indicate that monitoring or diagnostic use of MCS is not related to innovation activities present in the entrepreneurial orientation, which requires a considerable amount of risk, a high degree of flexibility and broad communication processes within organizations. Instead, monitoring use is associated with highly structured channels of communication and limited organizational performance (Chenhall et al. 1995). Because of its routine nature or single-loop learning (Argyris & Schön 1978), there is evidence that people tend to react to control measures by developing suspicion and resistance (Henri 2006a), critical factors in the learning orientation. The above arguments about monitoring MCS use generate the following hypothesis:

H1a: Monitoring use of MCS exerts a negative influence on LO

H1b: Monitoring use of MCS exerts a negative influence on EO

Legitimizing use: MCS can be used to justify past actions or decisions that have been previously made under conditions of uncertainty (Henri, 2006b). In this sense, legitimizing MCS use is a political tool not only to establish authority but also to maintain credibility (Dermer 1990). This use is associated with a control dominant type (Henri 2006b), centralization of power and sometimes a strong prevalence of only financial indicators, as a weapon of power (Markus & Pfeffer 1983). Centralizing power, as a feature of controlling companies, is not related to the characteristics of the capabilities studied. Based on the previous arguments about legitimization, the following hypotheses occur:

H2a: Legitimizing use of MCS exerts a negative influence on LO

H2b: Legitimizing use of MCS exerts a negative influence on EO

Attention focusing and strategic decision-making uses (Interactive use):

In a LOC approach (Simon et al. 1954), interactive MCS use is associated with the signals sent throughout the firm to focus organizational attention, stimulate dialogue, and support the emergence of new strategies. Interactive uses emphasize boss-employee interaction and reflect a leadership style (Naranjo-Gil & Hartmann 2007). Thus, in terms of information processing, three basic components result: intelligence generation, intelligence dissemination, and responsiveness (Kohli & Jaworski 1990). This use has a positive impact on capabilities because it promotes participation and involvement of employees, essential elements in both studied capabilities.

Attention focusing use: This type of use send signals to the organization about strategic issues (Simons 1995). It is a high-level learning (double-loop) (Argyris & Schön 1978) that contributes to the emergence of new strategies within the organizations (Simons 1995). This type of MCS use fosters organizational dialogue, debate, discussion, and information exchange to encourage organizational learning (Mintzberg 1978; Simons 1990; Simons 1995). This use is more compatible with factors like innovation, creativity, flexibility, responsiveness, change and adaptability (Henri 2006b), all of which are related to learning and entrepreneurial orientations. Attention-focusing use requires a liberal management style that values the principles of empowerment, entrepreneurship, and self-control (de Haas & Kleingeld 1999). Therefore, the following hypotheses are proposed:

H3a: Attention focusing use of MCS exerts a positive influence on LO

H3b: Attention focusing use of MCS exerts a positive influence on EO

Strategic decision-making use: In this type of use, MCS are facilitators (Hickson 1986) by providing information support systems when faced with a problem or the need to make a decision. Top managers involved in a new venture or an entrepreneurial action should be associated with more frequent strategic decision-making and changes, thus needing a considerable amount of information from the MCS to support their decision-making processes. Fast decision makers use more information and develop more alternatives than slow decision makers (Eisenhardt 1989). However, information systems can limit learning by showing only what is evident from the data (Vandenbosch 1999): if the information is too focused, strategies may be too narrow-minded; if too broad or too flexible, strategies will be vague (Argyris & Schön 1978). Nevertheless, in all cases, this leads to developmental attitudes expected for the studied capabilities. Hence the following hypothesis is consequently suggested:

H4a: Strategic decision-making use of MCS exerts a positive influence on LO

H4b: Strategic decision-making use of MCS exerts a positive influence on EO

2.5 Methodology

This study responds specifically to calls in the literature for quantitative research that provides insights into different uses of MCS and their interrelations with other constructs (Ahrens & Chapman 2007).

2.5.1 Stages, data collection, variable measurement, and descriptive statistics

Data- Sources:

Data were collected from primary sources in the form of structured surveys. We collected data from business managers from a list of firms in the manufacturing, trade, banking and service sectors in Mexico City. The target population consisted of 4750 Mexican firms in México DF, listed in the DENUE 2012 database (INEGI [9]) with primary and secondary SIC codes related to manufacturing, trade, banking and services [10]. The classification used to categorize firms by size was published in June 2009 in the Official Journal of the Mexican Federation. This publication states that the firm size is determined according to the number of workers: 1-50 Small, 51–250 Medium size, and 250 > Large firms.

Collection of information

To collect information over the course of eight weeks, we used two systems, online and offline systems; online was administered by a professional service called encuestafacil.com; offline was administered by a professional market research company. 323 (50.2%) completed surveys were collected through online participation and 321 (49.8%) were performed offline, giving a total of 644 units (13.56% of the sample). The response rate was calculated as a percentage of the number of usable completed surveys out of the number of sent (13.56%).

The invitation to participate consisted of an initial personalized email letter. In order to increase the response rate (Dillman 2000), we send two follow-up reminder emails and a final reminder to non-respondents, as susggested by Dillman. We

[9] Instituto Nacional de Estadística y Geografía (INEGI)
[10] Appendix A, shows the data fields in the directory SCIAN México 2012.

invested two months collecting information in a personalized way to ensure the quality; data was also captured in the same online system. In all cases, as an incentive to respond, we promise to provide the participants with an executive summary of the results. Because of this incentive, we have 350 new emails waiting for the results.

Survey

To test our hypotheses, we collected data through a questionnaire-based survey (appendix B). The survey was designed following the steps suggested by the literature (Dillman 2000; Archer 2003): 1) Select in the literature of strategy and management control systems the constructs that measure the variables and draw up a first draft of the questionnaire. 2) This draft is then contrasted with interviews of members of the target population. 3) Make adaptations based on the comments received. 4) Choose an attractive format, good quality WEB page, and printout form.

Non-response bias

To check for potential non-response bias, online and offline respondents, used as proxies for non-response, were compared across five measures. Using a comparison of the means, no significant differences ($p < 0.01$) were found between the firm age, size, system amplitude used, and respondent formal education or management experience of online respondent firms and offline firms (non-respondent), suggesting the absence of any obvious non-response bias in this sample [11].

Common method variance

The Harman´s one-factor test, was employed to ensure the absence of the potential undesirable effects of common method variance (CMV) (Podsakoff et al. 2003), caused by single-source bias. This test has yielded 7 factors with eigenvalues greater than one, with the first factor explaining only 19.04% of the variance, indicating that no single factor was dominant. In general, this test indicated the absence of common method effects in our data, suggesting that CMV due to single-source biases was not an issue in our study (See Appendix C. Non response bias & common method variance (CMV) analysis). Past studies (Bisbe & Otley, 2004; Bisbe & Malagueño 2009, 2015) show that charge percentages in a single load factor below 22% are typically accepted.

Variable measurement

The variables in the model are explained below and were measured using previously validated scales. All questions were asked using a five-point Likert scale. The scales are shown in the appendix B. Survey instrument.

MCS uses are measured using an adapted version of Vandenbosch (1999). With four dimensions: Monitoring; Focusing Attention; Legitimizing decisions and Solving problems, but adapted by (Henri 2006b) leaving aside the dimension of solving problems, an adding a dimension to measure the Strategic Decision-Making with seven elements given by (Brockmann & Simmonds 1997). Henri (2006a) chooses those items because they are the most generic (refer to strategic decision making in general) while the others refer to specific strategic decisions (venturing, new regulations, etc.). Anchors for the MCS uses scale were ``1= we never used, 2= used rarely, 3 = sometimes used, 4 = often used, 5 = always used". A factor score is calculated for each of the four uses based on all the items. A higher factor score indicates a more intense MCS use.

[11] See appendix C: Non response bias analysis.

Table 2.1: Variable measurement

Construct	Source	Dependent & independent variables	Measurements
MCS uses	27-item scale adapted by Henri (2006a) from Vandenbosch (1999)	**Independent** Four dimensions: monitoring; focusing attention; strategic decision-making; legitimizing	A factor score is calculated for each of the four uses based on their respective items. A higher score indicates a more intense MCS use.
Learning Orientation	4-item scale proposed by Hult (1998).	**Dependent** One dimension scale (LO)	A factor score is calculated with the four items. A higher factor score indicates a more Learning-Oriented firm.
Entrepreneurial Orientation	14-item scale by Lumpkin et al. (2009)	**Dependent** Five dimension Scale (EO) innovativeness, risk taking, proactiveness, autonomy, and competitive aggressiveness	A factor score is calculated with the fourteen items. A higher factor score indicates a more Entrepreneurial-Oriented firm.
Control variables	System amplitude, firm size (10-50 small; 51-250 medium; > 250 Large), firm age, industry and gender Industry was recoded to four categories (manufacturing, trade, services & banking); Firm size in binary mode; Some variables were asked in a flipped form (reversed-score)		

System amplitude was measured using a comprehensive MCS forced-choice instrument, developed by Hall (2008). Respondents were asked to indicate, which of the following two options represents more your management control system. 1 corresponds to a comprehensive and 0 corresponds to a partial MCS use.

Capabilities: Two different validated scales are used to measure capabilities. **Learning Orientation** is measured using an adapted version of the four-item scale proposed by (Hult 1998). This scale is intended to measure a learning orientated company, thus it is more general than the 13 items scale of (Sinkula et al. 1997). This section asks the respondents the extent to which each item describes their organization. A factor score is calculated with the four items. A higher factor score indicates a more Learning-Oriented firm. **Entrepreneurial Orientation**: To measure EO, the scale proposed by Lumpkin et al. (2009) was used, which is a mixture between the 9 items and the three dimensions scale (proactiveness, innovation and risk aversion) originally developed by (Covin & Slevin 1989), on which he added two more dimensions (autonomy with four items and competitive aggressiveness with one more item), staying with five dimensions: innovativeness, risk taking, proactiveness, autonomy and competitive aggressiveness (Lumpkin et al. 2009). A factor score is calculated with the fourteen items. A higher factor score indicates a more Entrepreneurial-Oriented firm.

Although Lumpkin and Dess proposed the inclusion of autonomy as a dimension of EO in 1996, few EO studies have investigated autonomy as an element of EO, perhaps because autonomy is not one of the "original" dimensions of EO identified by (Miller 1983) and developed by Covin and Slevin (1989)—innovativeness, proactiveness, and risk taking—. However, autonomy is important because this enables both opportunity-seeking and advantage-seeking behaviors (Ireland et al. 2003). The definition included for competitive aggressiveness was "the intensity of a firm's efforts to outperform rivals and is characterized by a strong offensive posture or aggressive responses to the actions of competitors" (Lumpkin & Dess 1996) and the item used is: "My business "does not" make a special effort to win a business competition", †EO14. (Lumpkin & Dess 2001). Descriptive statistics of the constructs and correlation matrix are presented in appendix D. Descriptive stats, correlations. Part 1: MCS uses, LO, EO (ch.II)

Control variables

This study is controlled by the following variables: Amplitude of the system, firm size (10-50 small; 51-250 medium size; > 250 Large firm), firm age, industry to which it belongs and gender. The Industry variable was recoded to include four categories, to provide a higher level of identification. Size is measured converted as a binary variable. Questions about certain variables were asked with a flipped scale (reverse-scored), (†EO4 †EO13 †EO14)†. († Items with a superscript (†) are reverse-scored.)

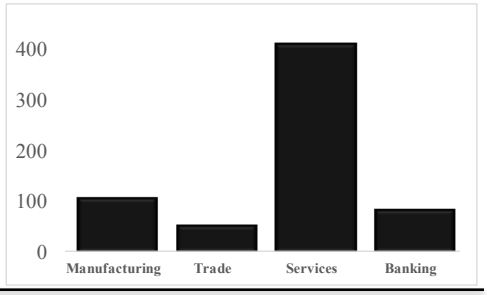
Descriptive statistics

With 644 usable questionnaires received we obtained a response rate of 13.56%. This is similar to the 12–25% range reported in recent studies 22.5% (Hall 2008); 24% (Henri 2006a); 42% (Naranjo-Gil & Hartmann 2007); 12% (McKelvie & Davidsson 2009); 15.6% (Wiklund & Shepherd 2003). Some authors forecasted a 20% response rate from surveys.

The final sample is comprised of 644 firms of which 296 (46%) are large-sized with an average of 4,257 employees and a mean of 44 years age; 191 firms (29.7%) are medium sized with an average of 158 employees and a mean of 24 years age; and 157 (24.4%) are small with an average of 32 employees and a mean of 11 years age. 49% of companies say they use or have a system that captures the key performance areas of their business units, providing a comprehensive overview of them; While 51.2% of companies say their systems cover some, but not all the key performance areas of the business units, offering only a partial view of the business.

Firm Industry Category

	#	%
Manufacturing	*105*	*16.3*
Trade	*51*	*7.9*
Services	*407*	*63.2*
Banking	*81*	*12.6*
Total	***644***	***100.0***



Source: Self-devised

Figure 2.2: Descriptive Statistics

The group is composed of 79 CEOs or General Managers (12.3%), 109 Functional or divisional directors (16.9%), 111 Department Directors (17.2%) and 345 managers (53.6%). 57 (8.9%) of them have completed high school, 393 (61%) have bachelor's degrees, 189 (29.3%) have a master's degree, and 5 (0.8%) have a doctoral degree.

The respondent's formal education in management is an average of 3.25 years; experience in management has a mean of 7.87 years and experience within their sector is an average of 9 years. The sample is distributed in four sectors. 105 manufacturing firms (16.3%), 51 trading firms (7.9%), 407 service firms (63.2%), and 81 related to banking (12.6%).

Exploratory factor analysis (EFA) with items related to each construct.

EFA across all items of different constructs (MCS Uses 27 items and Capabilities 18 items) was performed with several objectives: to ensure convergence and discriminant validity of the scales and to generate scores in each construct that will be

used in subsequent analyses. With this procedure we avoid multicollinearity problems present in the scale items (see appendix F. Convergent-discriminant validity, Part 2: EFA: MCS uses – LO & EO). Once completed, the following tests (ANOVA & MLR) are performed with the new scores produced by these factors in each construct.

Since there was an underlying factor to the items in each construct and their variances were similar, the internal consistency of the items included in the scale was assessed using Cronbach-alpha as a reliability coefficient. All the resulting alphas, above the 0.70 recommended level of acceptability (Nunnally et al. 1967) indicated a high internal consistency of the summed scales.

MCS uses exploratory factor analyses (EFA) results, which indicated that the 27 items loaded on four factors, namely FAC_L (Legitimizing), FAC_M (Monitoring), FAC_F (Focusing attention) and FAC_D (Strategic Decision-Making), were exactly the same theoretical factors that defined and represented by the scales used, and which explained the 65.26% of common variance. Capabilities EFA results with the 18 items, loaded on two factors, namely FA_EO (Entrepreneurial orientation) and FA_LO (Learning Orientation), explained the 69.227% of common variance [12].

2.5.2 Construct validity and reliability

Several procedures and tests were conducted to establish the validity of constructs and reliability: Content & face validity, pre-test of the survey in three steps, tests of convergence and discriminant validity, assessment of interraterTOTAL reliability and test of normality. Based on the tests, all constructs reflect strong validity and reliability.

Construct validity

Content and face validity: Here we focus on whether the operationalization (survey) is a good reflection of the constructs. We used content and face validity approaches to demonstrate that the measures reflect what we want to measure.

- To establish content validity, existing scales used in current literature have been employed.
- To provide face validity, we pre-tested the survey in 3 steps for clarity, complexity, ambiguity and face validity [13].
- Minor adjustments were made in terms of wording and presentation, according to recommendations given.

Convergent and discriminant validity: To ensure convergent and discriminant validity we conducted two empirical tests: 1) A correlation matrix of all items related to MCS uses and capabilities, and 2) An exploratory factor analysis (EFA) across all questions (MCS uses and capabilities):

1) Both correlation matrix, MCS uses (Monitoring, focusing attention, strategic decision making, Legitimization) and capabilities (LO & EO), show positive and significant correlation coefficients at the 0.01 level. Knowing that convergent correlations should always be higher than the discriminant ones, we can assume from the pattern of correlations that the different items are converging on the same point,[14] which in turn shows the discriminant ones[15]. I would conclude from this that the correlation matrix provides evidence for both convergent and discriminant validity (see appendix F, Convergent-

[12] See appendix D. Descriptive stats, correlations. Part 1: MCS uses, LO, EO (ch.II) and appendix F, Convergent-discriminant validity, Part 2: EFA: MCS uses – LO & EO (ch II).
[13] 1) Five academic business professors in planning/financial/accounting were asked to revise and complete the survey to provide comments on its form and content; 2) Five top managers (planning/financial/accounting officers) were interviewed and asked to complete the survey; 3) The survey was completed by a group of MBA students.
[14] The convergent correlations are associated with higher coefficients within the same construct among others.
[15] Measures that should not be related are in reality not related or have lower coefficients.

discriminant validity: Part 1 Correlation matrix MCS uses, capabilities)

2) The exploratory factor analysis (EFA) across all questions (MCS uses and capabilities) shows that every construct exhibits acceptable results. In the case of MCS uses, EFA shows that items related to the same construct, measure the same, and confirm that the information present in the 27 items can be summarized in four factors (precisely the theoretically proposed uses for MCS). That explains much of the information contained in the original variables, showing their discriminating power. In capabilities, the information resident in 18 items together, can be summarized in two factors, Learning and Entrepreneurial Orientations (exactly the theoretically proposed capabilities).

Bartlett's test (X^2=11,860 -MCS use- and X^2=9,884 –capabilities-) and a KMO (0.956 and 0.961 respectively), provides a suitable check for this factorial analysis (see appendix F. Convergent-discriminant validity. Part 2: EFA: MCS uses – LO & EO). Additionally, a statistical analysis of the reliability of these factors through Cronbach's Alpha was made; in both cases the results show values above 0.95, confirming previous results[16]. Furthermore, this analysis demonstrates that in turn, using the information provided by these new factors, by orthogonal origin, we will not have problems of multicollinearity when performing correlations.

Reliability

Internal consistency reliability was tested using the same instrument administered to a group of people to estimate reliability. This refers to how well the items that reflect the same construct yield similar results. Here we are looking at how consistent the results are for different items for the same construct within the measure. There are a wide variety of internal consistency measures that can be used. In this analysis focusing on the various uses of MCS, we use the "Average InteritemTOTAL Correlation". The Average InteritemTOTAL Correlation approach uses all the items on our instrument that are designed to measure the same construct. We first compute the correlation between each pair of items. The average interitem correlation is the average or mean of all these correlations in each construct, but also we compute an average score for the items in each use (Mavg, Favg, Davg, Lavg) and use it as a variable in the correlation analysis. Then we calculate an average of this correlation and the results in each use show an average of 0.806, significant at the 99% level and ranging from 0.766 to 0.853 in this sample, remaining at a very acceptable level for this analysis (see appendix E: Reliability. Part 1: Average Inter.itemTotal Correlation). Also two tests were performed (Kolmogorov-Smirnov; Shapiro–Wilk) to verify the hypothesis of normality necessary for the result of some reliable analysis, for example ANOVA. These tests supported the normality of all constructs (See appendix E: Reliability. Part 2: Normality test).

2.5.5 Analysis models

The methodologies selected for this study are twofold: 1) Analysis of variance (ANOVA) with the control variables as factors and the results of factor analyzes (EFA) as dependent variables to provide empirical evidence and 2) Multiple linear regressions with the full sample and dividing it into sub-groups by size and industry to test the robustness of the model. Statistical analysis was performed using SPSS (V.21) software.

[16] Nunnally et al. (1967) recommended 0.70 level of acceptability.

1) **ANOVA:** Analysis of variance about to check the means of the quantitative variables (MCS uses and capabilities), with respect to the categories in the qualitative variables (Size and Industry).
   Dependent variables: MCS Uses (Monitoring; Focusing Attention; Strategic Decision-Making; Legitimizing); Learning Orientation (LO); Entrepreneurial Orientation (EO).
   Fixed Factors: Size (Small; Medium; Large) and Industry (Manufacturing, Trade, Services, Banking).

2) **MULTIPLE REGRESSION** analysis was developed in two models that are explained forthcoming.

   Model A: tests the relationship between Capabilities (LO & EO) and the control variables (System amplitude, firm size, firm age, Industry sector and gender), as control and splitting variables, to provide a complementary testing of the hypotheses.

   Model B: Tests the relationship between Capabilities (LO and EO) and the different MCS uses (Monitoring M, Legitimization L, Attention focusing F and Strategic Decision-Making D) and introduces all the control variables (System amplitude, firm size, firm age, Industry sector and gender). This model seeks to support hypotheses 1 a, b; 2 a, b; 3 a, b and 4 a, b, where the coefficients and significance from linear regressions will be used to provide evidence and impact on two sets of hypotheses (a, b).

Also, to add robustness to the model and test whether the relationships are maintained in the same manner in companies of different sizes and industries, we conducted a multiple regression analysis dividing the sample into subgroups by size and industry.

2.6 Research findings

2.6.1 Results of the ANOVA analyses:

Table 2.2 presents the summary of the ANOVA analyses. Based on a comparison of the means obtained from the different MCS uses in companies of different sizes and different sectors, the results show that of the four different types of use (Monitoring, legitimizing, Focusing attention and Strategic Decision-Making), three of them do not show a significant difference in companies of different sizes ($p<0.001$). The exception is observed in "monitoring use", in which we can identify two groups of companies: small companies that have a mean of monitoring well below the average for the entire group of companies (-0.257) and another group of medium-sized (0.052) and large (0.103) companies (no statistical differences between medium & large size).

In the same analysis of company-size regarding capabilities, the results show that in learning orientation we can identify two groups: a group of small and a group of large firms (as mid-sized companies, statistically could be part of both groups); with small firms having a higher and positive mean (0.141) than large firms (-0.088), suggesting that smaller companies present greater learning orientation ($p<0.10$). With respect to industry type observed, in the entrepreneurial orientation analysis, we can identify the major differences between the banks with a negative average (-0.246) and the manufacturing industry (0.200). This suggests that manufacturing, followed by services firms, have higher entrepreneurial orientation than trade and banking ($p<0.05$) (see appendix G. Chapter II: Anova results).

Table 2.2: ANOVA analyses between MCS uses, LO & EO versus Size and Industry

MCS uses			Capabilities					
Monitoring			Learning Orientation			Entrepreneurial Orientation		
Differing	Mean (S.D.)	Groups	Differing	Mean (S.D.)	Groups	Differing	Mean (S.D.)	Groups
Size F:7.126 ***	-0.257 (1.155)	*Small*	Size F:2.757 *	0.141 (0.964)	*Small & Medium*	Industry F:3.398 **	-0.246 (0.982)	Banking & Trade
	0.052 (0.941)	*Medium & Large*		0.02 (0.996)	*Medium & Large*		-0.133 (1.083)	
	0.103 (0.925)			-0.088 (1.016)			0.014 (0.994)	Services & Manufacturing
							0.200 (0.959)	

Note: N=644 in all cases Note 1: * Significant @ 90%; ** Significant @ 95%; *** Significant @ 99% Note 2: All others constructs are not significative

Note 3: Mean (S.D.)

2.6.2 Results of the multiple regression analyses:

Table 2.3: Multiple Linear Regressions results

	Learning Orientation		Entrepreneurial Orientation	
	Model A	*Model B*	*Model A*	*Model B*
Variables	*Control variables*	*Control & Independent variables*	*Control variables*	*Control & Independent variables*
Controls				
System amplitude	**0.636*** **	**0.287*** **	**0.627*** **	**0.326*** **
Small firm	**0.206** **	**0.204** **	**0.176***	**0.183***
Large firm	**-0.192** **	-.110	*0.042*	.655
Firm age	0.001	.000	.002	.133
Ind 1: Manufacturing	0.211	.086	**0.463*** **	**0.368*** **
Ind 2: Trade	-0.005	-.058	.098	0.567
Ind 3: Services	0.124	.055	**0.312*** **	**0.264** **
Gender	-.060	-0.046	.003	0.967
Mgmt. Control Use		**MCS use**		**MCS use**
		Legitimizing **0.310*** **		Focusing att. **0.234*** **
		Focusing att. **0.274*** **		Legitimizing **0.223*** **
		Strat. Dec. **0.185*** **		Monitoring **0.168*** **
		Monitoring **0.151*** **		Strat. Dec. **0.156*** **
F-value	**10.105*** **	**23.507*** **	**10.649*** **	**17.662*** **
R^2	**0.113**	**0.309**	**0.118**	**0.251**

N=644;

Note 1: Unstandardized Coefficients are reported

Note 2: Industry reference: Banking

Note 3: Size reference: Medium

* Sig. at 90% level ** Sig. at 95% level *** Sig. at 99% level

Table 2.3 presents the results for each capability (LO & EO) with two models comprising the control variables and the set of independent or predictor variables (MCS uses). All hypotheses were tested using multiple linear regression analyses . The base model (Model A) included only the effects of the control variables. The model B includes the control variables and the

four MCS uses. The variance inflation factor (VIF) and TOLER scores were examined for all variables to quantify the severity of multicollinearity and all were within acceptable ranges (Ryan 1997); Results are reported in table 2.3 (see appendix H. Chapter II: Multiple Linear Regressions results (Full sample, size & industry complete details).

Learning orientation & hypotheses:

Model A

The base model A included only the effects of the control variables; It explained a significant portion of variance ($R^2 = 0.113$, $F = 10.105$, $p < .001$). Significant variables are system amplitude (0.636; p<.001), being a small (0.206; p<0.05) and large firm (-0.192; p<0.05) instead of a medium-sized firm.

Model B

To assess the direct relationships of each capability, the MCS uses set variables were introduced in Model B. The results explained a significant portion of variance in learning orientation, compared to Model 1, suggesting that the overall model is significant ($R^2 = 0.309$, $F = 23.507$, $p < .001$). Significant variables are system amplitude (0.287; p<.001), and being a small firm (0.204; p<0.05) instead of being a medium-sized firm. All the MCS uses are significant and positive and with these results the hypotheses (a) are verified.

Hypotheses (set a) vs. LO:

H1a predicted that a monitoring use would be negatively related to learning orientation in firms. Our analyses suggest that MCS used as monitoring is positively and significantly related to the learning orientation capability, contrary to the expected direction (i.e., positive instead of the expected negative direction) ($\beta = 0.151$, $p < .001$). H1a therefore is not supported.

H2a predicted that a legitimizing use would be negatively related to learning orientation in firms. Our analyses suggest that MCS use as legitimizing is positively and significantly related to the learning orientation capability, contrary to the expected direction ($\beta = 0.310$, $p < .001$). H2a therefore is not supported.

H3a predicted that attention focusing use would be positively related to learning orientation in firms. Our analyses suggest that MCS use as attention focusing is positively and significantly related to the learning orientation capability ($\beta = 0.274$, $p < .001$). H3a therefore is supported.

H4a predicted that a strategic decision-making use would be positively related to learning orientation in firms. Our analyses suggest that MCS used as strategic decision-making is positively and significantly related to the learning orientation capability ($\beta = 0.185$, $p < .001$). H4a therefore is supported.

Entrepreneurial orientation and hypotheses:

Model A

In the EO capability, the base model A included only the effects of the control variables and explained a significant portion of variance ($R^2 = 0.118$, $F = 10.649$, $p < .001$). Significant variables are system amplitude (0.627; p<001), with a small firm (0.176; p<0.1) instead of a medium-size firm and if the firm belongs to the manufacturing industry (0.463, $p < .001$) or service (0.312, p<.001) and not banking; this shows a direct relationship with the entrepreneurial orientation. To be a trade firm is

not significant in this analysis.

Model B

Model B assess the direct relationships with EO and the MCS uses and control variables. Model B explained a significant portion of variance in the entrepreneurial orientation, suggesting that the overall model is significant ($R^2 = 0.251$, $F = 17.662$, $p < .001$). Significant variables are system amplitude (0.326; $p<.001$), with a small firm (0.183; $p<0.10$) instead of a medium-size firm, and if the firm belongs to the manufacturing industry (0.368, $p < .001$) or services (0.264, $p<.005$) and not banking, it shows a direct relationship with the entrepreneurial orientation. Again, to be a trade firm is not significant in these analyses. All the MCS uses are significant and positive, and with these results the hypotheses (b) are verified.

Hypotheses (set b) vs. EO:

H1b predicted that a monitoring use would be negatively related to entrepreneurial orientation in firms. Our analyses show that, contrary to the expected direction (i.e., positive instead of the expected negative direction), MCS used as monitoring is positively and significantly related to the entrepreneurial orientation capability, ($\beta= 0.168$, $p < .001$). H1b therefore is not supported.

H2b proposed that a legitimizing use would be negatively related to entrepreneurial orientation in firms. Our analyses suggest that MCS used as legitimizing is positively and significantly related to the entrepreneurial orientation capability, contrary to the expected direction ($\beta = 0.223$, $p < .001$). H2b therefore is not supported.

H3b predicted that a focusing attention use would be positively related to entrepreneurial orientation in firms. Our analyses suggest that MCS use as focusing attention is positively and significantly related to the entrepreneurial orientation capability ($\beta = 0.234$, $p < .001$). H3b therefore is supported.

H4b predicted that a strategic decision-making use would be positively related to entrepreneurial orientation in firms. Our analyses suggest that MCS use as strategic decision-making is positively and significantly related to the entrepreneurial orientation capability ($\beta = 0.156$, $p < .001$). H4b therefore is supported. (Appendix H. Chapter II: Multiple Linear Regressions results (part 1 Full sample).

Table 2.4: Summary of hypotheses and results

Hypotheses	Results
H1a (LO vs. monitoring (-))	Not supported
H2a (LO vs. legitimizing (-))	Not supported
H3a (LO vs focusing attention (+))	Supported
H4a (LO vs Strategic decision-making (+))	Supported
H1b (EO vs. monitoring (-))	Not supported
H2b (EO vs. legitimizing (-))	Not supported
H3b (EO vs focusing attention (+))	Supported
H4b (EO vs Strategic decision-making (+))	Supported

In general, the results (table 2.4) show that both Learning Orientation (LO) and Entrepreneurial Orientation (EO) in an organization relate more to the use of MCS to legitimize ideas or approaches, to something we know or we need to do or learn, and as systems that help in the focusing attention on opportunities or problems in organizations. Using the MCS for monitoring or strategic decisions making, with a positive and significant

relevance, have less impact on the relationship with both capabilities, but are positive and significative.

2.6.3 MRL sub-group analyses (Size & Industry)

To test whether these relationships hold in the same way previously shown, in different company sizes and industry, the multiple regression analysis was repeated but now dividing the sample into subgroups by size and industry. The overall results are shown below (tables 2.5, 2.6, 2.7 & 2.8) and detailed analysis is shown in appendix H. Chapter II: Multiple Linear Regressions results (Part 2 size and industry)

MLR results sub-groups (Size)

LO and EO - Size sub-group analyses (table 2.5 and 2.6) holds that legitimizing and attention focusing were the MCS uses more related with both capabilities (LO and EO), with the only exception that for EO in large companies the two most important MCS uses are legitimizing and strategic decision making. The complete sample tells us that in the case of LO, MCS use as Legitimization has a greater impact on LO capability, followed by attention focusing, strategic decision-making and finally monitoring. This order is maintained for small firms; midsize businesses show that only two uses are significant, legitimizing and attention focusing, and in the case of large firms, the order changes to attention focusing being the most explanatory variable, followed by legitimizing, monitoring and finally strategic decision-making.

Table 2.5: LO - Size sub-group analyses

Learning Orientation LO							
All sample		**BIG**		**Medium**		**SMALL**	
Coefficients Model 2		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**	
Legitimizing	**0.310*** **	*Focusing att.*	***0.291*** **	*Legitimizing*	***0.400*** **	*Legitimizing*	***0.297*** **
Focusing att.	**0.274*** **	*Legitimizing*	***0.274*** **	*Focusing att.*	***0.238*** **	*Focusing att.*	***0.280*** **
Strat. Dec.	**0.185*** **	*Monitoring*	***0.252*** **	*Strat. Dec.*		*Strat. Dec.*	***0.266*** **
Monitoring	**0.151*** **	*Strat. Dec.*	***0.225*** **	*Monitoring*		*Monitoring*	**0.129** **

Note: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

EO capability – Size sub-group analyses (table 2.6) show that the order for the entire sample remains in small and medium firms, while in large companies this order changes to legitimizing, strategic decision making, focusing attention, and monitoring.

Table 2.6: EO - Size sub-group analyses

Entrepreneurial Orientation EO								
All sample		**BIG**		**Medium**		**SMALL**	
Coefficients Model 2		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**	
Focusing att.	***0.234******	*Legitimizing*	***0.219******	*Focusing att.*	***0.340******	*Focusing att.*	***0.327******
Legitimizing	***0.223******	*Strat. Dec.*	***0.212******	*Legitimizing*	***0.329******	*Legitimizing*	***0.178******
Monitoring	***0.168******	*Focusing att.*	***0.154******	*Monitoring*	***0.238******	*Monitoring*	***0.151******
Strat. Dec.	***0.156******	*Monitoring*	***0.115*****	*Strat. Dec.*	***0.203******	*Strat. Dec.*	

Note: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

MLR results sub-groups (Industry)

In the case of LO - Industry sub-group analyses (table 2.7), the results show that legitimizing and attention focusing are the most related variables in all the industries. The order for the entire sample is maintained only in services companies: in manufacturing companies the order changes, with the most important attention focusing, followed by monitoring, legitimizing and strategic decision-making. In trade firms only legitimizing and monitoring uses are statistically significant. For banking firms, the most important variable was legitimizing, followed by strategic decision-making and attention focusing while monitoring use was not statistically significant.

Table 2.7: LO - Industry sub-group analyses

Learning Orientation LO									
All sample		**MANUFACTURING**		**TRADE**		**SERVICES**		**BANKING**	
Coefficients Model 2		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**	
Legitimizing	0.310***	*Focusing att.*	*0.386****	*Legitimizing*	*0.465****	*Legitimizing*	*0.299****	*Legitimizing*	*0.355****
Focusing att.	0.274***	*Monitoring*	*0.307****	*Monitoring*	*0.290***	*Focusing att.*	*0.282****	*Strat. Dec.*	*0.284****
Strat. Dec.	0.185***	*Legitimizing*	*0.286****	*Focusing att.*		*Strat. Dec.*	*0.157****	*Focusing att.*	*0.274****
Monitoring	0.151***	*Strat. Dec.*	*0.229****	*Strat. Dec.*		*Monitoring*	0.110**	*Monitoring*	

Note: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

EO capability - Industry sub-group analyses (table 2.8) show that the order for the entire sample remains in services companies; In Manufacturing firms, only MCS uses as Focusing attention and Monitoring are statistically significant. For trade companies, only Legitimizing and Focusing attention uses are significant and for banking companies the order changes to strategic decision-making, legitimizing and focusing attention, while monitoring use is not significant.

Table 2.8: EO - Industry sub-group analyses

Entrepreneurial Orientation EO									
All sample		**MANUFACTURING**		**TRADE**		**SERVICES**		**BANKING**	
Coefficients Model 2		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**		**Coefficients Model 2**	
Legitimizing	*0.223****	*Focusing att.*	*0.268****	*Legitimizing*	*0.326****	*Legitimizing*	*0.236****	*Strat. Dec.*	*0.400****
Focusing att.	*0.234****	*Monitoring*	*0.255****	*Focusing att.*	*0.256***	*Focusing att.*	*0.257****	*Legitimizing*	*0.377****
Monitoring	0.168***	*Strat. Dec.*		*Strat. Dec.*		*Monitoring*	0.205***	*Focusing att.*	*0.248***
Strat. Dec.	*0.156****	*Legitimizing*		*Monitoring*		*Strat. Dec.*	*0.153****	*Monitoring*	

Note: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

2.6.4 Results summary

MCS uses – Size and Industry

In general, the various uses of MCS are not different in companies of various sizes, except use as monitoring that shows significant differences between companies of different sizes and especially was much greater among small and large businesses. Based on the idea that the larger the company, the greater need for control, it has been shown that medium-large companies have more resources and formal systems with which they can carry out such controls. In the full sample we found no significant differences for size and the various uses of MCS in different sectors.

Learning Orientation (LO) - Size

Similarly, to the previous ANOVA results, the coefficients in the multiple linear regressions suggest that small firms have a greater propensity to learn ($p<0.10$) than large companies and even more, the negative coefficient in large companies suggests an inverse relationship between the size and learning orientation. The organizational learning of a process proposed by Slater and Narver (1995) show that some factors in this inverse relationship may be related to the inherent size complexity including: not having have an attitude of search and learning, difficulties in obtaining relevant information being away from their clients, the lack of a common understanding and the complexity of disseminating information for being a large organization.

Entrepreneurial Orientation (EO) - Industry

As the ANOVA results, the coefficients in multiple regression analysis (positive and significant) suggest that manufacturing, followed by services firms, have higher entrepreneurial orientation than trade and banking ($p<0.05$).

MCS uses

The global study results indicate that different MCS uses have substantively different effects on Learning and Entrepreneurial orientations. Impacts (coefficients magnitude) of the different MCS uses vary, depending on the size of the company, and with greater or lesser extent, depending on the industry in which they reside, but in all cases the relation is positive and significant.

For LO: The MCS use with more impact on LO is legitimizing, followed by attention focusing, strategic decision-making and finally monitoring. For EO: The MCS use with more impact on EO is attention focusing, followed by legitimizing, Monitoring and lastly strategic decision-making. Both capabilities (LO and EO) are more related with the uses of legitimizing and focusing attention, but monitoring and strategic decision-making uses are positive and significant too.

In the complete sample, on the one hand, hypotheses H1 and H2, in both capabilities, are not supported. Although, in line with Koufteros et al. (2014), monitoring and legitimizing (diagnostic) MCS uses are positively and significantly related to the learning and entrepreneurial orientations, but contrary to the expected negative direction, argued by Henri (2006a). On the other hand, MCS uses of attention focusing and strategic decision making (interactive) support hypotheses H3 and H4 (a and b).

The analyses of hypotheses (a and b) by sub-groups (size and industry) show different results:

H1 a and b (monitoring) is not supported, although the relationship is positive and significant in all cases, except for LO-

medium-size firms and LO-banking, EO-trade & EO-banking firms, where it is not statistically significant.

H2 a and b (legitimizing) is not supported, although the relationship is positive and significant in all cases with exception of EO-manufacturing industry, where it is not statistically significant.

H3 a and b (focusing attention) receives complete support for firms of all sizes and all industries with exception of LO-trade industry where it is not statistically significant.

H4 a and b (strategic decision making) receives partial support fulfilling the assumption, except for LO-medium and EO-small-sized firms, LO-trade firms, EO-manufacturing and EO-trade firms where the strategic decision making variable is not statistically significant. For complete analyses see appendix I. Chapter II: Hypotheses results of the sub-group, size and industry analyses.

Globally, significant and positive relationship is observed for small firms in both capabilities, which can be understood as a higher propensity of small firms to develop both learning and entrepreneurial orientations. Specifically, in the case of entrepreneurial orientation (table 2.3), we can see that belonging to manufacturing or service industry, also relates in a positive and significant manner with EO.

2.7 Conclusions and discussion

In general, the literature in management control systems (MCS) uses an explicitly or implicitly RBV approach (Wernerfelt 1984; Barney 1991; Teece et al. 1997), and together with Simons' levers of control framework (Simons, 1995) and Executive support systems classification (ESS) (Vandenbosch, 1999), shows that MCS influence the strategic capabilities in organizations through the routines they stimulate. Based on the RBV we can identify the MCS as available resources in an organization, which generate a competitive advantage in terms of the use made for them (Lengnick-Hall & Wolff 1999). Therefore, understanding how these resources can be used in a better way, such as generating a source of sustainable competitive advantage, MCS can become a specific resource that cannot be duplicated easily. MCS (resources) do not generate profits per se, but can help by the way they are used (Penrose 1995). Although MCS can be employed for different uses, there is a lack of prior empirical research on these uses.

The general findings of this work are aligned with Simons' (1990) arguments in terms of going beyond the contribution of MCS as a tool for monitoring and evaluation, suggesting them more as a catalyst for the complete strategic process, which supports and encourages the creation and execution of strategies across the organization.

The results suggest globally that MCS use as monitoring shows significant differences between small and medium-large companies, while large companies make more monitoring use of their MCS. The other three uses (legitimizing, focusing attention and strategic decision making) of MCS are not significantly different in the various sizes of companies analyzed. Our results suggest that small firms have a greater propensity to learn ($p<0.10$) than large companies and even more, the resulting negative coefficient in large companies suggests an inverse relationship between size and orientation to learning. The results also suggest that manufacturing, followed by services firms, have higher entrepreneurial orientation than trade and banking ($p<0.05$) firms.

The results also show that the four uses analyzed, Monitoring, Legitimizing, Attention focusing and Strategic Decision-Making of MCS, contribute positively to capabilities. Thus, this supports both previous findings (Koufteros et al. 2014), that MCS interactive use enhances the development of organizational capabilities, but also raises the possibility of questioning the position that diagnostic use inhibits strategic capabilities of the organization (Simons 1995; Henri 2006a). Our findings also highlight a positive impact of diagnostic use (monitoring and legitimizing) on capabilities, contrary to the expected direction identified in previous studies.

Contrary to the current literature, but in line with our results, in a recent study, Koufteros et al (2014) argued that there is sufficient evidence to suggest that the diagnostic use of MCS leads to improved capabilities, which then impact performance. Like our research, they discovered that when analyzing interactive use and diagnostic use, the latter seems to be the the most constructive explanatory variable for capabilities. Note that in both works, although they are analyzed with different methods and measurement scales, the positive results of diagnostic use are consistent and seem to cast doubt on the results obtained by previous works (Henri 2006a), although we do not agree with how the construct was measured; this point is explained below. In our case, based on Simons (1995) and Vandenbosch (1999), diagnostic use was measured directly with two applications (monitoring and legitimizing), [16] while Koufteros et al (2014) measured diagnostic with three uses (monitoring, legitimizing and "focusing attention"). Specifically, and given that this is clearly established in the literature (Vandenbosh 1999), we do not agree that attention focusing should be considered a diagnostic use.[17] Finally, the positive outcome in both studies is consistent because in our case, attention focusing also positively impacts capabilities either individually or grouped as a second order construct such as that by Koufteros et al (2014).

Although potential diagnostic MCS use is recognized by Simons (1995), the literature has generally maintained that diagnostic controls limit the capacity of a firm to innovate (Henri 2006a). In the literature we can identify some positions for and against this negative or positive relationship. Grafton et al. (2010) argues that diagnostic use of MCS facilitates exploitation of existing capabilities and in the same line Vandenbosch (1999) argued that the discussion triggered by the diagnostic use leads to corrective action as a way of learning, but Henri (2006a) argues that corrective actions are not sufficient to sustain such capabilities. This would mean that, in theory, even if diagnostic use works against the deployment of capabilities (Henri 2006a), it may contribute to performance through organizational capabilities by monitoring goal achievement, restricting risk taking, providing boundaries for innovation, and closely monitoring variations in effectiveness, which is necessary to produce a better performance. Diagnostic use of MCS could help to increase the positive effects of an interactive use on capabilities by providing the necessary information to perform the interactive use (Widener 2007). In the same line, we suggest that the diagnostic MCS use is important for capabilities development in firms seeking an entrepreneurial orientation (EO) and to learn as a process (LO). Therefore, further research should be developed to provide a better understanding of these relationships.

The preceding research and theoretical arguments are provided to tentatively explain these expected and unexpected results. Our results are not consistent with those of Henri (2006), which fully supported the negative relationship of diagnostic use

[17] Appendix N in this thesis, analyze with EFA and CFA why the four types of use (Vandenbosch 1999) charge with respect to two factors, namely diagnostic and interactive as proposed by the literature.

and capabilities in the Canadian context. This difference can be explained in part by the concentration of his studies on diagnostic and interactive use of MCS while the current study integrates four kinds of uses, not only monitoring as a diagnostic MCS use and focusing attention as interactive MCS use.

Furthermore, the context for our research could be a possible explanation for our results. Mexico is a newly developed country and has the characteristics of an emergent economy. This has implications, for example: competition is at an early stage, and companies use traditional MCS in a diagnostic manner (which is not necessarily undesirable). However, they are in a learning process in which their reality requires meeting the first challenge of knowing how to use MCS in an interactive manner. In this line, Ittner et al. (2003) find that firms operating in new economy industries, in which strategies are unproven and therefore more uncertain, are more likely to rely on formal measures, like diagnostic measures.

Monitoring and capabilities: Research findings show that the primary reason for having a MCS was monitoring/controlling (30%) (Marr 2005). MCS as monitoring is a necessary condition, but not sufficient to generate a capability. As Chenhall (2003) stated, diagnostic MCS use should be sufficient to assist in taking and implementing decisions in an interactive manner. This conceptualization is directly linked to the notion of "what is not measured is not controlled" (Kaplan & Norton 1992; Berry et al. 2009). Monitoring is a necessary condition for providing information to challenge the context, the content and validity of the strategy followed by firms (Ittner et al. 2003). Translating that strategy into deliverables (outcomes) and measures helps managers to measure and ensure business (Hall 2008), necessary conditions for learning and to carry out a process conducive of change or improvement (Mintzberg 1973). Two of the four steps proposed by Slater & Narver (1995) in the process of organizational learning are related to the monitoring use of MCS: i) Information Acquisition –Collection- (How am I doing?) and iiii) Organizational memory –Storage- (How do I do it?). Previous research shows that the MCS monitoring use helps ensure that performance information is distributed fairly among participants, which enables learning and problem solving (Mahama 2006). The argument is that high performing firms rely on the information provided by frequently updated formal control systems to drive organizational learning (Simons 1987), and it was found that updated MCS has a significant positive impact on staff perceptions about learning capability (Yuan et al. 2008). The use of updated MCS supports a holistic look at all the strategic process, resulting in organizational learning (Slater & Narver 1995; Speckbacher et al. 2003). In summary, monitoring uses provides updated MCS, necessary elements to conduct a constructive dialogue on the evaluation of a situation or to evaluate performance vs. expectations.

Legitimizing and capabilities: Executives in organizations often use MCS to confirm or deny their own prior beliefs or to check against their primary expectations (Vandenbosch 1999). The legitimizing use of a MCS can operationalize the second and third steps of the organizational learning process,[18] as proposed by Slater & Narver (1995). Both steps are related with communication, the purpose of the legitimizing MCS use. Disseminating information, according to Mintzberg's (1973) is related to learning, and can be either directing attention or legitimizing previous decisions and thus increasing knowledge. Managers use information systems not only to justify decisions, but also to legitimize prior ideas ensuring their interpretation because they believe that doing so will encourage the competitiveness of organizations (entrepreneurial characteristics)

[18] Learning process: Information acquisition (How am I doing), information dissemination (communication), shared interpretation (what does it mean) and organizational memory (How I Do it) (Slater & Narver 1995).

(Vandenbosch 1999). This suggests that to make things happen, the leaders in an organization must devote considerable effort to justify and legitimize their proposals and actions. Feldman and March (1981) argue that legitimacy may be a relevant attribute of effective decisions in some organizations because, if actions will only be taken if they have been legitimized, organizations become dependent on information that can provide such legitimacy (Feldman and March 1981). From this point of view, the ability to learn or perform depends heavily on this stage of legitimization. For example, with the legitimizing use of MCS, Headquarters employ MCS in order to monitor local performance results, influence and guide local decision-making (Dossi 2008), or influence entrepreneurial attitude for initiation and implementation of strategic decisions (Fama and Jensen 1983; Prahalad and Doz 1987) or simply to legitimize different organizational actions (Vandenbosch 1999).

Focusing attention and capabilities: Seeking opportunities by stimulating participation and dialogue, proposed in attention focusing MCS use, is presented in the Entrepreneurial Orientation perspective as a permanent attitude and a process to proactively seek and exploit new business opportunities (Covin & Slevin 1991; Zahra & Garvis 2000). This will favor the generation of competitive advantage and better results in relation to competitors (Ripollés & Blesa 2005). Attention focusing MCS use can facilitate and guide organizational learning (Simons 1991; Ahn 2001) and foster innovative practices (Marginson 2002; Bisbe & Otley 2004; Henri 2006a; Cruz et al. 2011). The attention focusing use of a MCS is also related with steps 2 and 3 in the organizational learning process proposed by Slater and Narver (1995). By fostering organizational dialogue, stimulating creativity, and focusing organizational attention, Attention Focusing MCS use will thus impact the development of both capabilities.

Strategic Decision-Making and capabilities: This influencing role of the MCS is widely accepted in International Business literature, according to which MCS are data management tools influencing the cognitive orientation of managers in decision-making (Prahalad & Doz 1987). These tools have the potential to be not only answering and learning machines, but also ammunition and rationalization for learning and decision-making (Burchell et al. 1980). According to Mintzberg (1973) identifying problems and opportunities are ways to direct attention and making decisions. Therefore, strategic decision-making MCS use positively impacts the development of capabilities.

System amplitude

The control variable "System amplitude" is significant in all analyses and highly correlated with the various uses of MCS. In recent years, organizations have sought to develop more comprehensive MCS to provide managers and employees with relevant information for the complete strategic process by which managers are provided the necessary information to track their initiatives (Ittner et al. 2003). More comprehensive MCS provide an understanding of the linkages between business operations and strategy (Chenhall 2005). Previous studies indicate that today most complete MCS includes a more diverse set of monitoring and performance measures that are linked to the entire strategic process and can be used in different ways, to follow, to motivate, to challenge, or to drive (Neely et al. 1995; Malina & Selto 2001; Chenhall 2005). Norton and Kaplan (1996) argue that the more comprehensive system used, the greater the contribution to managerial performance by clarifying managers' role expectations (diagnostic use), and by providing feedback to enhance managers intrinsic task motivation (interactive use). A practical example can be observed in the widespread deployment in different kinds of firms of "the

Balanced Scorecard" (Kaplan & Norton 1996) and the "Performance pyramid" (Lynch & Cross 1991). Thus, we can conclude that a broad set of measures that cover different parts of an organization's operation is an important aspect of more comprehensive MCS.

Our results show that, to a greater or lesser extent, the different uses that can be given to MCS are related to learning and entrepreneurial orientations in business. MCS used diagnostically creates the necessary conditions to subsequently generate interactive use; i.e., by encouraging the necessary elements in order to explore and evaluate alternatives and thus to have a constructive dialogue. This may be another reason that both uses (diagnostic & interactive) have a positive and significant relationship with capabilities. Managers who use these systems must be aware and be wary of designing and using such systems, as the results show a possible complementarity and balance necessary between different uses without limiting their use. If a MCS is used only diagnostically, this will not generate maximum potential, because although relevant information is generated, there will not necessarily be improvement. Similarly, MCS used only to focus attention or make strategic decisions supported by financial analysis or results without continuous data feeding from monitoring will not add much value to the dialogues generated. The elements provided from these systems are relevant in all strategic process phases (Widener 2007) and if being used in a complementary manner, MCS can provide information about the drivers of success and causes of failures.

2.8 Limitations and suggestions for further research

Limitations

Our study has potential limitations that must be considered when making generalizations. Tests on the instrument used to measure the different variables show high reliability and propose a valid measure from a psychometrical point of view, but studies that attempt to make a measurement as the one proposed here, could refine and validate the instrument, thus ensuring reliability.

Although the corresponding tests were performed to ensure reliability, the results should be analyzed taking into account that they were obtained by a survey, which entails several implications. The survey method to collect data creates potential for bias due to common response. In this line, we are aware that the results of this study could show a bias by a form of common method variance (CMV) called Single Source Bias (SSB) (Campbell & Fiske 1959), and although Harman's one-factor test indicated the absence of common method effects in our survey data (See Appendix C. Non response bias & common method variance (CMV) analysis). There are arguments to think that this test is necessary but insufficient (Podsakoff et al. 2003). So, this is a limitation in our study and also an area of opportunity for future research using multi-method strategies for data collection, in order to enhance the validity and reliability of the construct measures. Future studies in this area should also use more refined measurement instruments to address these concerns and, where feasible use multi-source measures.

The surveys also provide results according to manager perceptions, which is our particular interest (Van der Stede et al. 2005). Although the tests do not show signs of bias or noise, surveys habitually contain noise and should be interpreted taking this

into account.

Some possible limitations regarding the database are that the scope was limited to Mexican organizations; thus generalizations can only be made cautiously. Finally, the study focused on business managers or directors; thus further research is required to assess whether different MCS uses have the same results at other managerial levels.

Suggestions for further research

The study points to several avenues for future research. Previous studies suggest negative results in the relationship between the various uses of MCS and organizational capabilities. In other words, MCS uses as a diagnostic tool can inhibit capabilities. Since the results obtained in this study show positive and significant relationships between uses monitoring and legitimization and organizational capabilities of EO and LO, we consider it important to keep an open discussion, and take these results with caution, as they may be being modified by any variable outside our field of study. Linked to this, future lines of research could offer empirical evidence using the proposed model, but under other environmental conditions.

This study analyzes the classification of MCS under the Vandenbosch proposal (1999), so new models that include other classifications trying to prove the above relationships, would bring knowledge to the line of study that seeks to find the impact of MCS on organizational capabilities and performance.

This study focused on evaluating the impact of MCS uses in two capabilities (Learning and Entrepreneurial Orientation), but other strategic orientations also may be impacted by the various uses of MCS, so this is a line of research that can be developed.

The use of qualitative research methodologies can provide different conclusions to those presented in this study and it would be particularly useful to find further explanations and new insights into the relationships tested. In the same line, other methodologies, such as the structural equation model, can support studies like this because of the latent variables.

An additional avenue for future research is to examine the specific characteristics or attributes of the measures used, i.e., the number of measures, kind of measures, financial and nonfinancial and the impact with the MCS uses and capabilities relationship. However, it is important to note that recent research indicates that simply adding more performance measures does not necessarily improve the impact of MCS on performance (Cheng et al. 2007).

The results of this study show that MCS uses are positively related with capabilities development. This essay does not investigate if these relationships affect firm performance, and therefore, an important avenue for future research is to investigate the relationship between the different MCS uses and performance, mediating this relationship through the company capabilities.

Moreover, future research could investigate whether contextual factors influence the relations reported in this study. Factors like perception of uncertainty, measurement diversity, or human capital factors (e.g., access to human capital employee or human capital background), have been used in similar studies and have reported an impact on the usability of the systems and their final results on performance.

Finally, future research could track firms over time, giving the work a longitudinal character.

Chapter III: Impact of Management Control Systems uses on performance: Direct or Indirect Effect?

3.1 Abstract:

Organizations believe that Management Control Systems (MCS) can help them in the task to deliver value. There is, however, very little broad-based empirical research examining the role that MCS can play in shaping organizational performance. This study, based on a resource-based perspective (Barney 1991; Barney et al. 2011; Wernerfelt 1984; Day 1994; Teece et al. 1997) and management control literature (Simons 1995; Vandenbosch 1999), aims to examine how the various uses of MCS can act as an antecedent to organizational capabilities leading to superior performance. MCS research has been done with respect to design, purpose, types, or adoption factors with ambiguous findings; but less is known about MCS impact on performance, directly or indirectly through the organizational capabilities that trigger performance in different kind of firms.

Looking to examine the relationship between MCS use, capabilities and performance, a theoretical model is developed and tested with empirical data gathered from a survey. Using structural equation modelling this research attempts to answer these questions: First, what is the impact of MCS use in generating capabilities of Entrepreneurial Orientation (EO) and Learning Orientation (LO) in firms? Second, what are the implications of these capabilities in organizational performance? And finally, how do diverse uses of MCS impact on performance?, directly or indirectly?

Data collected from 644 Mexican companies of various sizes and sectors provide valuable results. The main findings show that in line with previous studies, in general both Diagnostic and Interactive MCS uses, show a positive impact on the organizational capabilities (LO and EO) studied, independently of what industry or size. Only Diagnostic use generates a significant, positive and direct impact on organizational performance; interactive use does not. Entrepreneurial Orientation (EO) has a direct impact on organizational performance and therefore also has a mediating effect on the indirect impact of both uses of MCS on performance; learning orientation (LO) has no effect directly on performance.

Keywords: Management control systems use; Capabilities; Learning orientation; Entrepreneurial orientation; performance.

3.2 Introduction

Much of empirical research in management literature has been focused on the mechanisms and processes that facilitate strategic processes. As a part of this strategic process[19], administrators perform a set of activities supported by some tools, with which they ensure the execution of work plans, so that actual results can be compared to the desired performance and thus permit corrective actions. It is in this activity where Management Control Systems (MCS) are responsible for creating the models and systems to support the strategic process. A number of researchers (Hopwood 1987; Dent 1990; Argyris 1990; Hedberg & Jönsson 1978) have provided strong theoretical support for the idea that MCS may have an active role in shaping this task, arguing that the MCS use is recommended for facilitating strategy implementation and enhancing organizational performance (Davis & Albright 2004). However, there is little broad-based empirical research examining how management control systems (MCS) are used in different organizations in order to develop capabilities that enable them to perform better (Shields 1997; C.-L. Lee & Yang 2011).

MCS are defined as the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives (Anthony 1965). MCS provide relevant strategic information on the drivers of success and causes of failures (Mintzberg 1994; Simons 1995). Over the last two decades, the development of MCS has been exponential and many organizations are investing heavily in his development and maintenance (Neely et al. 2008). This has triggered the need for a better understanding of the role of MCS and how to meet managerial needs. The findings of this research may help management better understand what types of MCS use should be encouraged to increase the level of strategic orientations and thus impact firm performance (Hult 2004).

This research responds to criticism that more comprehensive types of MCS should be studied (Otley 1980; Fisher 1995; Milgrom & Roberts 1995), and follows the lines of approach that see MCS as more than mechanistic tools. This research investigates a combination of four MCS uses: Monitoring, Legitimizing, Attention Focusing, Strategic Decision-Making (Vandenbosch, 1999), grouped in two latent constructs called Diagnostic and Interactive uses (Simons, 1990, 1995, 2000), which until now it have not been proven systematically, with the exception of proposals in research by Koufteros et al. (2014) and Henri (2006a). In these two cases, the researchers use only part of the Vandenbosch (1999) proposal and complement their work with other studies. Thus, we seek to find how these uses may be associated with two firm organizational capabilities, learning and entrepreneurial orientations (LO and EO) (Ripollés & Blesa 2005), resulting in better performance in companies of various sizes.

From the resource-based perspective (Barney 1991), MCS (resources) do not generate utilities per se, but rather are a function of the way they are used (Penrose 1995). That is, the different uses that are given to the MCS can be a source of organizational capabilities development. Based on a review of relevant literature and theoretical conceptualizations, we will argue that among the key antecedents to performance are the constructs of learning orientation (LO) and entrepreneurial orientation (EO). While it is generally agreed that capabilities contributes to business performance, relatively little is known about the drivers of EO and LO and how those drivers operate via capabilities to collectively influence performance (Hult 2004). Even assuming that MCS can be employed for different uses, there is a lack of prior empirical research examining such use. Some studies suggest

[19] Mainly consisting of three phases (Formulation, implementation, performance) (Hitt et al. 2011; Rumelt et al. 1991)

that capabilities are shaped by MCS, but how? Research on MCS use and capabilities have yielded valuable, but ambiguous, inconclusive or sometimes contradictory results (Chenhall 2003; Ittner et al. 2003). We can see positive (Simons 1990; Simons 1991; Simons 1995; Cruz et al. 2011) or negative (Bisbe & Otley 2004) relationships between MCS and innovation or learning (Ahn 2001; Chenhall 2005; Godener & Söderquist 2004), or mixed relationships, depending on how the MCS are used; positively related (used interactively) or negatively (used as diagnostic) with capabilities (Henri 2006a; Henri 2006b). With the possible exception of research conducted by Henri (2006a, 2006 b), there are no studies linking the various MCS uses and its impact on firm strategic capabilities (Berry et al. 2009). Despite these studies, there is still a need to better understand the impact of the various MCS uses on organizational capabilities.

Based on insights from performance literature and the fact that the impact of MCS on capabilities remains unclear, this work argues that the different MCS uses (Simons 1995; Vandenbosch 1999) could encourage the development of strategic firm capabilities, thus impacting performance. It is noteworthy that a rich body of literature has examined the link between MCS and performance, finding ambiguous results (Luft & Shields 2003). Three are the research questions in this work: First of all, how do the diverse MCS uses impact on performance? Second, to what extent do MCS uses contribute to organizational performance, through an indirect effect on organizational capabilities? And finally, does MCS have a direct effect on performance?

In the attempt to test the link between MCS use - strategic capabilities - performance, this study builds upon the model presented by Henri (2006a) which connected two MCS uses extracted from Simons (1995) (diagnostic and interactive use) with four capability items (entrepreneurship, innovativeness, market orientation, and organizational learning). However, unlike the previous studies, in the current research we use the complete Vandenbosch (1999) categorization of MCS usage, relating it to Simons (1995) diagnostic and interactive uses, thus to generate our hypotheses. We also expand Henri's (2006a) work using an more encompassing EO and LO concepts (Yuan et al. 2008), which hold five items in the case of the former (Lumpkin et al. 2009) and a four-item scale in the case of the latter (Hult 1998). Finally, another contribution of this work can be seen in the way of measuring performance. Unlike Henri´s (2006a) work, where he uses only three indicators: volume sales, return on investment and profits, our work uses a more holistic view of the organizational performance level with a six-indicator proposal to measure perceived organizational performance. We consider financial, operational, customer satisfaction and employee satisfaction aspects, besides an integrative question, in the twelve past months against the expectations or goals at the beginning of the year. This form was used in studies of different authors (Kohli & Jaworski 1993; Narver & Slater 1990) and was included in a meta-analysis research (Kirca et al. 2005). With this richer model, a more complete analysis of the MCS Use–Strategic Capabilities-Performance linkage will be carried out which may help to solve some of the inconsistent results. In addition, our study uses structural equation modeling (SEM) to test the proposed relationships. SEM provides an evaluation of the entire model as a whole, rather than simply its parts, focusing the analysis at a macro-level perspective (Kline 1998).

To improve understanding of how various MCS uses can be a source of competitive advantage by the development of organizational capabilities in different firm sizes, we realize this empirical application in a large sample of different sectors (manufacturing, services, trade, and banking). Previous studies have been done on samples of 100-300, and focused only on manufacturing firms (Bisbe and Otley 2004; Cruz et al. 2011; Henri 2006a; Henri 2006b). Moreover, such studies were not

performed in SMEs and have not been compared with large firms.

The remainder of this paper is organized as follows: Section 3.3 defines the theoretical framework behind this research. The following section 3.4 develops the theoretical model used to study the relationship between MCS uses, organizational capabilities and performance, besides developing a set of hypotheses. Section 3.5 shows the research methods, sampling procedures, data collection, measurement of variables, test validity, and reliability analysis. The results of the data analysis using structural equation modeling are discussed in Section 3.6. Then, Section 3.7 ends by summarizing the findings, conclusions and discussing the managerial implications. Finally, Section 3.8 evaluates some of the limitations of the study and introduces some directions for future research.

3.3 Theoretical Framework: RBV, Organizational Capabilities, MCS, Performance.

The Resource-Based View and Organizational Capabilities

This study is based on the principles of Resource Based View (RBV) and Dynamic Capabilities (DC) (Barney 1991; Day 1994; Teece et al. 1997; Wernerfelt 1984), as an attempt to explain why some firms are able to have and use different tangible and intangible assets which enable them to have some capabilities that provide sustainable competitive advantage and earn superior returns (Wernerfelt 1984; Grant 1996; Barney 1991; Eisenhardt & Jeffrey 2000; Day 1994; Teece et al. 1997). Resource-based view theory claims that firms with resources with specific characteristics have the potential of achieving superior performance (Barney 1991; Barney 2001; Wernerfelt 1984). RBV rests on the principle that competitiveness is a function of the strength, exploitation, and leveraging of the specific internal resources and capabilities controlled by a firm (Lengnick-Hall & Wolff 1999). This theory conceptualizes firms as a group of resources heterogeneously distributed, whose differences will persist over time (Barney 2001). That is, resources are tied semi-permanently to a company and specific and idiosyncratic resources (rare, valuable, imperfectly imitable and non-replaceable or substitutable) are sources of sustainable competitive advantage that cannot be easily duplicated (Wernerfelt 1984; Barney 1991). A company's resources must not only fulfill the above characteristics to facilitate superior performance, but must be appropriately organized in order to take advantage of these resources (Wiklund & Shepherd 2003).

Resources are assets that can be divided into two major categories (Miller & Shamsie 1996): Property-based (tangibles) and knowledge-based resources (intangibles). Property-based refers primarily to tangible input resources as access to financial capital or access to production equipment, constituting the basic factors of production. Knowledge-based resources may be particularly important and play an essential role in the firm's ability to be entrepreneurial (Galunic & Eisenhardt 1994), and improve performance (McGrath et al. 1996). As RBV proposes, knowledge is difficult to imitate, and mainly refers to two types of resources: first, capabilities that can be seen in successful firms' practices; and second to the capabilities related to the human capital (founder/executives/employee's) (Wiklund & Shepherd 2003). These are the ways in which firms combine and transform the tangible input resources in value (McEvily & Chakravarthy 2002; Hoskisson et al. 1999).

Although in words of Porter (1980), competitive advantage depends on firms' ability to position and differentiate themselves in their industry, some studies have provided evidence to suggest that firm-level resources and capabilities, not industry

characteristics, are the primary determinants of firms' performance (Hoskisson et al. 1999). RBV literature, establishes that a competitive advantage[20] is required to sustain both current and future performance (Grant 1996), but this is a function of firm's ability to exploit its existing capabilities and the development of new ones (Barney 1991; Grant 1991). Capabilities are a link between resources and their deployment because they are organizational processes and routines to integrate, reconfigure, gain and release resources (Grant 1996; Eisenhardt & Jeffrey 2000). In this vein, organizational capabilities are present in the firm practices and knowledge of individuals, and are reflected in the different uses that managers give to their MCS (Bisbe & Otley 2004; Grafton et al. 2010; Henri 2006a; Marginson 2002; Mundy 2010; Tuomela 2005). In this study we focus on the capabilities of entrepreneurial and learning orientation because they are between the most recognized and researched organizational strategic capabilities (entrepreneurship, innovativeness, market orientation and organizational learning) (Covin & Slevin 1991; Lumpkin & Dess 1996; Ripollés & Blesa 2005; Henri 2006a; Henri 2010). Moreover, business literature supports that learning (Widener 2007) and entrepreneurial orientations (Ripollés & Blesa 2005) are positively associated with performance (Yuan et al. 2008).

Learning Orientation (LO)

The changing environments of business organizations are becoming highly competitive, involving high demands for information and knowledge (Senge 1990). This has promoted the creation of knowledge-based organizations that learn and use intellectual capital as a source of sustainable competitive advantage enabling them to obtain better yields (Garvin 1993; Senge 1990). LO was defined in various forms: as the development of ideas, knowledge and relations among past actions and future actions (Fiol & Lyles 1985); as creating structures and strategies that facilitate the learning of all members of the organization (Chenhall 2005); as a phenomenon directly related to new product success (Slater & Narver 1995); and more strictly, as a process that results in new behaviors (Argyris & Schön 1978).

LO refers to the activities undertaken by the organization in the creation and dissemination of knowledge, to achieve superior results and develop competitive advantages (Sinkula et al. 1997). According to Baker and Sinkula (2002) orientation to learning can be viewed as the degree to which the company questions their beliefs and practices to proactively seek new knowledge to maximize the performance of the organization. Comprehensive review of the LO concept are found in the literature (Argyris & Schön 1978; Fiol & Lyles 1985).

Theoretical research on learning contends that LO involves systems to acquire, interpret, diffuse and store information and results (Huber 1991; Roth & Senge 1996). Information acquisition entails obtaining information and knowledge to provide potentially useful ideas and opportunities that are relevant for the formulation of innovative strategies (Hambrick 1982); Information interpretation refers to the process whereby information is given meaning (Daft & Weick 1984). The very process of clarifying purpose can result in seemingly accidental discovery of effective strategies which then provide focus (Kogut 1991); Information distribution is concerned with sharing information, linking individuals who need information with those who possess it (Huber 1991). Such distribution is central to enabling organizations to conduct their business (Tushman & Nadler 1978) and organizational memory provides a repository of information that is often extensive and precise (Chenhall

[20] Day (1994) propose two related sources of advantage: assets (e.g., scale economies, locations, distribution system or brand value) and capabilities (complex set of knowledge and abilities accumulated throughout time) that allow a firm to coordinate and make use of its assets (Day 1994).

2005), whereby information and knowledge are stored for the future (Huber 1991).

LO is considered to be an important facilitator of competitive advantage by way of improving a firm's information processing activities at a faster rate than rivals do (Baker & Sinkula 1999), giving a linkage among learning orientation, and performance in the firm (Calantone et al. 2002). But to do so, requires frequently updated information (Simons 1987). MCS have been identified as an important tool to acquire, interpret, diffuse, and store information and results (Huber 1991; Levitt & March 1988). Some studies report that high performance firms rely on the information provided by frequently updated formal control systems to drive organizational learning (Simons 1987) and argue that MCS has a significant positive impact on staff perceptions of learning capability (Yuan et al. 2008).

Empirical evidence has shown that there is a direct positive relationship between LO and performance (Aragón-Correa et al. 2007; Sinkula et al. 1997; Calantone et al. 2002; Tippins & Sohi 2003). Although admittedly, there are also studies where this relationship showed little or no significance (Farrell & Oczkowski 2002; Llonch Andreu et al. 2007). Sinkula et al. (1997) developed a 13 item scale to measure LO (Sinkula et al. 1997). This scale has been adapted by Hult (1998) into a four-item scale intended to offer a more general measure of learning orientation applicable to the overall company (Hult 1998).

Entrepreneurial orientation (EO)

Like LO, Entrepreneurial Orientation (EO) has been defined from several points of view: as a permanent attitude of the company (Covin & Slevin 1991) that is proactively seeking new business opportunities (Zahra & Garvis 2000); as the set of processes, practices and decision-making activities undertaken to successfully manage the entry of a new company to market (Slater & Narver 1995; Slater & Narver 1994); as the intangible ability of the company's strategic position hardly replicable and related to superior results (Wiklund & Shepherd 2005). The EO concept (Covin & Slevin 1991; Lumpkin & Dess 1996) is an extension of the entrepreneurship concept that has been moved from the individual level to the organizational level (C. Lee et al. 2001). It is suggested that entrepreneurial values enhance the creation of new businesses within the existing business and the renewal or revival of ongoing businesses that have become stagnant or require transformation (Slater & Narver 1994; Slater & Narver 1995). The concept of EO specifically captures entrepreneurial aspects (processes, methods, and styles) (Miller 1983) of a firm's strategies (Covin & Slevin 1989; Lumpkin & Dess 1996; Covin & Lumpkin 2011). Entrepreneurial orientation is also identified as a critical organizational process that contributes to firm survival and performance (Hitt et al. 2001; Miller 1983).

From the standpoint of the RBV, EO can be identified as a high-level organizational routine, durable and difficult to imitate or transfer (Gómez-Villanueva, Llonch Andreu, & Rialp Criado, 2010), and a positive association between EO and performance has been suggested by several studies (Wiklund 1999; Covin & Slevin 1991; C. Lee et al. 2001; Lumpkin & Dess 1996; Ripollés & Blesa 2005). MCS use is related to the superior performance of companies who have an EO, unlike those who have more conservative strategies. Furthermore, performance was associated with entrepreneurial firms where the MCS is used extensively (Chenhall & Morris 1995). Barney (1991, 2001). The way that a firm uses its information systems, when combined with firm resources, can enhance the positive relationship between resources and firm performance (Barney 1991; Barney 2001). In this line, knowledge-based resources as the MCS use, when are directed to discover and exploitation of opportunities, are positively related to firm performance, and EO enhances this relationship (Wiklund & Shepherd 2003).

Empirical evidence has found a positive direct relationship between EO and results (Wiklund 1999; Zahra 1991; Zahra & Covin 1995; Wiklund et al. 2007), for companies of all sizes, small, medium, and large (Wiklund & Shepherd 2003; Wiklund & Shepherd 2005; Rauch et al. 2009).

Entrepreneurship can be viewed as a set of organizational characteristics and can be measured by looking at managerial behavior as the firm engages in the entrepreneurial process. Entrepreneurial firms are those in which top managers have entrepreneurial management styles, as evidenced by the firm's strategic and operative decisions and philosophies (Covin & Slevin 1986). One of the first measures of EO was done by Covin and Slevin (1989), who developed a three-dimension scale (proactiveness, innovation and risk aversion). This scale was later built upon by Lumpkin et al. (2009) who added two more dimensions (autonomy and competitive aggressiveness), an addition which gave it a more complete character. This latter scale has become the accepted measure for EO within the related literature.

Current literature reflects interest in identifying and defining the determinants of organizational capabilities (such as EO and LO). MCS play an important role here because, as discussed above, they have a direct impact on the ways and perceptions related to learning and they can support strategic-decision making in the company related to the market, opportunities and results. Simons (1995, 2000) argues that top managers use interactive control systems ''to stimulate experimentation'' and ''to stimulate opportunity-seeking and encourage the emergence of new initiatives''.

Overview of Management Control Systems (MCS)

Management Control Systems have been conceptualized in various ways. The classic view is outlined in Anthony's (1965) study, in which he divided the control concept between strategic planning, management control, and operational control. He defined management control (p. 17) as "the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives" (Anthony 1965). A more comprehensive notion of the MCS role may include the entire strategic process, that is, strategic formulation (Mintzberg 1978) and strategic implementation and evaluation (Merchant & Otley 2007). In this line a modern MCS definition would be "the evolving formal and informal mechanisms, processes, systems, and networks used by organizations for conveying the key objectives and goals elicited by management, for assisting the strategic process and ongoing management through analysis, planning, measurement, control, rewarding, and broadly managing performance, and for supporting and facilitating organizational learning and change" (Ferreira & Otley 2009) [21].

The term MCS, refers to the set of procedures and processes that managers and other organizational participants use in order to help ensure the achievement of their goals and the goals of their organizations (Otley et al. 1995) and it encompasses formal control systems as well as informal personal and social controls (Otley 1980; Ouchi 1977). Formal MCS consist of purposefully designed, information-based sets of explicit structures, routines, procedures and processes (Maciarello & Kirby 1994), which help managers ensure that strategies and plans are carried out (Simons 1995; Merchant 1998).

According to Otley (1999) Management control systems framework can be viewed as a five-step process: 1) Identification of the key organizational objectives and processes/methods to assess the level of achievement. 2) Process of formulating and

[21] A number of MCS definitions have been proposed in more recent years, for a review and discussion see (Malmi & Brown 2008).

implementing strategies, plans, performance measurement and evaluation. 3) Setting performance targets. 4) The rewards systems (achieving or failing). 5) Information flows required for monitoring of performance and to support learning (Otley 1999).

MCS are composed of multiple control systems that work together (Widener 2007) and complement each other (Otley 1994). The purpose of the MCS is to support the processes of decision-making, planning, monitoring and evaluation by providing valuable and relevant information at the right time (Kaplan & Norton 1992). MCS seek to influence human activity within the company; they are formal or informal procedures and systems that can be identified by common business management practices that use information to maintain or alter patterns in an organizational activity (Mintzberg & Waters 1985). Some MCS are formal, such as planning, budgeting or reporting systems, monitoring procedures, project management systems, human resource systems, cost accounting systems, or support decision making systems like SAP platforms[22]. Some MCS are informal like weekly meetings, daily checks, emails, etc. (Simons 1991).

It is widely accepted that a firm's MCS is designed to support its strategy (Widener 2004), but they should be explicity tailored to do so (Langfield Smith 1997). Only then can they lead to competitive advantage and superior performance of a business (Dent 1990). In the literature we can observe a general understanding that MCS does not automatically improve the performance of enterprises; instead, performance is related to how systems are designed, developed, and used. Evidence suggests MCS use can be more significant than its formal design. The use made of information and controls is a cornerstone of the MCS (Ferreira 2002). Thus, the best way to approach the study of MCS is by looking at how they are used (Langfield Smith 1997).

While management accounting literature is replete with studies that investigate MCS, only some of them focus on detailed controls such as the MCS uses (Ittner & Larcker 1998b). Furthermore, the concept of "use" has not been well-developed in the literature (Ferreira 2002)[23]. In this line, this study proposes a combination of two classifications that have been used separately in previous studies: These classifications will both be related to generate the hypotheses proposed: The theoretical proposition about levers of control (LOC) (Simons 1995) and the proposal of executive support systems (ESS) classification (Vandenbosch 1999).

Levers of control (LOC) (Simons 1995)

Simons (1995) hypothesized that senior managers may use different aspects of the control system to focus on four key constructs of MCS uses that are critical to the successful implementation of strategy: beliefs (core values), boundary (behavioral constraints), diagnostics (monitoring), and interactive uses (forward- looking, management involvement). A brief explanation of each is presented.

Beliefs and values are systems to secure commitment to goals and to inspire employees in their search for opportunities and solutions (Marginson 2002). These systems are "the explicit set of organizational definitions that senior managers use for

[22] For example, Performance Measurement Systems (PMS), one important aspect of MCS, represent the formal process and the set of metrics used to quantify both the efficiency and effectiveness of actions (Neely et al. 1994) by providing the information necessary to challenge the content and validity of the strategy (Ittner et al. 2003).

[23] Except for the work of Hopwood's (1972) who speaks about a 'rigid' and 'flexible' use categories (Hopwood 1972), Simons (1995) Levers of Control framework and Vandenbosch (1999) executive support systems classification,; we cannot find other studies focused on MCS use.

formal communication and systematic reinformcement, providing basic values, purpose, vision and direction for the organization" (Simons, 1995, p. 34). Belief systems are: communication channels, formal mission statements, credos, statements of purpose, email, meetings, (un)written codes of conduct, strategic planning systems and formal rules and procedures.

The boundary lever of control "delineates the acceptable domain of strategic activity for participants" (Simons, 1995, p. 39). It is an explicit set of organizational definitions and parameters: administrative controls hierarchically based (Marginson 2002), expressed in negative or minimum terms (Simons 1995). The boundary system communicates the actions that employees should avoid (Widener 2007). Any system that sets out minimum standards or guidelines for behavior can be used by managers as a boundary lever of control (Pun & White 2005; Mundy 2010). For example, boundary processes aim to prevent employees from wasting the organization's resources. It is hoped that these restrictions will somehow provide employees the freedom to innovate and achieve, but within certain predefined areas (Widener 2007).

Diagnostic systems use (control over organizational goals (Simons 1995)) refers to the use of MCS, including PMS (performance measurement systems) or KPIs (key performance indicators), to monitor organizational performance against important dimensions of a given strategy. These systems are intended to motivate employees to perform and align their behavior with organizational objectives (Widener 2007). Such systems include a broad range of metrics in key areas (Marginson 2002) for comparing actual performance against pre-set targets, thus identifying exceptions and deviations from plans (Navarro & Guerras Martín 2001; Mundy 2010). Diagnostic controls consist of data transmitted through formal reports and rely heavily on specialists to prepare and interpret information (Widener 2007). In its purest form, a diagnostic system acts as a constraint on employee behavior (Simons 2000).

Interactive MCS use is intended to be forward-looking and is characterized by active and frequent dialogue among top managers and employees. This use implies formal two-way processes of communication where employee participation is encouraged in a formal process of debate, as a way of sharing information (Simons 1995; Henri 2006a; Mellahi & Sminia 2009; Mundy 2010). The aim is to enable employees to search for opportunities, solve problems, make decisions (Widener 2007), and to influence and guide the learning process (Simons 1990). As Simons (1991) shows, interactive use of MCS provides a vehicle for top management to reveal their values and preferences to organization members (Simons 1991). An example of this practice is the creation process of a Balanced Scorecard (Kaplan & Norton 1992).

Diagnostic use focuses on the evaluation of actual results, while Interactive use focuses on the formulation and use of predictions.

Beliefs & core values and interactive control systems are described as creating positive inspirational forces. Boundary systems (which control risks) and diagnostic control systems (which control critical performance variables) create behavior constraints (Simons 1995; Widener 2007; Langfield Smith 1997; Henri 2006a; Henri 2006b). Simons posits that in LOC framework, the four control systems working together are necessary to provide an effective control environment (Simons 2000).

Two of the main criticisms of the LOC model is that, on one hand, this framework is strongly focused on the top level of management and that it does not cope well with the range of informal controls that exist in organizations, particularly in small ones, and furthermore, the concept of balance is quite ambiguous (Ferreira 2002).

LOC framework shows that MCS uses influence or inhibit strategic capabilities in organizations through the routines they stimulate (Franco-Santos et al. 2012). In this study we focused on these last two uses (diagnostic and interactive uses) because MCS are present and related with them (Simons 1990). We argue that, depending on the type of use, diagnostic control systems (used on a basis to monitor and reward achievement of specified goals through the review of critical performance variables or key success factors) or interactive control systems (used to expand opportunity-seeking and learning), show different results for the MCS-Performance relationship.

Simons (1995, 2000) suggests a positive association between the interactive use of MCS and performance at both individual and organisational levels (Simons 1995; Simons 2000). However, innovation management literature tends to minimize or ignore the potential role of MCS diagnostic use as a factor that may influence successful product innovation (Dougherty & Hardy 1996; Verona 1999). This literature even suggests that a widespread use of formal diagnostic MCS use is in fact incompatible with innovation. MCS are seen as deterrents for creativity (Abernethy & Stoelwinder 1991; Amabile 1998; Ouchi 1977). This suggests that the use of formal MCS by top managers is not relevant for successful innovation performance. At the same time, formal use of an MCS remains a priority and a forum for the generation and implementation of creative ideas. In fact, the most innovative companies are intensive users of formal MCS and intensive use of MCS can lead to increased innovation capacity (Simons 1990; Simons 1995). Still, some studies have found formal MCS to coexist with product innovation (Khandwalla 1977; Miller & Friesen 1982). In other words, although the formal use of a MCS is expected to block excessive innovation or creativity, it can also help ideas to be transferred effectively to generate product innovation and thereby impact organizational performance (Dent 1990; Chenhall & Morris 1995; Kaplan & Norton 1996). Moreover, when multiple uses of control systems are combined in the context of a "Control package" (Otley 1980; Otley 1999), companies are expected to encourage innovation, a critical aspect of LO and EO, and performance.

Executive support systems classification (Vandenbosch 1999)

The second classification used in this study is based on a proposal made by Betty Vandenbosch (1999), an empirical comparative analysis of MCS and organizational competitiveness, which identifies a typology with four categories for the use of management information systems. A brief explanation of each category is presented.

Score Keeping (Monitoring) is a composite activity of standardized processes for obtaining and processing management information. Such processes evolve over long periods of time and seek to keep up to date information relevant to the business (e.g., fulfillment of goals or the degree of progress in an initiative). Monitoring is characterized by consistency between time periods so that comparisons are easy to make. Score keeping or monitoring activity responds to the question: How am I doing? (Simon et al., 1954). Here MCS are used to provide feedback regarding expectations. That is MCS becomes a feedback system that measures the outputs of a process and, by comparison with previously predefined goals, can provide feedback to identify corrective actions to ensure reaching targets (Vandenbosch 1999). This proposed use for MCS is somewhat similar to Simons' (1995) proposal of diagnostic controls. In both cases, what is sought is mainly to ensure that a business obtains the information necessary for accessing whether or not objectives have been achieved.

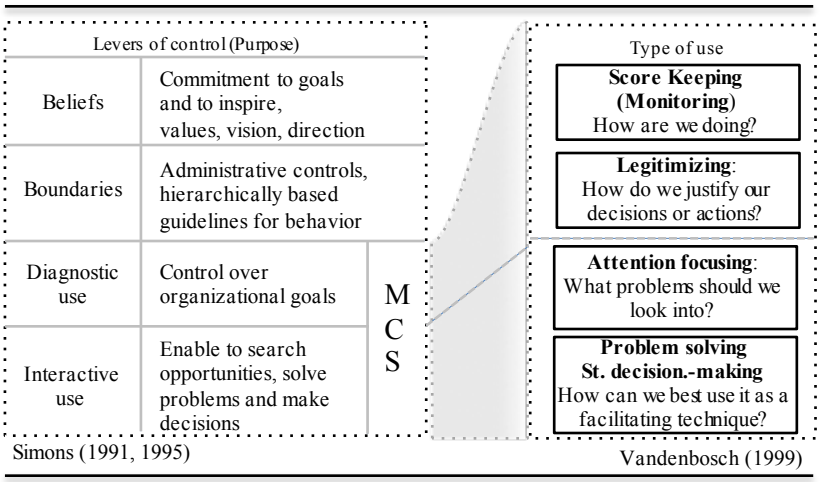
Problem solving (Strategic decision making) refers to a non-routine activity of senior management where data analysis processes are performed for strategic decision-making. Simon et al. (1954) stressed the importance of information to improve

these processes and several studies proposed that information is the key to drive success. Fast decision makers use more information and develop more alternatives than slow decision makers (Eisenhardt 1989). Use of MCS in a problem solving manner is similar to the interactive control proposed by LOC (Simons 1995).

Focusing organizational attention (Attention focusing): The organizational learning associated with an attention-focusing MCS use contributes to the emergence of new strategies (Mintzberg 1978; Simons 1990; Simons 1995). Using MCS to direct attention is done by responding to the question "what problems must we focus on?" "What opportunities and challenges are presented?" (Simon et al. 1954). This type of use is similar to the interactive control proposed by Simons (1995).

Finally legitimizing decisions (Legitimization): Effective decisions must go through a process of legitimization. As described by Vandenbosch (1999), this type of use refers principally to justify and validate past actions, thus increasing and ensuring the legitimacy of future actions. MCS use information from the entire firm, which provides the authority and credibility to legitimize activities. Interactive MCS use give an opportunity for top managers to indicate to all members of the organization that different initiatives are legitimate, meaningful and are welcome to the organizational agenda (Dougherty & Hardy 1996). This is a major reason for the use of a MCS (Vandenbosch 1999). This legitimizing use of MCS, through the information that is yielded, is similar to what is proposed by Simons (1995) as a diagnostic use of MCS (Simons 1990).

Figure 3.1: Uses of Management Control Systems



Source: Self-devised

Both typologies, Simons (1995) and Vandenbosch's (1999) are used within the related literature, but have always been used separately. The relationship proposed [24] allows us to specifically observe how these types of MCS can interact together and produce different results (Figure 3.1). In other words, examining them jointly may allow us to have a more complete picture of the links between MCS use and its impact on strategic capabilities and organizational performance.

Performance

The research on performance has been developed mainly in two schools of thought: *economics*, suggesting the role of industry structure; and the *RBV*, emphasizing the importance of firm resources and characteristics. The literature on strategic performance management argues that MCS can be viewed as an important firm resource, based on the assumption that MCS benefits organizations by facilitating the evaluation and control process, and the resulting decisions can impact performance

[24] To achieve this, an analysis is subsequently proposed to create two second-order constructs called Diagnostic & Interactive Uses, proposed by Simons, and each will be related to two of the uses proposed by Vandenbosch.

(Ittner & Larcker 2003; Chenhall 2005; Kaplan & Norton 1996).

In order to manage critical success factors and achieve desired performance in today's complex businesses, MCS encompasses multiple measures (Kaplan & Norton 1996). Therefore, the concept of performance is not limited to only the financial aspect but also integrates aspects such as customer satisfaction, productivity, quality, and innovation (Henri & Journeault 2010). Franco-Santos et al. (2012) classify the consequences/results into three categories[25]: people's behavior, organizational capabilities, and performance. Unlike Franco-Santos et al. (2012), Henri (2006a) sees these capabilities as a cause of performance and not as a result. Along this line, our work considers capabilities to be key drivers of organizational performance and views capabilities as a trigger of performance.

The concept of performance mainly refers to the various consequences in an organization. Seeing performance as a consequence has some advantages, allowing attention to focus on causes, considering results of different types, such as market response, quantifiable benefit, profitability, growth achieved, rent-seeking business, or what is also commonly called value creation. Some studies use innovation to measure organizational effectiveness or performance (Miller & Friesen 1982), while others define performance using 10 or 12 dimensions, recognizing that there are many possible performance dimensions critical to measuring the a firm's success (Govindarajan 1988; Govindarajan & Fisher 1990). A long debate has focused on identifying the variables that make up the performance of a firm (Rumelt et al. 1994), and after 20 years, researchers are still debating how to operationalize constructs such as performance (Boyd & Reuning-Elliot 1998). In recent studies, there have been explicit requests to include outcomes in some other shape or form, because the connotation of performance with financial parameters is too limiting (Mellahi & Sminia 2009).

Two perspectives have been taken when approaching the study of firm performance: *reported performance* and *perceived performance* (Franco-Santos et al. 2012). Reported performance[26] is based on information internally or externally reported, and can be financial or non-financial. Perceived performance[27] is based on responses from research participants' perceptions of firm performance. Firm performance can be measured both objectively and subjectively, and is indeed a complex issue (Sandberg & Hofer 1987). Performance research has been dominated by self-assessment processes, commonly used in research on private firms (Narver & Slater 1990), where individuals provide an evaluation of performance across a range of important processes (Chenhall 2003) or organizational goals (Govindarajan 1984). Evidence suggests that a subordinate's self-assessment correlates with their objective counterparts (superior's) and objective assessments (Chenhall 2003; Dess & Robinson 1984). Although objective reported measures are desirable, a researcher should consider a perceptual measure when there is no available objective data or when he or she may not have the option of removing the variable performance of its study (Dess & Robinson 1984).

However, MCS impact on performance is unclear on both reported and perceived performance; the results are inconclusive

[25] Franco-Santos et al (2012) made the following classifications: consequences/results-- people's behavior: actions or reactions of employees as motivation, participation; organizational capabilities--specific processes or competences that enable the organization to perform and gain competitive advantages; and performance--financial and non-financial results at all levels of the organization.
[26] Reported performance: financial: accounting performance, stock market performance, market performance, financial annual reports, and non-financial performance: customer satisfaction, etc. (Franco-Santos et al. 2012).
[27] Perceived performance: financial and non-financial performance; performance improvement; strategic goals achievement; positioning; and strategic performance outcomes in terms of delivery, flexibility, low cost, quality and customer performance (Franco-Santos et al. 2012.

and inconsistent. The literature shows some studies finding a positive MCS effect (Crabtree & DeBusk 2008; Cruz et al. 2011; Ittner & Larcker 1998a; Ittner & Larcker 2003; Ittner et al. 2003; Banker & Potter 2000; Hyvönen 2007; Chenhall 2005; Chenhall & Langfield-Smith 1998; Grafton et al. 2010; Henri 2006a; Hoque 2004; Hoque & James 2000). In fact, a second set of studies finds mixed results (Griffith & Neely 2009; Ittner & Larcker 1997; Kihn 2007; Braam & Nijssen 2004), Bisbe & Malagueño (2012) find evidence supporting a positive association between SPMS and performance that is mediated by the comprehensiveness of the strategic decision arrays; And finally a third set of studies finds no relationship – or a very weak relationship with performance (HassabElnaby et al. 2005; Ittner et al. 2003; Said et al. 2003; Perera et al. 1997). The perceptions of the impact of MCS on firm performance is highly dependent on the way MCS are designed, developed and used (e.g., (Griffith & Neely 2009; Ittner & Larcker 1997; Henri 2006a; Henri 2006b; Godener & Söderquist 2004; Johnston et al. 2002; Malina & Selto 2001)). Because of these contradictions, research on MCS effect on performance is still considered important.

MCS, capabilities, and performance relationships

Firms build and use a MCS in order to provide administrators with critical information regarding the firm's resources and capabilities (Simons 2000), which in turn will positively affect performance (Kaplan & Norton 2002). The three constructs, MCS, capabilities, and performance, have been widely studied individually. The hypotheses proposed in the theoretical model of this paper are based on the relationships that these constructs may have as a whole. Some theoretical arguments supporting these relationships are explained in the following section.

MCS and capabilities

In general, as to the connection between MCS and capabilities, literature using an *RBV* approach (Barney 1991), *Simons'* LOC (Simons 1995) and of lesser degree, the ESS of Vandenbosch (1999), show that MCS does influence (creating or enhancing) strategic capabilities (Henri 2006a; Henri 2006b; Bisbe & Otley 2004; Cruz et al. 2011; Marginson 2002; Johnston et al. 2002; Godener & Söderquist 2004; Mundy 2010; Grafton et al. 2010; Chenhall 2005; Ahn 2001).

Studies show that combined MCS use for feedback and feed-forward, affects the exploitation of existing capabilities, or the search for and identification of new capabilities (Grafton et al. 2010). In fact, this suggests that the ability to use MCS constitutes a unique capability in its own right (Mundy 2010). While others found a negative relationships between MCS and some capabilities (Bisbe & Otley 2004), e.g., Widener (2007) find that interactive MCS use does not facilitate organizational learning. Studies have shown that different MCS uses generate different capabilities. An interactive MCS use can foster innovative practices (Marginson 2002; Bisbe & Otley 2004; Henri 2006a; Cruz et al. 2011), facilitate organizational learning (Ahn 2001; Johnston et al. 2002; Godener & Söderquist 2004; Henri 2006a) and develop entrepreneurship, and market orientation (Henri 2006a). Some studies indicate that a diagnostic use of MCS seems to weaken all capabilities (Henri 2006a; Henri 2006b). However, in the same line, Widener (2007) concludes that both interactive and diagnostic MCS uses, generate a positive effect on firm performance (Widener 2007), although there is a cost for such control. The above arguments show inconsistent results in the literature. In other words, there are arguments for, against, or with mixed results, depending on the context where they have been analyzed.

Capabilities and performance

The second group of relationships is between capabilities and performance. Following the RBV of the firm, unique resources and capabilities lead to a sustained competitive advantage, which in turn contributes to performance differences among firms. It is argued that firms with greater capabilities are able to develop a competitive advantage, achieving corporate renewal and higher levels of performance (Danneels 2002; Hurley & Hult 1998). In this sense LO and EO constitute two capabilities that are valuable, hard to duplicate, and non-substitutable. Previous empirical studies provide evidence showing that both capabilities contribute positively to performance (C. Lee et al. 2001; Hult & Ketchen 2001; Naman & Slevin 1993; Narver & Slater 1990; Spanos & Lioukas 2001). On one hand, literature maintains that LO is critical to maintaining competitive advantage and is associated with improved performance (Levitt & March 1988; Slater & Narver 1995). Tippins and Sohi (2003) find that improved firm performance results in the presence of LO capability (Tippins & Sohi 2003). Secondly, literature on entrepreneurship supports that EO concept captures specifically the entrepreneurial aspects (processes, methods, and styles) (Miller 1983) of a firm's strategies (Covin & Slevin 1989; Lumpkin & Dess 1996; Covin & Lumpkin 2011). Overall, company strategies are related to obtaining better results than the competition and to achieve this, and one of the ways used by companies is by finding and implementing new profitable business opportunities. EO is defined as a permanent attitude of the company (Covin & Slevin 1991) that is proactively seeking new business opportunities (Zahra & Garvis 2000) through a set of processes, practices, and decision-making activities undertaken to successfully manage the entry of a new company to market (Lumpkin & Dess 1996). EO does not only include entry into new markets; it would seem that entrepreneurial values enhance the creation of new businesses within the existing business, and the renewal or revival of ongoing businesses that have become stagnant or require transformation (Slater & Narver 1994; Slater & Narver 1995). The search of opportunities from various MCS uses is present in the EO perspective as an attitude and the processes involved can exploit opportunities. Empirical studies propose that MCS are associated with the superior performance of companies who have an EO, unlike those who have more conservative strategies. Furthermore, this performance was associated with entrepreneurial firms where MCS is used extensively (Chenhall & Morris 1995). But despite all the arguments in favor of this relationship (Capabilities-Performance), there are still inconsistencies in the literature about the impact produced by some capabilities (innovation and entrepreneurship) in performance; thus these theoretical concepts remain unclear and require further research (Franco-Santos et al. 2012).

MCS and capabilities and performance:

Regarding the relationship between MCS, capabilities, and performance as a whole, the impact of capabilities on performance has also been studied adopting a RBV approach. Studies suggest that MCS indirectly influence organizational performance by impact on the strategic capabilities that are essential to reach competitive advantages (Covin & Slevin 1991; Lumpkin & Dess 1996; Ripollés & Blesa 2005; Henri 2006a; Henri & Journeault 2010). There is empirical evidence that supports the existence of this indirect relationship, e.g., studies investigating the association between market competition capability and performance. These studies have found that the use of accounting information, mediates this relationship (Widener 2006). Furthermore, management accounting literature has a number of studies suggesting a positive relationship between MCS and economic performance (Ittner & Larcker 1997; Ittner et al. 2003; Luft & Shields 2003; Widener 2006). These studies argue

that appropriate accounting information provided by MCS supports effective resource management and contributes to economic performance (Baines & Langfield Smith 2003; Widener 2007). Kofteros et al. (2014) argued that there is sufficient evidence to suggest that the use of MCS leads to improved capabilities, which then impact performance. His results show that both MCS uses, disgnostic and interactive, impact performance positively and, furthermore, diagnostic use appears to be the most constructive explanatory variable for capabilities, and thus performance.

However, despite the fact that prior research has examined the relationship between MCS and performance supporting a positive relationship, we can also find arguments against this, proposals that insist MCS be aligned with capabilities in order to be effective and consistent with performance (Franco-Santos et al. 2012). Also, there are some empirical studies (Abernethy & Brownell 1999; Bisbe & Otley 2004) that did not find evidence supporting a direct relationship between MCS and performance. Some researchers have argued that looking for a direct link between MCS and performance might be misleading due to the internal and external factors that play a role in economic performance evaluation (C.-L. Lee & Yang 2011). Following RBV arguments, MCS are not necessarily strategic resources that allow a company to maintain a sustainable competitive advantage because, besides the resources that can be purchased or transferred between companies, these do not necessarily generate sustainable rents (Barney, 1991). Therefore, the use of MCS may not directly contribute to performance. Some others attributed several interrelated factors contributing to performance, arguing it is difficult to attribute a direct causal relationship MCS - performance (Henri 2010).

Not only are there relatively few empirical studies in both the capabilities-performance and MCS literatures that address this relationship, but also the limited prior research appears to provide contradictory findings. Therefore, theoretical support and prior empirical evidence in the literature are inconclusive and insufficient (Bisbe & Otley 2004) to justify or not MCS use - performance direct relationship. Consequently, to obtain more knowledge about these relationships, this paper makes hypotheses supporting a direct relationship between the use of MCS and performance; moreover, the impact between MCS and performance will be examined indirectly through capabilities.

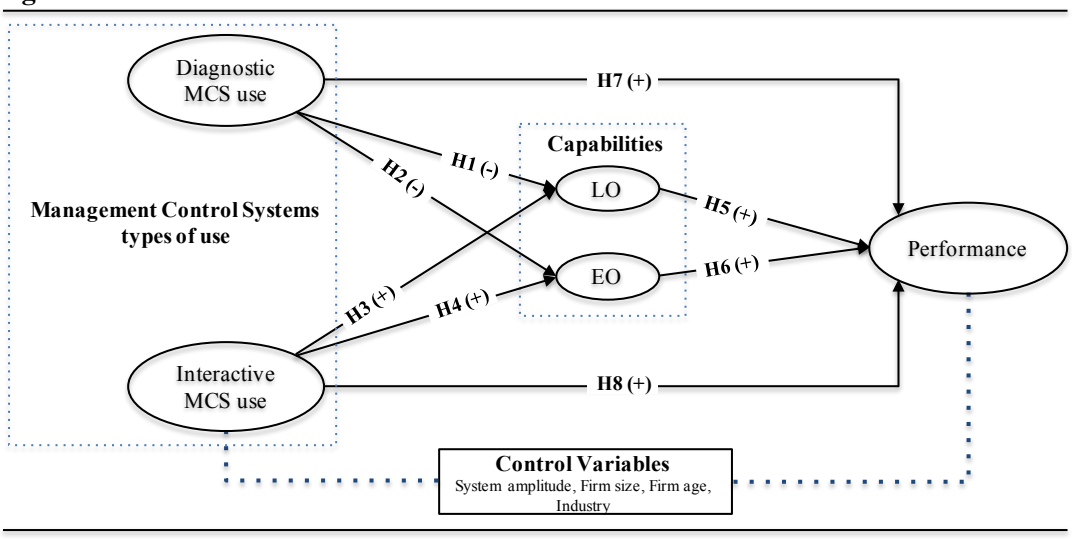
3.4 Theoretical model and research hypotheses

3.4.1 Theoretical model

In this work, we adopt classifications of MCS use according to Simons (1995) and Vandenbosch (1999), both to examine the extent to which MCS use can impact a firm's capabilities and performance. In other words, organizational performance is modeled as a result of strategic capabilities and these in turn as a result of the various MCS uses. Our expectations and hypotheses are developed in this section.

Figure 3.2 presents the conceptual model of this study and also represents the major relationships that we seek to demonstrate, among the two MCS uses (Diagnostic & Interactive), two organizational capabilities (Entrepreneurial and Learning Orientations) and Performance.

Figure 3.2: Theoretical model



Source: Self-devised

Based on the theoretical framework, there are three major premises behind the development of this model:

1) The two MCS uses impact capabilities in various ways. In other words, the different MCS uses have been linked to capabilities of LO and EO (Hypotheses 1 to 4): On one hand, monitoring and legitimization MCS uses (Vandenbosch 1999), acting as a a 2nd order construct called "Diagnostic MCS use" negatively influences capabilities because they are acting in a Diagnostic mode (Simons 1995)[28]. On the other hand, it is expected that focusing attention and strategic decision-making uses (Vandenbosch 1999), acting as a 2nd order construct called "Interactive MCS use," are positively related with capabilities because they are acting in an interactive way (Simons 1995).
2) Likewise, it is expected that LO and EO Capabilities have a positive impact on organizational performance (Hypotheses 5-6).
3) MCS impact performance directly (Hypotheses 7-8) and indirectly through capabilities (through LO, if H1+H5 and H3+ H5 are met; and through EO if H2+H6 and H4+H6 are met)

3.4.2 Hypotheses

Relationships between MCS and Capabilities:

MCS Diagnostic use: Monitoring and Legitimizing uses

Diagnostic MCS use, comprised of monitoring and legitimizing uses in a LOC approach (Simons 1995), is employed to "justify, monitor and reward" the achievement of pre-established objectives and goals, providing motivation and direction. The diagnostic systems are formalized routines intended to guide behavior, and as such, facilitate organizational learning

[28] It is noteworthy that despite the results obtained in the previous chapter, the two applications that are related to the MCS diagnostic use (monitoring and legitimizing) individuallyshow a positive impact on capabilities, in the same line of Koufteros et al's. (2014) research. In this paper we have decided to continue a hypothesis in a negative sense on capabilities for three reasons: 1) The proposed theoretical arguments (Simons 1995; Henri 2006[a]; Theriou et al. 2009; among others) have more support than the Koufteros et al. (2014) results; 2) The approach in the previous chapter employed the four uses individually proposed by Vandenbosh (1999), unlike what is proposed in this chapter, where the four uses are integrated into two second-order constructs called diagnostic and interactive, and 3) in this chapter with a very different and more robust methodology (SEM), where we expect to keep the same positive trend, thus our positive results will have more definite findings.

(Simons 1990). It is generally believed that the contribution of diagnostic MCS use was in deviations searches or finding "errors", in other words, seeing why we have not become what we intended (Theriou et al. 2009). This is based on a negative way of thinking that typically arises when productivity and efficiency have fallen and innovation needs to be curbed; this use sends a negative signal (Henri 2006a) which could limit the search for opportunities and innovation. However, diagnostic MCS use comprises the review of critical variables to monitor and coordinate the implementation of intended strategies. And in the same vein, there are arguments (Mintzberg, 1973; Eisenhardt, 1989; Vandenbosch, 1999; Slater & Narver, 1995; Grafton et al. 2010; Koufteros et al. 2014) suggesting that MCS diagnostic use can have a positive influence on the development of capabilities, laying the foundation for carrying out a conversation to enable better decisions, such as communicating the same information and allowing it to be understood in the same way. Even, Koufteros et al. (2014), studying 386 Italian firms and using longitudinal panel data over a ten-year period, found that there is sufficient evidence to suggest that MCS uses (diagnostic and interactive) leads to improved capabilities, which then impact performance. Furthermore, these results show that, on the one hand, the most constructive explanatory variable for capabilities was diagnostic use. On the other hand, when both MCS uses are used simultaneously and with different intensity, the results differ, ie, high levels of both types of usage generate high levels of capabilities. Conversely, lower levels of organizational capabilities occur with a high level of diagnostic use and low interactive use. But, as mentioned above, analyzing their approaches, we have found reasons to question the way MCS diagnostic use has been measured, with such shortcomings and omissions.

With MCS use as a monitoring tool, findings show that the primary reason (30 %) for having MCS was monitoring/controlling (Marr 2005). The use of MCS as monitoring represents the more traditional role that has been documented, supporting and reviewing critical performance variables to monitor-coordinate the implementation of intended strategies in a routine process (Simons 1995). By consistency between time periods, comparisons and standardized reports are easy to make in a routine way. Monitoring use was usually tied to specialized work and control values like stability, enforced roles, and bureaucracy (Hofstede 1978), and is also associated with highly structured channels of communication and limited organizational performance (Chenhall et al. 1995).

Previous studies indicate that monitoring use of MCS is not related to a considerable amount of risk, flexibility, broad communication processes or innovation activities present in the entrepreneurial orientation. Also, because of its routine nature or single-loop learning (Argyris & Schön 1978), there is evidence that people tend to react to control measures by developing suspicion and resistance (Henri 2006a), critical factors in learning orientation. This would mean that diagnostic use, measured as monitoring MCS use, works against the deployment of capabilities (Henri 2006a).

Although there are arguments relating monitoring and capabilities negatively, this statement is not conclusive. We can also find mixed and positive relationships or dependency of some other variables. i.e., studies found that if the manager perceives that assessment based on a limited controlled budget style, he or she is more likely to experience work-related stress (Hopwood 1972). Otley's (1978) research found that the use of a budget-constrained style did not lead to high levels of job-related tension; in fact, this style was associated with higher performance (Otley 1978), a result opposite to that of Hopwood. Brownell (1982), who argue that a budget constrained leadership style is most effective under conditions of high participation,

supporting a contingency framework between MCS use and performance linking environmental uncertainty. Miller and Friesen (1982), in a moderate position, argue that the relationship between monitoring and innovation depends on the firm's strategy (Miller & Friesen 1982). In other words, monitoring was positively correlated with innovation for conservative firms, allowing administrators to become aware of potential areas of opportunity; and negatively correlated with innovation for entrepreneurial firms seeking continuous product/market development by monitoring innovation in excess (Simons 1990).
On the other hand, and in a positive sense, Vandenbosch (1999) contended that the discussion triggered by diagnostic use leads to corrective action as a way of learning, and similar to Grafton et al. (2010), argues that diagnostic use of MCS facilitates exploitation of existing capabilities. The use of MCS as a monitoring tool also represents an instrument of communication between managers and subordinates to share information about environmental issues (Henri & Journeault 2010). Hence, monitoring MCS use can operationalize the first, second, and fourth steps of the organizational learning process[29] (Slater & Narver 1995). Moreover, other MCS uses need this important monitoring role because they require information to support the analytical process. In fact, it has been observed that those who make more rapid decisions, use more information and generate more alternatives than slow decision makers (Eisenhardt 1989). This would mean that monitoring goal achievement, restricting risk taking, providing boundaries for innovation, and closely monitoring variations in effectiveness would produce a better performance. In other words, monitoring use may contribute to performance through organizational capabilities.

Legitimizing MCS use is also called decision ratification (Simons 1990) or decision-influencing (Dossi 2008). In the negative sense, legitimizing MCS use is a political tool not only to maintain credibility but also to establish authority (Dermer 1990). Markus and Pfeffer (1983) provide evidence that this use is related to the acquisition or exercise of power by setting direction, altering performance, and thus conferring legitimacy (Markus & Pfeffer 1983). Legitimizing MCS use is associated to a control dominant type (Henri 2006b), centralization of power, and sometimes a strong prevalence of only financial indicators (Kaplan & Norton 1992, 1996, 2001, 2002). The feature of controlling companies is not related to the characteristics of the capabilities of LO and EO, and has a negative effect on the studied relationships.

In the positive sense, MCS is used as legitimization tool to justify past actions or decisions (Burchell et al. 1980) made under conditions of uncertainty (Henri, 2006b). This use is beneficial to executives because the information provided confirms or denies their own previously held beliefs or expectations (Vandenbosch 1999). This influencing MCS role is widely accepted in international business literature, according to which, MCS are data management tools influencing the cognitive orientation of managers in decision-making (Prahalad & Doz 1987). MCS use information of the entire firm, which gives them the authority and credibility to provide legitimacy of activities. Legitimizing is a major reason for the use of a decision support system because there is a strong relationship between legitimizing decisions and enabling competitiveness (Vandenbosch 1999); i.e., corporate headquarters employ MCS to influence and guide local decision-making (Fama & Jensen 1983) and to influence initiation and implementation of strategic decisions (Entrepreneurial orientation) (Prahalad & Doz 1987). Managers not only use information to justify their decisions, they believe that doing so enables their organization's competitiveness (Vandenbosch 1999). These findings seem to indicate that the energy that managers expend on justifying and legitimizing, in order to make things happen, is directly related with characteristics of entrepreneurship (Zahra & Garvis 2000; Covin & Slevin

[29] Learning process: Information acquisition (How am I doing?), information dissemination (communication), shared interpretation (What does it mean?) and organizational memory (How do I Do it?) (Slater & Narver 1995).

1991). Legitimacy may be a relevant attribute of making things happen, because if actions will only be taken if they have been legitimized, organizations become dependent on such information (Feldman & March 1981). In addition, by legitimizing prior ideas, managers ensure their interpretation; therefore, we can interpret that MCS use the of legitimizing operationalizes the second and third steps of the organizational learning process (Slater & Narver 1995), impacting the development of this capacity. As we can see in the previous arguments, there is a lack of consensus in the literature about legitimization, so the research cannot clarify whether its impact is clearly positive or negative.

The above arguments about monitoring and legitimizing open more than one possibility for the construct of diagnostic use. In our approach, the two uses monitoring and legitimizing are acting diagnostically and thus impact capabilities negatively. In other words, we know that Henri (2006a) found a negative relationship, but also know that Koufteros et al. (2014) have found a positive relationship between the diagnostic use and organizational capabilities. Tto corroborate our previous results (Chapter 2) and uUsing a more robust methodology than SEM, we decided to propose a negative relationship between diagnostic use and capabilities, in line with a previous studies (Henri 2006a), leading to hypothesis 1 and 2:

H1: Diagnostic use of MCS exerts a negative influence on LO

H2: Diagnostic use of MCS exerts a negative influence on EO

Interactive use: Attention focusing & Strategic decision-making uses

Interactive MCS use, comprised of attention focusing and strategic decision-making uses, in a LOC approach (Simon et al. 1954), facilitates and guides organization learning (Simons 1991; Simons 1995; Ahn 2001) and fosters innovative practices (Marginson 2002; Bisbe & Otley 2004; Henri 2006a; Cruz et al. 2011). Studies report empirical support of the relationship between interactive controls and organizational learning (Abernethy & Brownell 1999) demonstrating that high performing firms rely on the information provided by frequently updated MCS to drive organizational learning (Simons 1987). This has a significant positive impact on staff perceptions about learning capability (Yuan et al. 2008). This use provides, in terms of information processing, three basic components: intelligence generation, intelligence dissemination, and responsiveness (Kohli & Jaworski 1990). Interactive MCS use is associated with the signals sent throughout the firm to focus organizational attention, stimulate dialogue (Simons 1995), support the decision-making process and the emergence of new strategies (Mintzberg 1978). This emphasizes boss-employee interaction and reflects a leadership style (Naranjo-Gil & Hartmann 2007a). Interactive MCS use, composed of attention focusing and strategic decision making MCS uses, has a positive impact on capabilities because it promotes participation and involvement of employees, essential elements in both capabilities studied.

When the MCS focus is on attention, action and improvement (Interactive) rather than on reporting and control (diagnostic), these systems become effective mechanisms for facilitating organizational learning that supports growth and development at all levels (Johnston et al. 2002; Godener & Söderquist 2004; Ahn 2001; Chenhall 2005). MCS used to focus attention fosters organizational dialogue, debate, discussion and information exchange, as a high-level learning double-loop (Argyris & Schön 1978), to encourage organizational learning (Mintzberg 1978; Simons 1990; Simons 1995) in general. This type of use send signals to the organization about strategic issues (Simons 1995) and the seeking of opportunities, proposed in the EO perspective as an attitude and a process to exploit business opportunities. Attention-focusing MCS use requires a

liberal management style that values the principles of empowerment, entrepreneurship, and self-control (De Haas & Kleingeld 1999).

Strategic decision-making MCS use works as a facilitator (Hickson 1986) by providing information support systems to make decisions. Top managers involved in a new venture or an entrepreneurial action should be associated with more frequent strategic decision-making and more changes. Thus, they need a considerable amount of information from the MCS to support their decision-making processes. Eisenhardt (1989) says that fast decision makers use more information and develop more alternatives than slow decision makers (Eisenhardt 1989).

Hence the following hypotheses are suggested:

H3: Interactive use of MCS exerts a positive influence on LO

H4: Interactive use of MCS exerts a positive influence on EO

Relationships between Capabilities (LO & EO) and Performance

It is argued that firms with greater capabilities (valuable, hard to duplicate, etc.) are able to develop a competitive advantage (Widener 2007), achieving higher levels of performance (Danneels 2002; Hurley & Hult 1998). Some studies provide evidence showing that both, LO & EO, contribute positively to performance (C. Lee et al. 2001; Hult & Ketchen 2001; Naman & Slevin 1993; Narver & Slater 1990; Spanos & Lioukas 2001).

LO – Performance*:* The literature argues that organizational learning is critical to maintaining competitive advantage and is associated with improved performance (Levitt & March 1988; Slater & Narver 1995), and some authors believe that learning is the only way to compete in the long-term (Hult 1998; Slater & Narver 1995; Widener 2007). Tippins and Sohi (2003) have investigated information technologies competencies and found that firm performance results are better in the presence of organizational learning capability (Tippins & Sohi 2003).

EO – Performance*:* From the standpoint of the RBV, entrepreneurial orientation can be identified as a high-level organizational routine, durable and difficult to imitate or transfer (Gómez-Villanueva et al. 2010), an intangible ability of the company's strategic position, difficult to replicate and related to superior results. Studies suggest that EO enhances the relationship of MCS and performance, when used to discover and exploit opportunities (Wiklund & Shepherd 2003). Literature on entrepreneurship emphasizes the importance of EO as a determinant of business performance (Ripollés & Blesa 2005) and empirical studies have proposed that MCS are associated with the superior performance of companies who have an entrepreneurial orientation, unlike those with more conservative strategies, and furthermore, performance was associated with entrepreneurial firms where MCS is used extensively (Chenhall & Morris 1995).

In summary, and from the standpoint of innovation, good performance or superior customer value, is achieved through LO and EO; i.e., incremental innovations caused by the knowledge obtained in LO and radical innovation as a result of the EO that favors the development of new designs and technology applications (Atuahene-Gima 1996; Atuahene-Gima & Ko 2001; Li et al. 2009; Wiklund & Shepherd 2003). Hence, the following hypotheses are consequently suggested:

H5: There is a positive relationship between learning orientation capability and performance

H6: There is a positive relationship between entrepreneurial orientation capability and performance

Relationships between MCS & Performance

Based on the facts of prior research, there is evidence of a link between MCS and different levels of performance, such as manufacturing performance, quality performance, and customer performance (CHOW et al. 1991; Selto et al. 1995; Sim & Killough 1998). Using a fit notion within the context of the organization, some works have examined the relationship between MCS and performance and have found a significant and positive relationship (Govindarajan 1988; Govindarajan & Fisher 1990). Also, the research line of MCS design and performance has supported this positive relationship (Baines & Langfield Smith 2003; Davila 2000; Scott & Tiessen 1999). It is noteworthy that although Koufteros et al. (2014) argue that there is a gap in the literature on how the specific uses of MCS use affect performance (p. 315), and refer to their business importance of exploring this effect, mainly to alloting resources and maximizing returns, their study does not make a hypothesis in regards to a direct relationship between MCS and performance, as we do.

Continuing with the review of the literature, in the middle we can see studies with empirical evidence supporting the MCS-performance relationship. For example, Abernethy & Brownell (1997), who examined the role of accounting and non-accounting controls, found that personal control forms (similar to those of interactive use) have a more positive effect on performance than the accounting forms (comparable to those of diagnostic use); in other words, behavior controls, in which the involvement of managers is necessary, are significantly more effective than accounting controls, thus showing that interactive controls have a positive relationship, whereas diagnostic controls could have a negative or no relationship at all.

Finally, there are studies that cast doubt over the existence of the relationship between MCS and performance at the organizational level (Bisbe & Otley 2004). Others such as Henri (2006a) who provides a theoretical explanation does not propose hypotheses about this relationship, arguing that from the RBV view, MCS can not be a source of competitive advantage for two reasons: firstly, it does not generate sustainable incomes directly and readily so that they can be transferred; therefore, the MCS may not directly contribute to performance (Henri 2006a). On the other hand, he also argues that the accounting and systems literature emphasizes that "how this system is used" impacts the organizations performance.

Overall, both -accounting and MCS extant literature research- provide inconsistent findings regarding the relationship between MCS and performance and have pointed to the different styles of use (Simons 1987; Simons 1990; Simons 1995; Simons 2000) or the different roles (Chapman 1997; Chapman 1998) as explanations for these apparently inconsistent studies. On emphasizing the relevance of attributes related to use, Simons levers of control framework provides insights that help understand the apparent inconsistencies mentioned.

Because we find mixed results in the existing literature regarding the direct relationship between MCS and performance, it is evident the need for further studies to distinguish the potential of the various roles that an MCS can play. Since neither the theoretical development nor previous evidence gives us strong arguments for or against a potential direct effect, our conceptual framework contemplates the possibility that the use of both diagnostic and interactive MCS might directly influence performance. However, according to prior studies that hold the existence of a relationship via capabilities (Koufteros et al. 2014), this direct effect is expected to be relatively small, and a large proportion of the potential relationship between MCS use and performance is expected to come indirectly through capabilities rather than through a direct effect. Therefore, specific

hypotheses supporting a direct relationship between MCS use and performance have been formulated.

H7: There is a positive relationship between MCS diagnostic use and organizational performance

H8: There is a positive relationship between MCS Interactive use and organizational performance

MCS – Indirect Performance Effect

While hypotheses H7 and H8 predict a direct effect of MCS uses on performance, an indirect effect may also occur through the mediated effect of LO & EO capabilities. In other words, we propose that EO and LO have a mediating effect on the MCS-Performance relationship, which will also be analyzed in this study, and should be reflected upon completion of the hypotheses described above.

To prove the above assertion will require a series of steps: First, the effect that exists in a model that includes only three constructs should be assessed: the diagnostic use, the interactive use and performance, in the hope that present relationships are significant. Second, the LO & EO constructs will be included in a stepwise model, and the results and their implications will be observed individually. Finally, the relationships will be discussed in the full model which includes the five constructs: diagnostic use, Interactive use, LO, EO and performance. This analysis will be first done for the whole sample; subsequently, a second analysis will be done for a company size sub-groups in an effort to reinforce the results and to study the differences between companies.

This indirect effect on performance of the uses of Interactive and Diagnostic MCS, acting through EO & LO capabilities could be proposed according to the following explanation: The mediating effect of LO & EO capabilities can show a full, partial or null relationship between the observed uses of MCS (Interactive and diagnostic) and performance. In other words, besides the direct impact, there should be a part of the relationship between the MCS uses (Interactive and Diagnostic) and performance, explained by an indirect effect of the LO & EO capabilities which in return impacts performance.

This can be formally expressed as:

a) If H1 and H5 are met, there will be a mediating effect of LO between the use of Diagnostic MCS and Performance.
b) If H3 and H5 are met, there will be a mediating effect of LO between the use of Interactive MCS and Performance.
c) If H2 and H6 are met, there will be a mediating effect of EO between the use of Diagnostic MCS and Performance.
d) If H4 and H6 are met, there will be a mediating effect of EO between the use of Interactive MCS and Performance

3.5 Methodology

3.5.1 Stages, data collection, descriptive statistics and variable measurement

Data- Information Sources & Collection

Data were collected from primary sources in the form of structured surveys from business managers in the fields of manufacturing, trade, banking and services of 4750 Mexican firms in Mexico City, listed in the Mexican DENUE 2012 INEGI database. We collected information over the course of eight weeks using online systems (323 surveys received, 50.2%) and offline systemes (face-to-face) (321 surveys received, 49.8%), giving a total of 644 received questionnaires (response rate of 13.56% of the sample). The invitation to participate consisted in an initial personalized email letter. In order to increase the

response rate, we sent two follow-up reminding emails, and a final reminder to non-respondents (Dillman 2000).

Questionnaire

The hypotheses were tested with data collected through a questionnaire survey (Appendix B shows the questionnaire items), which was designed following the steps suggested by the literature (Archer 2003; Dillman 2000):

1) Select in the literature of strategy and management control systems the constructs that measure the variables and prepare a first draft of the questionnaire; 2) This draft is contrasted with the interviews done to members of the target population; 3) Make adaptations based on the comments received; 4) Choose an attractive format, good quality WEB and printout form.

Non-response bias

To check for potential non-response bias, offline respondents were used as proxies for non-response across five measures. Using a comparison of the means, no significant differences ($p < 0.01$) were found between the firm's age, size, system amplitude used, respondents' formal education and management experience of online and offline respondent firms (non-respondent), suggesting the absence of any obvious non-response bias in this sample (Appendix C shows the Non-Response bias analysis).

Common method variance

The Harman´s one-factor test, was employed to ensure the absence of the potential undesirable effects of common method variance (CMV) (Podsakoff et al. 2003), caused by single-source bias. This test has yielded 7 factors with eigenvalues greater than one, with the first factor explaining only 19.04% of the variance, indicating that no single factor was dominant. In general, this test indicated the absence of common method effects in our data, suggesting that CMV due to single-source biases was not an issue in our study (See Appendix C. Non response bias & common method variance (CMV) analysis). Past studies (Bisbe & Otley, 2004; Bisbe & Malagueño 2009, 2015) show that charge percentages in a single load factor below 22% are typically accepted.

Descriptive statistics

We received 644 questionnaires and obtained a response rate of 13.56%. This range is similar to the 12–25% range reported in recent studies, such as 22.5% (Hall 2008); 24% (Henri 2006a); 42% (Naranjo-Gil & Hartmann 2007a); 12% (McKelvie & Davidsson 2009); 15.6% (Wiklund & Shepherd 2003). The distribution of the response sample is as follows: 296 (46%) are large companies with an average of 4,257 employees and 44 years of age; 191 (29.7%) medium-sized firms with an average of 158 employees and 24 years of age; and 157 (24.4%) are small businesses with an average of 32 employees and 11 years of age. The respondents' positions are 79 CEOs (12.3%); 109 division directors (16.9%); 111 department directors (17.2%); and 345 managers (53.6%). Firms are distributed in four sectors: 407 in services (63.2%); 105 in manufacturing (16.3%); 81 in banking (12.6%); and 51 in trading (7.9%).

Variable measurement

Lastly, the validation variables used to test robustness of the model are measured as follows. Variables (table 3.1) were measured using previously validated scales. All questions were asked using a five-point Likert scale. The scales are shown in Appendix B. Survey instrument.

MCS uses

MCS uses are measured using a version of the Vandenbosch (1999) system with four dimensions: Monitoring; Focusing Attention; Legitimizing decisions and Solving problems. Some of these uses were adapted by Henri (2006b), leaving aside the dimension of solving problems, and adding a dimension to measure the Strategic Decision-Making with seven elements given by Brockman & Simmonds (1997). Henri (2006a) chooses those items because they are the most generic (referring to strategic decision making in general) while the others refer to specific strategic decisions (venturing, new regulations, etc.). Anchors for the scale of MCS uses were ``1= never used, 2= rarely used, 3 = sometimes used, 4 = often used, 5 = always used". A factor score is calculated for each of the four uses based on all the items to check construct validity.

Table 3.1: Variable Measurement

Construct	Source	Dependent & independent variables
MCS uses Diagnostic & Interactive	27-item scale, adapted by Henri (2006a) from Vandenbosch (1999)	**Independent:** Monitoring; focusing attention; strategic decision-making; legitimizing
Learning Orient.	4-item scale proposed by (Hult 1998)	**Dependent** One dimension Scale (LO)
Entrepreneurial Orient.	14-item scale by Lumpkin et al. (2009)	**Dependent** Five dimensions Scale (EO)
Performance	6-item scale by Jaworski & Kohli (1996); Kohli & Jaworski, (1993) adapted by Gómez-Villanueva (2008)	**Dependent** Six dimensions Scale (Pf)
Control variables	System amplitude, firm size (10-50 small; 51-250 medium; >250 Large), firm age, industry	

Based on the theoretical approach of this paper, the 4 dimensions of MCS uses will be used to create two 2nd-order constructs called Diagnostic use and Interactive use respectively, according to the proposals made by Simons (1990, 1995, 2000) and Vandenbosch (1999). This procedure will be explained below.

Capabilities

The capabilities section asks the respondents the extent to which each item describes their organization where: 1 = does not describe and 5 = fully described. This part was assessed using the two validated scales. Learning Orientation (LO) was measured using a previously validated and adapted version (Henri 2006a) of the four-item scale to capture learning (Hult 1998). This scale is intended to measure a learning orientation in the overall of the company; thus it is more general than the 13-item scale of (Sinkula et al. 1997). A factor score is calculated with the four items to check construct validity. To measure Entrepreneurial Orientation (EO) we used the scale proposed by Lumpkin et al. (2009). This scale is an upgraded version of the three-dimension scale of proactiveness, innovation, and risk aversion (Covin & Slevin 1989). Two more dimensions were added: autonomy with four items, and competitive aggressiveness with one more item, summing up a total of 5 dimensions: innovativeness, risk taking, proactiveness, autonomy, and competitive aggressiveness (Lumpkin et al. 2009). A factor score is calculated with the fourteen items to check construct validity.

Performance

In this study, organizational performance is modeled as a result of strategic capabilities and MCS, allowing us to explore the processes by which organizational outcomes are improved. As several authors argue (Dess & Robinson 1984; Venkatraman & Ramanujam 1987), in terms of consistently providing valid and reliable performance assessment, neither objective nor

subjective measures are superior. Following upon prior studies (Swieringa & Moncur 1972; Milani 1975; Hayes 1977; Kenis 1979; Merchant 1981), this study chooses to use self-ratings of performance measures since we have small businesses in the sample. It has been shown that it is quite common for owners/entrepreneurs to refuse to provide objective measures of performance to researchers. Therefore, it is better to ask for perceived performance (Sapienza et al. 1988).

The instrument used is a self- rated measure of performance, commonly used in management accounting research. It measures performance on six dimensions: return on investment (ROI), profit, sales growth, customer satisfaction, employee satisfaction, and overall performance (Kohli & Jaworski 1993; Jaworski & Kohli 1996; Kirca et al. 2005) adapted by Gómez-Villanueva (2008). The respondents were asked to indicate their organization's performance over the past 12 months against the expectations or goals set at the beginning of the year, using a scale of 1 to 5, (where 1=Very poor performance, 2= Low performance, 3=Goals were reached, 4=Above goals, and 5=Outstanding performance above targets). Descriptive statistics of the constructs and correlation matrix are presented in Appendix D. Descriptive stats, correlations: Part 2: MCS uses, LO, EO, Performance (ch.III).

Control variables

There is little evidence of the effect of control variables on the relationship of the MCS - Business capabilities and Results. Several studies used different factors related to the company, such as the industry effect of whether they belonged to the manufacturing or service sectors (Avlonitis & Gounaris 1997; Gray & Hooley 2002), or the size of firms (Narver & Slater 1990; Pelham 2000; C. Lee et al. 2001; Santos et al. 2002). Kirca et al. (2005) meta-analysis mainly emphasizes the size of the company, the dynamism of the environment, and the generic strategy of the organization (Kirca et al. 2005) as the more widely used control variables.

Size has been measured in several ways including profits, sales volume, assets, and employees. The use of financial measures can make comparisons between organizations difficult as different accounting treatments can be found across firms (Chenhall 2003). Most MCS studies have defined and measured size relating it to the number of employees. Contingency theories of organizations (Burns & Stalker 1961; Lawrence & Lorsch 1967) suggest that size may affect the way organizations design and use management systems (Wiklund & Shepherd 2003). As firm size increased, this enabled firms to improve efficiency, providing with the resources to expand into global operations, sometimes in the way of mergers, take-overs, licensing, or other collaborative arrangements, and internally with opportunities for specialization and work division. However, all this comes at a cost of accounting and control processes that tend to become more specialized and sophisticated; also, the need for the flow of effective communication becomes more apparent. Merchant (1981) claims that organizational growth poses increased communication and control problems (Merchant 1981). As a consequence, managers of large firms need to handle a greater deal of information and measurement issues (Kaplan & Atkinson 1998), and with this, the implementation of controls such as rules, documentation, roles, functions, and extended hierarchical structures (Child & Mansfield 1972). Khandwalla (1977) and Merchant (1981) found that large firms were more diversified and divisionalized, employed more formal communication, and made greater use of sophisticated controls (Khandwalla 1977; Merchant 1981). On the other hand, small enterprises frequently do not elaborate performance evaluation techniques, as the strategy setters are close to the action (Hoque & James 2000). In line with the above arguments, Bruns and Waterhouse (1975) identified two forms of control associated

with size: administrative with large firms and personal with small firms (Bruns & Waterhouse 1975).

The role of MCS in smaller or medium-sized entities has received little attention in the MCS literature (Reid & J. A. Smith 2000), and few MCS studies have explicitly considered size as a contextual variable (Merchant 1981; Kaplan & Atkinson 1998). Almost all studies have examined relatively large organizations, usually justifying this by arguing that large firms tend to have incorporated formal MCS´s and are more likely to benefit from the use of MCS than are smaller firms (OConnor et al. 2011). Narver & Slater (1990) hypothesize a positive relation between a business's relative size advantage and its profitability (Narver & Slater 1990).

Finally, in the literature there is no evidence of empirical studies that analyze the potential industry impact on the different applications that are given to the MCS. In our study, industry effects were captured by dummy variables for the firm's main line of business (Manufacturing, Trade, Services and Banking).

Our study is controlled by the following variables: firm size, industry to which it belongs, understanding of the system used, and firm age (years of foundation). Since the size of a firm has been shown to affect the way in which control systems are utilized (Bruns & Waterhouse 1975; Merchant 1981), in our study, the classification used to categorize firms size is determined according to the number of workers, as is done in previous research (C. Lee et al. 2001; Santos et al. 2002) and converted into a binary variable. Additionally, the sample for this study was split based on the size to create three subsamples of firms: Small (10-50), medium-sized (51–250), and large firms (250 >) as was published on the Official Journal of the Mexican Federation (2009). The industry variable was recoded to four categories to give it a higher level of identification. Comprehensive/Amplitude MCS was measured by an adapted version of the "Comprehensive MCS forced-choice instrument" (Hall 2008), in which the respondents are invited to indicate with an "X", which of the following two options represent more the Management Control Systems in their company: Comprehensive or Partial (See Appendix B: Survey instrument). Some variables had a flipped scale (reverse-scored), (†EO4 †EO13 †EO14)†.

3.5.2 Second order constructs: Diagnostic & Interactive Uses

It is important to note that our predictions linking the four MCS uses (monitoring, legitimizing, attention focusing and strategic decision-making) proposed by Vandenbosch (1999) with capabilities and performance are not capabilities causal in isolation; instead they are predicted to be elements that collectively contribute to the development of latent and intangible constructs (Joreskog & Sorbom 1993). These constructs are named Diagnostic use and Interactive use respectively. A construct is a conceptual term used to describe a phenomenon of theoretical interest (Edwards & Bagozzi 2000; Bisbe et al. 2007).

Since conceptual specification of constructs is the process by which imprecise notions are made more specific and precise, it involves considering at least two issues: i) to define the exact meaning of a construct and ii) determining the nature and direction of the relationships between a construct and its indicators (Bisbe et al. 2007). We argue, according to the arguments offered by Simons (1990, 1995, 2000) and Vandenbosch (1999), that the four uses (latent exogenous variables: Monitoring, Legitimization, Attention Focusing, and Strategic Decision-Making) proposed by Vandenbosch (1999) can be grouped in two second-order-constructs named Diagnostic and Interactive uses (Latent variables endogenous) (Simons, 1990, 1995, 2000). While other indicators can be related, the presence of these four is due to their deep roots in past research and use (Henri

2006a; Vandenbosch 1999). Koufteros et al. (2014) propose a different arrangement of these applications where monitoring, legitimizing and atttention focusing charge on the second order diagnostic construct. Nevertheless, the seminal literature proposed by Simons (1990, 1995) and Vandenbosch (1999) does not support this whole approach. However, it is noteworthy that the 2nd order construct proposed here still has not been proven systematically in the literature, yet. Specifically, the scale for Diagnostic use is a second order factor measured by two first order factors: Monitoring (4 reflective indicators) and Legitimizing (9 reflective indicators). In other words, "Monitoring and Legitimizing" uses are positive first-order indicators or latent exogenous variables of the higher-order factor of "Diagnostic use". In the same way, the scale for Interactive use is a second order factor measured by two first-order factors or latent variables, Attention focusing (5 reflective indicators) and Strategic Decision-making (7 reflective indicators). Theses uses are positive first-order indicators or latent endogenous variables of the higher-order factor of "Interactive use".

The first step is to perform an exploratory factor analysis (EFA) for each of the two constructs: the diagnostic, which includes items related to monitoring and legitimizing; and the Interactive, which includes items related to attention focusing and strategic decision making. The EFA results across all ítems of the four MCS uses (Monitoring, Legitimizing & Attention focusing-Strategic Decisión- making) show two factors in general (diagnostic and interactive) and two factors in each EFA (Monitoring and Legitimizing in Diagnostic, and Attention focusing-Strategic Decisión- making in Interactive), indicated that the different scales were one-dimensional and that every construct showed acceptable results. We examined the KMO (0.935 for diagnostic & 0.910 for interactive) and the Cronbach Alpha reliability coefficient showing values above 0.90 (Nunnally et al. 1967). Results of 0.930 for diagnostic & 0.908 for interactive confirm our expectations (see Appendix J. Chapter III: EFA for Diagnostic and Interactive uses (Second order factor analysis), and Appendix N: Chapter IV Second Order constructs).

The second step is to confirm the existence of multidimensionality through a confirmatory factor analysis using structural equations. In order to confirm this, in the 2nd order constructs for Diagnostic & interactive uses, a rival model strategy was developed (Anderson and Gerbing, 1988; Hair et al., 2006). Therefore, we compared the second order models in which various dimensions measured the multidimensional construct under consideration with a first order model in which all items weighed on a single factor (Steenkamp and Van Trijp, 1991). The results showed that the second-order model had a much better fit than the first-order model. These results led us to conclude that the variables "Diagnostic use" & "Interactive use" showed a multidimensional nature. The next table (3.2) shows the results of the analysis of the second-order model for Diagnostic and Interactive uses. The loadings of the measurement ítems of the first-order factors (Monitoring-legitimizing & Attention focusing-Strategic Decision-making) on the second-order factors, named diagnostic & Interactive uses respectively, were all significant ($p<0.001$). Furthermore, the goodness of fit índices exceed the requirements. The second-order CFA was estimated by summarizing in single factors the indicators of the Diagnostic (Monitoring-legitimizing) and Interactive (Attention focusing-Strategic Decision-making) uses through the analysis of structural equations (Using SPSS AMOS 21.0 for Windows).

The Goodness-of-fit index (GFI) measures how much the actual input matrix is predicted by the estimated model. Usually, values above 0.80 indicate reasonable model fit (Browne et al. 1993). The GFIs of our second-order models were 0 .931 &

0.938 respectively. The CFI assesses which two or more competing models provide better fit to the data. Values above .90 indicate good fit (Bentler 1990). The CFIs of our second-order models were 0.956 & 0.952. RMSEA is an index of absolute fit that takes into account the error of approximation in the population; usually, values equal to or less than 0.08 are considered a fair fit (Bagozzi & Yi 1988). The RMSEAs of our second-order models were 0.78 & 0.089.

Table 3.2: Analysis of multidimensionality in the second-order factors

	Indicators	Chi*2	Chi*2 norm	Significance	GFI	CFI	RMSEA
Diagnostic Use	First order model	358.394	6.074	0.000	0.918	0.946	0.089
	Second order model	308.866	4.903	0.000	0.931	0.956	0.078
Interactive use	First order model	637.79	18.223	0.000	0.806	0.833	0.164
	Second order model	207.183	6.094	0.000	0.938	0.952	0.089

3.5.3 Construct Validity and Reliability

Several procedures and tests were conducted to establish the validity and reliability of the scales used in our model: content & face validity, tests of convergence and discriminant validity using factor analysis (EFA & CFA), and finally some data test of normality. Based on the tests, all constructs reflect strong validity and reliability (see Appendix E & Appendix F).

Construct validity

Content & face validity of the questionnaire

To establish content validity, the scales used in this study were founded on the review of the most relevant literature to guarantee the content validity of the measurement instrument. To provide face validity, we pre-tested the questionnaire in three steps for clarity, complexity, ambiguity, and face validity: i) Five academic business professors in planning/financial/accounting were asked to revise and complete the questionnaire to provide comments on its form and content; ii) Five top managers (planning/financial/accounting officers) were interviewed and asked to complete the questionnaire; iii) The questionnaire was answered by a group of MBA students. Some minor adjustments were made in terms of wording and presentation following recommendations of such groups.

Convergent and discriminant validity

To ensure convergent and discriminant validity we conducted two empirical tests: 1) Correlation matrices of all items related to MCS uses, capabilities and performance; and 2) Exploratory and Confirmatory factor analysis across all constructs:

1) The correlation matrices between constructs of MCS uses (Monitoring, Legitimizing, Attention Focusing and Strategic decision making), capabilities (LO & EO) and performance show positive and significant correlation coefficients at the 0.01 signification level. Knowing that convergent correlations should always be higher than the discriminant ones, the correlation matrix provides evidence for both convergent and discriminant validity (see Appendix F. Convergent-discriminant validity. Part 1: Correlation MCS uses, capabilities, performance, PEU).

2) The exploratory factor analysis (EFA) across all questions (management control uses, capabilities and performance) to test convergence and discriminant validity indicated that the different scales were one-dimensional and that every construct exhibited acceptable results. To establish the reliability of each construct, we examined the Cronbach Alpha and composite

reliability. The constructs must exceed the recommended cut-off point of 0.70 to reflect an acceptable level (Fornell & Larcker 1981; Nunnally et al. 1967). Cronbach's Alpha reliability coefficient results show values of above 0.873 for the overall sample and above 0.808 for the multi-group analysis, confirming previous results (Nunnally et al. 1967) (see Table 3.3 and Appendix F. Convergent-discriminant validity. Part 3: EFA: MCS uses – LO & EO – Performance (Ch.III)).

To verify convergent validity, we use the confirmatory factor analysis (CFA). We have performed first-order CFA for seven constructs (e.g., MCS uses –Monitoring, Legitimizing, Attention Focusing and Strategic decision making-, capabilities -LO & EO- and performance). The variance extracted must exceed the recommended cut-off point of 0.50 (Hair et al. 2006) to adequately reflect convergent validity (Fornell and Larcker, 1981). In addition, these three elements were examined for the CFA: a) the significance of the factor loading and the R^2 for each item, b) the overall acceptability of the measurement model using chi-square statistics, and c) three fit indices [30]: GFI, CFI and RMSEA. These indices are among the most frequently reported. The results for the second-order constructs (diag. / inter.) are (i) GFI (0.931/0.938); CFI (0.956/0.952); RMSEA (0.078/0.089). Table 3.2 shows the CFA results for each construct.

Reliability

Internal consistency reliability means how well the items, that reflect the same construct, yield similar results. i.e., we are looking at how consistent the results are, for different items for the same construct within the measure. There is a wide variety of internal consistency measures that can be used. We use the "Average Interitem Total Correlation" and focus on the various uses of MCS. This approach uses all of the items in our instrument that are designed to measure the same construct. We first compute the correlation between each pair of items. The average interitem correlation is the average or mean of all these correlations in each construct, and we also compute an average score for the items in each use (Mavg, Favg, Davg, Lavg) and use it as a variable in the correlation analysis. Then, we calculate an average of this correlation. The results in each use show an average of 0.806 significance at 99% level, ranging from 0.766 to 0.853 in this sample, remaining at a very acceptable level for this analysis (see Appendix E Reliability. Part 1: Average Inter.itemTotal Correlation).

Normality

Finally, to verify the hypothesis of normality, necessary for the result of reliable analysis, two tests were performed (Kolmogorov-Smirnov; Shapiro–Wilk), supporting the normality of all constructs (see Appendix E . Reliability. Part 2: Test of normality).

3.5.4 Analysis Models

Structural equation modeling (SEM)

This study specifically responds to calls (Ahrens & Chapman 2007; Henri 2006a; Henri & Journeault 2010) for quantitative research that provides insights into different uses of MCS and their interrelations with other constructs. Studies that have examined the relationship between MCS and performance have mainly done it in two ways: by introducing variables, such as

[30] GFI: Goodness of fit index, (Joreskog & Sorbom 1984)), GFI value is less than or equal to 1, a value of 1 indicates a perfect fit;
CFI: comparative-fit index, (Bentler 1990; Hu & Bentler 1995), fall in the range from 0 to 1, values close to 1 indicate a very good fit.
RMSEA:root mean square error of approximation, (Browne et al. 1993), practical experience show that a value of the RMSEA of about .05 or less would indicate a close fit of the model in relation to the degrees of freedom.
The threshold values recommended are (i) GFI > 0.90 , (ii) CFI > 0.9 , and (iii) RMSEA < 0.08.

environmental uncertainty or technology to mediate this relationship and by building structural models that help explain how some constructs affect the outcomes (Chenhall 2005). This study uses Structural Equation Modeling (SEM)[31] to test the relationship between the MCS uses – Organizational Capabilities – Performance. In addition to testing individual path coefficients, SEM will provide us with an evaluation of the entire model; thus, the anaylsis focuses on a macro-level perspective (Kline 1998) rather than on its parts. SEM assumes multivariate normality, which is usually identified through univariate analysis (Kline 1998). A review of the data shows that all measures were within tolerable limits of skewness and kurtosis, and no outliers were identified.

Also, we find that it is appropriate to make distincitions regarding firm size. The procedure followed proposes dividing the sample of companies into three groups according to the number of employees: small (10-50), medium-sized (51–250), and large firms (250 >). In order to be able to analyze the model proposed, a multi-group structural equation model is used, taking into consideration one of the dominant focal points for analyzing the multi-group data, the measurement invariance (Hair et al. 2006). We conduct the tests for the global sample (644 firms) as well as for each sub-group (157 small, 191 medium, 296 large firms) . Statistical analysis was performed using SPSS (V.21.0) software, and a structural equation modeling software program SPSS-AMOS (V.21.0) was used to estimate the structural equation model depicted in Figure 3.2. As suggested by Kline (1998), a SEM model is analyzed and interpreted in two stages (Kline 1998): The first stage estimates the measurement model while the second estimates the structural model. The estimation method used was that of maximum likelihood (Blentler & Chou 1987). The data analysis follows two steps. First, structural equation modeling (SEM) is used to test the model. Second, still using SEM, multi-group analyses are conducted to assess the influence of the size factor on the model. As aforementioned, by splitting the sample, three sub-samples are created and compared.

Measurement model

The first step is to perform a CFA for all the constructs in the model employing the SEM technique, with the aim of assessing the measurement reliability and validity. The first analysis showed that to be better adjusted (some items show inadequate R2, <0.7, or variance extracted <0.50) it was necessary to refine the scales. In other words, the model had to be respecified. According to Joreskog and Soroborn (1993) and following their recommendations, respecifications were necessary for the following constructs: Three items from Attention Focusing (F1, F6 and F7), and one item from Strategic decision making (D1). In regards to capabilities, it was necessary to eliminate one item from Learning Orientation (L03). Finally, regarding performance, two items were deleted (P4_SC and P5_SW). From a total of 51 items, 7 were eliminated. After those re-specifications, all constructs exceeded the recommended cut-off point for the Cronbach Alpha, composite reliability and variance extracted, exhibited acceptable model fit, reflected adequate R2, all factor loadings were statistically significant ($p < 0.01$) and complied with the recommendation regarding at least three indicators to be used per latent construct (Landis et al. 2000). Results of the final confirmatory factor analysis for the entire sample and for the sub group analysis are reported in Table 3.3. All comparisons between the variances extracted and the squared correlations support the discriminant validity of

[31] Structural modeling approach are appropriate when the theory sets out to explain the role of variables that intervene in the studied relationship (Luft & Shields 2003). SEM, have been employed in order to build latent variables from multi-item questionnaires and thereby to identify, simultaneously, statistical significance with multiple dependent variables (S. W. Anderson & Young 1999; Shields et al. 2000). This approach assumed contextual factors as noise within the models and does not consider how the results might be modified by these contextual factors (Chenhall 2005). Also this methodology allows researchers to be able to incorporate the influence of various factors under the theory that support it unfolds.

the constructs. These results suggest that our re-specified measurement model provides a good fit to the data on the basis of a number of fit statistics.

Table 3.3: Internal consistency and convergent validity

		Overall Sample				Small size				Medium size				Large size			
Variable	**Indicator**	Factor Loading	α	CR	AVE	Factor Loading	α	CR	AVE	Factor Loading	α	CR	AVE	Factor Loading	α	CR	AVE
Monitoring	M1	0.829	0.87	0.88	0.64	0.845	0.89	0.90	0.68	0.810	0.853	0.857	0.601	0.827	0.87	0.87	0.63
	M2	0.866				0.897				0.849				0.848			
	M3	0.884				0.876				0.880				0.890			
	M4	0.832				0.870				0.806				0.818			
Legitimizing	L1	0.769	0.93	0.93	0.61	0.823	0.94	0.94	0.62	0.724	0.912	0.913	0.539	0.761	0.94	0.94	0.64
	L2	0.760				0.753				0.753				0.768			
	L3	0.786				0.782				0.722				0.820			
	L4	0.811				0.808				0.731				0.852			
	L5	0.809				0.840				0.733				0.829			
	L6	0.816				0.824				0.839				0.802			
	L7	0.791				0.764				0.798				0.807			
	L8	0.856				0.838				0.835				0.881			
	L9	0.851				0.885				0.760				0.874			
Att. Focus	F2	0.777	0.88	0.85	0.59	0.819	0.88	0.85	0.59	0.720	0.866	0.829	0.551	0.787	0.90	0.86	0.61
	F3	0.742				0.771				0.660				0.773			
	F4	0.796				0.754				0.811				0.816			
	F5	0.822				0.810				0.817				0.836			
St. Mgmnt. Dec.	D2	0.812	0.91	0.90	0.60	0.812	0.91	0.89	0.58	0.812	0.906	0.898	0.595	0.812	0.91	0.91	0.62
	D3	0.842				0.842				0.842				0.842			
	D4	0.804				0.804				0.804				0.804			
	D5	0.821				0.821				0.821				0.821			
	D6	0.782				0.782				0.782				0.782			
	D7	0.799				0.799				0.799				0.799			
Diagnostic 2º order	Monitoring	0.684	0.930	0.76	0.62	0.675	0.93	0.71	0.55	0.671	0.913	0.743	0.595	0.790	0.939	0.81	0.68
	Legitimizing	0.882				0.801				0.860				0.863			
Interactive 2º order	Focusing	0.896	0.927	0.82	0.69	0.930	0.922	0.83	0.71	0.779	0.916	0.779	0.638	0.857	0.937	0.85	0.74
	Desicion	0.759				0.743				0.818				0.859			
LO	LO1	0.862	0.83	0.81	0.58	0.880	0.81	0.84	0.64	0.871	0.818	0.838	0.638	0.848	0.84	0.82	0.60
	LO2	0.850				0.860				0.884				0.825			
	LO4	0.797				0.769				0.759				0.829			
EO	EO1	0.880	0.97	0.96	0.65	0.886	0.97	0.96	0.66	0.901	0.967	0.968	0.682	0.865	0.97	0.97	0.68
	EO2	0.845				0.847				0.862				0.833			
	EO3	0.870				0.873				0.882				0.861			
	EO4r	0.779				0.771				0.783				0.781			
	EO5	0.846				0.832				0.852				0.850			
	EO6	0.832				0.846				0.840				0.821			
	EO7	0.846				0.815				0.864				0.848			
	EO8	0.854				0.849				0.860				0.855			
	EO9	0.815				0.812				0.766				0.851			
	EO10	0.833				0.852				0.818				0.835			
	EO11	0.847				0.848				0.822				0.866			
	EO12	0.838				0.832				0.807				0.866			
	EO13r	0.814				0.774				0.842				0.814			
	EO14r	0.797				0.750				0.845				0.785			
Performance	P1_S	0.818	0.88	0.87	0.62	0.822	0.86	0.86	0.62	0.800	0.891	0.888	0.665	0.826	0.87	0.87	0.64
	P2_Bº	0.830				0.829				0.810				0.844			
	P3_R	0.834				0.803				0.868				0.831			
	P6_G	0.813				0.796				0.860				0.786			

Goodness of fit indices (Measurement models): *=p<0.01

Overall sample: $\chi2$ (888 DF) = 2363.362; $\chi2$/DF=2.661; Significance=0; GFI=0.848; CFI=0.931; RMSEA=0.051.
Small Firms: $\chi2$ (888 DF) = 1452.182; $\chi2$/DF=1.635; Significance=0; GFI=0.709; CFI=0.9; RMSEA=0.064.
Medium firms: $\chi2$ (888 DF) = 1506.778; $\chi2$/DF=1.697; Significance=0; GFI=0.743; CFI=0.901; RMSEA=0.061.
Large firms: $\chi2$ (888 DF) = 1744.444; $\chi2$/DF=1.964; Significance=0; GFI=0.79; CFI=0.917; RMSEA=0.057.
Overall sample measurement model (Multigroup Unconstrained): $\chi2$ (2664 DF) = 4704.539; $\chi2$/DF=1.766; Significance=0; GFI=0.755; CFI=0.907; RMSEA=0.035.

Reliability of the constructs, also presented in Table 3.3, demonstrates their high-internal consistency. In all cases, Cronbach's Alpha (α) exceeded the recommendation of 0.70 (Nunnally et al. 1967), also Kaiser-Meyer-Olkin measure (KMO) and

Bartlett´s test of sphericity meet desired levels. The Composite reliability (CR) also complied fully with the recommendations of at least 0.60 (Bagozzi & Yi 1988) and represented the shared variance among a set of observed variables measuring an underlying construct (Fornell & Larcker 1981). The Average Variance Extracted (AVE) calculated for each construct was used to assess the convergent validity of constructs within the SEM model. The results indicate that all AVEs are above the conventional guideline of 0.50 for adequate convergent validity (Fornell & Larcker 1981). *Convergent validity* is also verified by analysing the factor loadings and their significance. On one hand, the coefficient of all the standardized loadings were higher than 0.50 and the average of the item-to-factor loadings were higher than 0.70 (Hair et al. 2006). On the other hand all factor loadings were significant ($p<.001$) by the t test scores obtained. In conclusion, the seven scales used demonstrated high levels of reliability. Finally, as we can see, the goodness of fit indices meet the recommended levels. GFI >.80; CFI> 0.90 and RMSEA < 0.08, for both analysis conducted, one for the entire sample and one for the multi group.

The discriminant validity of the constructs in the measurement model was assessed by calculating the average variance extracted (AVE) and compared with the squared correlations between constructs. This provides a test of the extent to which a construct shares more variance with its measures than it shares with other constructs (Fornell & Larcker 1981). Table 3.4 shows that the shared variance between pairs of constructs (squared correlations), was always less than the corresponding AVE in the diagonal (Fornell & Larcker 1981). All AVE measures are greater than the respective squared correlations attesting to satisfactory discriminant validity. This is true for both the full sample and for the subgroup analysis. Moreover, and confirming the discriminant validity of this model, it is argued that existing discriminant validity is acceptable if the correlations between the variables in the confirmatory model are not much higher than 0.8 (Bagozzi 1994), situation which is perfectly fulfilled in our study.

Table 3.4 Discriminant validity

	Diagnostic	Interactive	LO	EO	Performance
	Overall Sample				
Diagnostic	0.623				
Interactive	0.500	0.689			
LO	0.373	0.359	0.584		
EO	0.251	0.259	0.241	0.652	
Performance	0.228	0.190	0.126	0.165	0.624
	Small size firms				
Diagnostic	0.549				
Interactive	0.456	0.708			
LO	0.394	0.326	0.643		
EO	0.297	0.283	0.317	0.663	
Performance	0.167	0.110	0.106	0.173	0.616
	Medium size firms				
Diagnostic	0.595				
Interactive	0.513	0.638			
LO	0.318	0.231	0.638		
EO	0.274	0.289	0.224	0.682	
Performance	0.287	0.285	0.211	0.170	0.665
	Large size firms				
Diagnostic	0.684				
Interactive	0.465	0.736			
LO	0.440	0.473	0.600		
EO	0.229	0.250	0.215	0.680	
Performance	0.230	0.187	0.110	0.158	0.636

Note: Diagonal = AVE, below the diagonal, the shared variance (squared correlations) is represented

Based on the conclusions reached with the above criteria, we believe that the scales used and the proposed model has sufficient evidence of reliability and convergent and discriminant validity. Therefore, the measurement model of this study is considered reliable and we can continue, first assuring the measurement invariance of the instrument and then with the second step related to the structural model.

Measurement invariance

With the above procedures, we can assure the validity and reliability of the scales we used; however, since our study is based on the multi-group analysis, that is not enough to ensure robust conclusions. Now we must make sure that the instrument we use does not vary with different groups of answers so that those can be compared. (Steenkamp & Baumgartner 1998). Therefore, we must assure the *measurement*

invariance of the measurement instrument (Hair et al. 2006). This is essential to obtain robust conclusions (Horn 1991).

Then, we will carry out three steps to analyze the invariance of our measuring instrument (Byrne 2013; Byrne 2004); These steps correspond to the three invariance levels the study must meet.

STEP 1: This step evaluates the loose cross-validation or single group solution. This involves making estimates for the CFA model for each of the three groups separately. A good fit is required in the three groups. The CFA fit results were good for the three groups. Table 3.5 shows a summary of these estimates, in the line of single group, individual solutions.

STEP 2: In step 2, the groups factor structure is analysed, looking to be the same in the different groups than in the complete sample. This step is known as equal form factor or structure or configurational invariance. Unlike the previous step where the groups were analyzed separately, in this case, a multi-group study is done (i.e., simultaneously for all groups). We verified that the chi-squared and the degrees of freedom (DF) in this new model were the sum of the previous ones that were estimated separately (see Table 3.5 in the line of measurement invariance: Equal Form), $\chi^{2,}$ *& DF* still remain significant; in addition, the rest of the indicators showed that it was reasonable to assume the same factorial structure in the samples (GFI=0.755; CFI=0.907; RMSEA=0.035).

STEP 3: The third step verifies the invariance of the factorial loadings (called equal factor loadings or metric invariance). This step relates to verifying that it can be assumed that in the samples of the various groups, the factor loadings linking each factor with its indicators is the same; in other words, the concepts have been measured similarly in all cases. This verification is done by comparing the chi-square in steps 2 and 3, (see Table 3.5 in the line measurement invariance "equal form" and "equal factor loadings"), verifying that the fit of the new model is not significantly worse (p= 0.24).

Table 3.5 Measurement invariance test

Model	χ2	DF	Δχ2	ΔDF	p	GFI	CFI	RMSEA
Single Group, Individual solution								
Small firms (n=157)	1452.182	888				0.709	0.900	0.064
Medium-sized firms (n=191)	1506.778	888				0.743	0.901	0.061
Large firms (n=296)	1744.444	888				0.790	0.917	0.057
Measurement invariance (n=644)								
Equal form (Multi-group)	4704.5	2664				0.755	0.907	0.035
Equal factor loadings	4811	2738	106.11	74	0.236	0.750	0.906	0.034

* (p<0.01)

The difference of the chi-squared is 106.11, but it is not significant, so we can assume that the fit of the new model is not significantly worse. Thus, we can conclude that imposing restrictions of the equality of factorial loadings does not deteriorate the fit significantly. In other words, we can affirm the factorial invariance of the measurement instrument.

MCS – Performance indirect effect

While hypotheses H7 and H8 predict a direct effect of MCS uses on performance, an indirect effect may also occur through the mediating effect of LO & EO capabilities. i.e., we propose that EO and LO have a mediating effect on the MCS-Performance relationship and that it should reflect upon completion of the hypotheses described below.

To prove the above assertion, we followed a series of steps: 1) A model that included only three constructs –diagnostic use,

interactive use, and performance- was assessed, hoping that the relationships were significantly present. 2) In a stepwise model, LO & EO were included; and the results and their implications were observed individually. Finally, a full model that included the five constructs was assessed: diagnostic, interactive, LO, EO, and performance. This analysis was performed for the whole sample and for the size of the sub-groups; this last with the aim of analyzing the differences between companies.

Thus, the indirect effect of the uses of the Interactive and Diagnostic MCS acting through the EO and LO capabilities over performance is formally expressed as:

a) If H1 and H5 are met, there will be a mediating effect of LO between the use of Diagnostic MCS and Performance.
b) If H3 and H5 are met, there will be a mediating effect of LO between the use of Interactive MCS and Performance.
c) If H2 and H6 are met, there will be a mediating effect of EO between the use of Diagnostic MCS and Performance.
d) If H4 and H6 are met, there will be a mediating effect of EO between the use of Interactive MCS and Performance.

3.6 Research findings

3.6.1 Results of the Structural Model

Table 3.6 presents the main results in terms of path coefficients, significance, goodness-of-fit indices and hypotheses results of two models of structural equations (Model 1: Overall Sample and Model 2: Multi-group Analysis).

Table 3.6: Results of the structural equation models

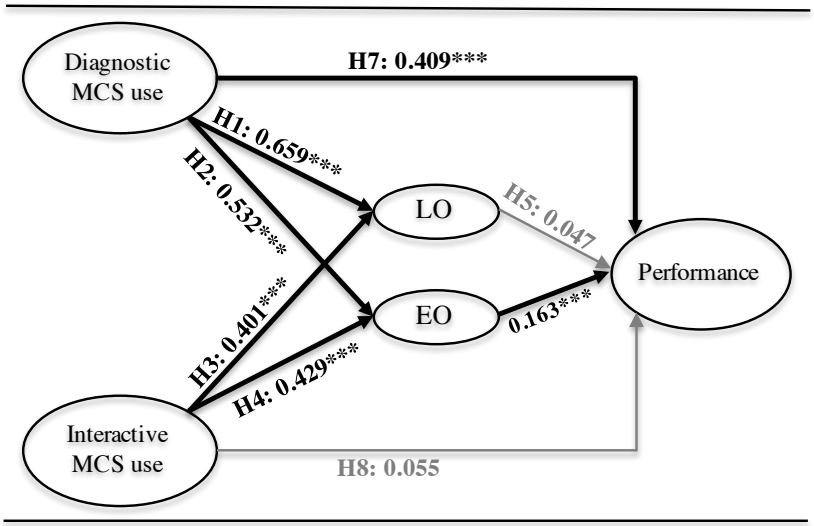
	A: Overall		**B:Multigroup analysis by firm size**					
Path descript. & expected sign	Overall sample		Small		Medium		Large	
	Path coeff.	Hyp.	Path coeff.	Hyp.	Path coeff.	Hyp.	Path coeff.	Hyp.
H1 Diagnostic use → LO (-)	0.659 ***	✗	1.443 ***	✗	1.037 ***	✗	0.391 ***	✗
H2 Diagnostic use → EO (-)	0.532 ***	✗	1.084 ***	✗	0.752 ***	✗	0.29 ***	✗
H3 Interactive use → LO (+)	0.401 ***	✓	-0.003	✗	0.239 **	✓	0.593 ***	✓
H4 Interactive use → EO (+)	0.429 ***	✓	0.008	✗	0.478 ***	✓	0.521 ***	✓
H5 LO → Performance (+)	0.047	✗	-0.066	✗	0.164 **	✓	-0.001	✗
H6 EO → Performance (+)	0.163 ***	✓	0.161 *	✓	0.105 *	✓	0.174 ***	✓
H7 Diagnostic use → Performance (+)	0.409 ***	✓	0.623 *	✓	0.414 **	✓	0.448 ***	✓
H8 Interactive use → Performance (+)	0.055	✗	-0.002	✗	0.143	✗	0.02	✗
Goodness-of-fit indices of the model								
Chi-square	3031.772		5491.5					
DF	890		2744					
$\chi 2$/DF	3.406		2.001					
GFI	0.827		0.734					
CFI	0.9		0.875					
RMSEA	0.061		0.04					
# cases	644		157		191		296	

Note 1: *significant at the 0.1 level; ** Significant at the 0.05 level; *** Significant at the 0.01 level.
Note 2: Hyp. = Hypothesis conclusion: "✓ Supported" or "✗ not supported"

Model A tests the specific hypothesis of the overall study, between the two uses of the MCS (Diagnostic and Interactive), the organizational capabilities, and performance in the whole sample. Model B presents the results of the analyses of three sub-groups, performed to validate the robustness of the theoretical model, using firm size as a splitting variable and using multi-group analyses. Both models meet the recommended threshold of limit values (Kline, 1998).

A. Overall sample. Figure 3.3 shows the main results of the relationship between the uses of MCS - capabilities - performance for the overall sample. In the line of Koufteros et al. (2014) results [32], the use of diagnostic MCS shows a significant relationship with the LO and EO capabilities but in the opposite direction (+). Those results fail to support hypotheses H1 and H2 because this impact is contrary to our predictions and to the results of prior studies that have found negative links between the diagnostic use of MCS and capabilities (Henri 2006a). We can observe positive and significant path coefficients between (i) the diagnostic use of MCS (0.659, p<0.001) and LO, and the same positive relationship with EO (0.532, p<0.001). On the other hand and consistent with previous predictions and results of studies that have found links between the use of interactive MCS and Capabilities (Henri 2006a; Koufteros et al. 2014), our results in the whole sample show a positive and significant relationship between interactive MCS use and organizational capabilities in both cases, with LO (0.401, p<0.001) and with EO (0.429, p<0.001). Therefore, H3 and H4 are fully supported.

Figure 3.3 Structural model results H1 to H8 (Overall sample)



Regarding the capabilities – performance relationship in the whole sample, only EO showed a positive and significant coefficient (0.163, p<0.001) in this relationship. Thus, H5 (LO – performance) was not supported, but H6 (EO – performance) was fully supported.

In relation to the MCS direct effect on performance, the use of diagnostic MCS reflected a positive and significant relationship in the overall model (0.409 p<0.001); therefore, H7 was fully supported. However, it was not the case for the use of interactive MCS in which such use does not reflect a significant relationship between MCS and performance. Therefore, H8 was not supported. For a complete summary of the results of the hypotheses see Table 3.7.

As we explained above, there should be a part of the relationship between MCS uses (interactive and diagnostic) and performance which was explained in part by an indirect effect, whereby interactive / diagnostic uses of MCS increase LO and EO capabilities which in turn increases performance. i.e., There is a mediating effect of capabilities (LO and EO) in the

[32] Koufteros et al. (2014) results found a significant and positive relationship between the use of diagnostic MCS and organizational capabilities.

relationship between the MCS uses and performance. In the context of the whole sample, the results show that EO capability plays a mediating effect on the relationship between both uses and performance (diagnostic use-EO, 0.532, p<0.001; interactive use–EO, 0.429, p<0.001; and EO-Performance; 0.163, p<0.001). Nevertheless, it is not the case for LO, which does not have a mediating effect between the uses of MCS and performance. See table 3.9 for a complete summary of the indirect effect of MCS on Performance.

B: Multi-group analysis by firm size

In regards to the relationships between the uses of MCS and capabilities, the use of diagnostic MCS show a positive and significant relationship with LO and EO capabilities in all cases of the multigroup analysis (small, medium, and large firms), but in the unexpected opposite direction (+). Thus, those results fail to support hypotheses H1 and H2. For the relationship of the use of MCS with capabilities (LO and EO), the subgroup analysis remains in the same positive and significant impact as the whole sample, with the exception of small businesses, where the use of interactive MCS shows no significant relevance in these relationships. Hence, H3 and H4 are partially supported.

In regards to capabilities and performance, the relationship EO-performance is present in all firms, positively and significantly (small 0.161 p<0.1, medium 0.105 p<0.1, 0.237; large 0.174 p<0.001). The LO-Performance case is positive and significant only in medium-sized businesses (0.164, p<0.05), but that is not the case for small and large firms since no significant relationship was found. In summary, LO shows almost no impact; thus, H5 is partially supported, while the EO capability is positive and significantly related to organizational performance in all firm sizes, thus, supporting H6.

In relation to the direct effect of the uses of MCS –Performance (H7 & H8), the use of **d**iagnostic MCS reflects a positive and significant direct relationship with performance in the analysis of each sub-group (0.623, p<0.1 in small; 0.414, p<0.01 in medium & 0.448, p<0.001 in large size firms); hence, H7 is fully supported. However, this is not the case for the use of interactive MCS, which does not reflect a significant relationship with performance for the analyses of all sub-groups; therefore, H8 is not supported. (For a complete overview, see Appendix L. Chapter III: Structural model results -overall sample and multi-group size analysis). Table 3.7 show a summary of the result hypotheses.

Table 3.7: Results of Hypotheses

		Overall sample	Small size	Medium size	Large size
H1:	Diagnostic use ➔ LO (-)	✗ Not supported	✗ Not supported	✗ Not supported	✗ Not supported
H2:	Diagnostic use ➔ EO (-)	✗ Not supported	✗ Not supported	✗ Not supported	✗ Not supported
H3:	Interactive use ➔ LO (+)	✓ **Supported**	✗ Not supported	✓ **Supported**	✓ **Supported**
H4:	Interactive use ➔ EO (+)	✓ **Supported**	✗ Not supported	✓ **Supported**	✓ **Supported**
H5:	LO ➔ Performance	✗ Not supported	✗ Not supported	✓ **Supported**	✗ Not supported
H6:	EO ➔ Performance	✓ **Supported**	✓ **Supported**	✓ **Supported**	✓ **Supported**
H7:	Diagnostic use ➔ Performance	✓ **Supported**	✓ **Supported**	✓ **Supported**	✓ **Supported**
H8:	Interactive use➔ Performance	✗ Not supported	✗ Not supported	✗ Not supported	✗ Not supported

In regards to the indirect effect of the uses of MCS –Performance

As previously stated, hypotheses H7 and H8 predict a direct effect of the uses of MCS on performance, but an indirect effect may also occur through the mediating effect of the LO and EO capabilities; i.e., EO and LO may have a mediating effect on the MCS-Performance relationship. Since these analyses are based on the multi-group analysis, the results presented below were also executed assuring the stability of the measurement model for each observed group (measurement invariance, see Appendix K. Chapter III: Measurement invariance test (Direct effect - Indirect Efect)). To prove this, we took 4 steps and the results were as follows:

1) The relationship between the uses of MCS and Performance was observed in isolation, both for the entire sample and for the analysis of the sub-groups by company size (see Tables 3.8 and 3.9). In the whole sample, we can see that both the diagnostic use as interactive use has a significant positive influence on organizational performance. In the case of the diagnostic use, this positive and significant relationship is maintained in all firm sizes; nonetheless, in the case of the interactive, the relationship is not significant in small businesses. In the second and third steps, each of the two organizational capabilities (EO and LO) were introduced into the model to examine whether the relationships identified in the previous step still held true.

Table 3.8: Hypotheses results: MCS – Performance (direct & indirect effect)

		Overall sample	Small size	Medium size	Large size
Direct effect					
H7:	Diagnostic use ➔ Performance	✓ **Supported**	✓ **Supported**	✓ **Supported**	✓ **Supported**
H8:	Interactive use➔ Performance	✗ Not supported	✗ Not supported	✗ Not supported	✗ Not supported
Indirect effect					
H1 + H5	Mediating effect of **LO** between Diagnostic use ➔ Performance	✗ Not supported	✗ Not supported	✓ **Supported**	✗ Not supported
H2 + H6	Mediating effect of **EO** between Diagnostic use ➔ Performance	✓ **Supported (partial)**	✓ **Supported (partial)**	✓ **Supported (partial)**	✓ **Supported (partial)**
H3 + H5	Mediating effect of **LO** between Interactive use➔ Performance	✗ Not supported	✗ Not supported	✓ **Supported**	✗ Not supported
H4 + H6	Mediating effect of **EO** between Interactive use➔ Performance	✓ **Supported (total)**	✓ **Supported (total)**	✓ **Supported (total)**	✓ **Supported (total)**

2) By introducing EO, we could observe that with the diagnostic use it maintained its positive and significant influence directly on performance; moreover, this use had an indirect effect on performance through EO which also had an influence on performance and kept these results for businesses of any size. The results in the interactive use were different and showed that when EO was introduced, the direct effect of the interactive use on performance was completely lost; however, EO had an indirect impact on performance. Likewise, both relationships were present in companies of any size.

3) By introducing LO, we could observe that for diagnostic use, although the magnitude of its coefficient decreaseed, it remained a directly positive and significant influence on performance. Moreover, an indirect relationship was generated between the diagnostic use and performance through LO, which in turn affected the performance in companies of any size. Again, it was not the case of the interactive use, in which by introducing LO, the direct relationship of this use with performance was maintained in the complete sample but completely lost in the analyses by sub-groups. In addition, no kind

of indirect relationship through LO of firms was generated.

Finally, in the fourth step, by introducing both constructs (EO and LO) in the full model, we observed that the diagnostic use continued having a direct, positive and significant influence towards organizational performance. On the other hand, its counterpart, the interactive use, completely lost this direct effect, and this was also true for any size of firms. EO mediates the relationship between the two uses and performance in different ways: i) In the relationship between the diagnostic use of MCS and performance, EO was a partially mediating variable; and ii) EO completely mediates the relationship between the interactive use and performance in large and medium-sized firms. I.e., In the first case the direct impact remained but decreased and occured in parallel to the diagnostic impact on performance indirectly by Eo and this in turn in performance. While in the second case, the direct impact of the interactive use on performance disappeared and the possibility of having an influence on performance was only indirect through EO. Generally, LO did not work as a mediating variable in the relationship between the uses of MCS and organizational performance, except for the medium-sized companies. LO had no significant direct impact on performance. Table 3.8 shows the MCS – Performance (direct & indirect effect) hypotheses results. For a complete step by step Direct and Indirect effect summary of the MCS-Performance relationship, see Table 3.9.

Table 3.9: MCS uses (Dignostic/Interactive) - LO & EO - Performance analysis (direct & indirect effect)

	Overall		Small		Medium		Large	
1: Diagnostic / Interactive - Performance	Estimate	P	Estimate	P	Estimate	P	Estimate	P
Diagnostic --> Performance	0.485	***	0.517	***	0.554	***	0.464	***
Interactive --> Performance	0.188	***	0.088		0.353	**	0.129	**
2: Diagnostic / Interactive - EO - Performance								
Diagnostic --> EO	0.493	***	0.457	**	0.652	**	0.285	**
Interactive --> EO	0.409	***	0.257	**	0.519	***	0.528	***
EO --> Performance	0.176	***	0.243	***	0.139	**	0.178	***
Diagnostic --> Performance	0.425	***	0.467	**	0.514	**	0.428	***
Interactive --> Performance	0.064		-0.051		0.193		0.028	
3: Diagnostic / Interactive - LO - Performance								
Diagnostic --> LO	0.679	***	0.661	***	1.456	***	0.429	***
Interactive --> LO	0.358	***	0.435	***	-0.152		0.513	***
LO --> Performance	0.119	**	0.150		0.250	***	0.053	
Diagnostic --> Performance	0.427	***	0.430	**	0.302	**	0.492	***
Interactive --> Performance	0.100	**	0.006		0.333	**	0.054	
4: Diagnostic / Interactive - EO & LO - Performance								
Diagnostic --> LO	0.659	***	1.443	***	1.037	***	0.391	***
Interactive --> LO	0.401	***	-0.003		0.239	**	0.593	***
Diagnostic --> EO	0.532	***	1.084	***	0.752	***	0.290	**
Interactive --> EO	0.429	***	0.008		0.478	***	0.521	***
LO --> Performance	0.047		-0.066		0.164	**	-0.001	
EO --> Performance	0.163	***	0.161	**	0.105	**	0.174	***
Diagnostic --> Performance	0.409	***	0.623	**	0.414	**	0.448	***
Interactive --> Performance	0.055		-0.002		0.143		0.020	

p<0.001: ***; p<0.05: **; P>0.05: ___

3.7 Conclusions, discussion and managerial implications

Companies today compete in a complex world that reinvents itself faster and pays a high price for innovation and business models based on knowledge. This context drives the need to better understand the role of different systems and how they can better meet managerial needs (Widener 2004). Company managers need to identify what the best practices are, on the one

hand, allowing them to make better use of their MCS; and on the other hand, to enable them to develop competitive advantages, being both future drivers of improved performance (Widener 2007). The purpose of this paper, from a resource-based perspective, is to investigate the role played by the different uses of MCS as an antecedent to organizational capabilities as well as to assess their significance. It also pursues to identify whether the uses of MCS and capabilities are drivers of organizational performance.

It has been found in the literature that the MCS can be a catalyst for all stages of the strategic process of a company (Mintzberg 1978; Mintzberg & Waters 1985), by providing the necessary information to challenge the content and validity of the strategy (Ittner et al. 2003). Research indicates that MCS are not only important for strategy implementation, but also for strategy formation (Simons 1990). The general findings of this work related to the direct and indirect impact of MCS over perfomance are aligned with Simons' (1990) arguments in terms of raising the contribution of MCS to more than just a tool for monitoring and evaluating, but to also offer them as a catalyst for the complete strategic process; a process which supports and encourages the creation and execution of strategies across the organization. Although there is a common understanding that the systems do not have a direct impact on performance, performance is a function of the way these systems are designed and used. Our results challenge the previous statement and show that MCS are resources in an organization, which generate a competitive advantage in terms of how they are used. (Lengnick-Hall & Wolff 1999). Therefore, understanding how these resources can be better used as specific, hard-to-duplicate resources generates a sustainable source of competitive advantage because from that point of view, they directly or indirectly have an impact on performance.

The MCS studied in this work show a different impact on capabilities; a summary of the results for the whole sample and the multigroup analysis are shown below. The diagnostic use of MCS had a direct impact on performance, and it also had an indirect effect through the entrepreneurial orientation in business.

Diagnostic use – LO and EO

The main findings showed that the use of the diagnostic MCS generated a significant, positive, and direct and indirect impact on organizational performance. In all cases (the overall sample and the multigroup analysis) the use of the diagnostic MCS showed a significant relationship with LO & EO capabilities but in the unexpected opposite direction (+). This is contrary to our predictions and results of prior studies that had not found links between MCS and Capabilities (Henri 2006a). Although those results fail to support hypotheses H1 and H2, they are in the same line of studies that found a positive and significant relationship between MCS and capabilities (Koufteros et al. 2014). This important finding is discussed below.

The above results lead to the possibility of questioning the previous literature that assumed that the use of diagnostic MCS inhibited the development of organizational capabilities, and thus, have a possibly negative impact on firm performance (Simons 1995; Henri 20016a; among others). The positive sign and significance found in the use of the diagnostic MCS - LO & EO capabilities relationship- highlights the positive impact that the use of the diagnostic MCS has on capabilities. This leads to have several explanations: There are arguments (Mintzberg, 1973; Eisenhardt, 1989; Slater & Narver, 1995; Vandenbosch, 1999; Grafton et al. 2010, Koufteros et al. 2014) suggesting that the diagnostic use has a positive influence on the development of capabilties, laying the foundation for carrying out a conversation to enable better decisions, i.e., to have

the same information and understand it in the same way. The diagnostic use operationalizes the first and the second steps in the learning process[33] (Slater & Narver 1995). Also, the diagnostic systems legitimizing the use of MCS are formalized routines (Simons 2000) intended to guide behavior, to communicate, and to formalize decisions that may already have been taken. Somehow, Simons (1995) also contends that diagnostic controls to legitimize are used to communicate agendas and translate strategy through the identification of critical success factors. In the same line, organizational learning originates in historical experiences, which are then encoded in routines that guide behavior (Levitt & March 1988). Putting together these ideas, legitimizing MCS use, serves as a lever that facilitates organizational learning, and then, we can assume why we obtain a strong and positive relationship. LO is related to learning from past events, learning from our previous results (Levitt & March 1988), that can only be achieved by making a solid diagnostic use of MCS. Finally, Koufteros et al. (2014) argue that Henri (2006a) found a negative relationship between diagnostic controls and organizational learning because he used a narrow definition of the diagnostic use, only for monitoring uses. On the other hand, EO as a concept is related to an organizational level where systems are widely used. They could be influenced by how a company uses its information systems when combined with strategic resources, such as knowledge-based resources directed to discover and exploit opportunities which can boost competitiveness and entrepreneurship (Barney 1991, Chenhall & Morris, 1995)

In addition, since an essential characteristic of entrepreneurship is to make things happen, leaders devoted considerable effort to justify and legitimize their proposals and actions. Legitimacy may be relevant because if actions will only be taken if they have been legitimized, organizations become dependent on information that can provide legitimacy (Feldman & March 1981), and thus, the diagnostic use of MCS plays an important role. Managers use MCS to legitimize prior ideas assuring the right interpretation (Vandenbosch 1999) because they believe that by doing so, it leads to organizations' competitiveness. Evidence of this argument is shown in a Dossi (2008) study, arguing that with a legitimized use of MCS use, headquarters employ MCS to monitor local performance results, influence, legitimize, and guide local decision-making (Dossi 2008), influencing the entrepreneurial attitude for initiation and implementation of strategic decisions (Fama & Jensen 1983; Prahalad & Doz 1987).

Finally, the positive sign of the results in the diagnostic use of MCS may also be due to the interrelationship that exists in the two uses of MCS which has been documented by some academics (Mundy, 2010). These results allow us to suppose that the assumption that a control system has a negative impact when used in such a way could be engrossed if we think that it had an individual use. Apparently, somehow the systems work at the same time and support each other (Simons 1995). Widener (2007) study finds that when firms emphasize one use of MCS, they also emphasize each of the other three control systems, involving the same direction. The evidence suggests that the inter-dependencies are complementary. The interactive use of MCS influences the diagnostic use of MCS since the latter provides the necessary structure that enables the interactive control system to be effective (Chenhall & Morris 1995). This interrelationship between the uses of diagnostic and interactive MCS is summarized by Simons (2000) when he says, "the information and learning generated by interactive systems can be embedded in the strategies and goals that are monitored by diagnostic control systems" (Simons 2000), arguing that different uses do not occur in isolation. Hence, controls are interrelated and complementary, not substitutes. Managers should consider

[33] Learning process: Information acquisition (How am I doing), information dissemination (communication), shared interpretation (what does it mean) and organizational memory (How I Do it) (Slater & Narver 1995).

both when designing and using their control system to increase its effectiveness, and thus, translate it into performance.

Interactive use – LO & EO

Consistent with previous results, the interactive use of MCS, such as expected, has an impact on the development of both capabilities (LO & EO) by fostering organizational dialogue, stimulating creativity, and focusing organizational attention. It showed a positive and significant relationship with the development of organizational capabilities in the overall sample. Subgroup analysis kept the same relationships in medium-sized and large companies; however, in the case of small businesses, the interactive use of MCS showed no significant relevance. Our results are in the same line of prior studies that found links between the uses of interactive MCS and Capabilities (Henri 2006a; Koufteros et al. 2014). Hence, those results support hypotheses H3 and H4.

LO - Perfomance

Learning orientation has been identified in previous studies as a trigger for better performance (Levitt & March 1988; Slater & Narver 1995; Tippins & Sohi 2003). However, in general in our study, Learning Orientation (LO) has no effect on performance, thus failing to support H5. It has been argued in previous studies that through intensive and deliberately specific use of MCS, managers sent signals to the firm. These signals were used as information to search for understanding, to set the agenda and action plans, and to look for new initiatives in an entrepreneurial way (Simons 1991), thereby guiding organizational learning. Our results did not support these arguments, and therefore, we believe that further research is needed.

EO - Performance

In line with previous results (Chenhall & Morris 1995), our results showed that Entrepreneurial Orientation (EO) had a direct impact on organizational performance; thus, it **supports H6.** Even more, in our results we could see that this impact is positive in companies of different sizes (small, medium and large); and therefore, it also has a mediating effect on the indirect impact of both uses of MCS on performance. Recent studies suggest that there is a contingent relationship between EO and the firm's internal characteristics (Wiklund & Shepherd 2003). Some scholars argue that the relationship between EO and performance is likely to be more complex than a simple main-effect-only (Lumpkin & Dess 1996); therefore, it would be important to consider the modifying effects of the firm's internal characteristics, such as human resources or technology. In addition there are systematic differences in MCS among firms that compete in different ways and with different orientations (Miller & Friesen 1982; Govindarajan & Gupta 1985).

MCS & Performance

Direct effect. The use of diagnostic MCS reflects a positive and significant direct relationship between MCS and performance, in the overall model giving full support to H7. This is not the case for the interactive where such use does not reflect a significant direct relationship between MCS and performance in the entire model. As a consequence, our results failed to support hypotheses H8. In previous research, there was evidence specifically arguing that the emphasis on the use of interactive control was associated to enhanced performance, for firms engaged in exploratory innovation but not in exploitation (Bedford 2015). This could be the main explanation for the absence of a direct impact of interactive MCS on organizational performance. Still, other studies have argued an indirect impact of interactive controls on performance, which

can be observed by increasing the effectiveness of other processes, such as an intervening effect (Henri 2006a; Widener 2007; Bedford 2015).

Indirect effect. As stated above, there should be some relationship between the uses of MCS and performance, which was partly explained by an indirect effect; while the interactive / diagnostic uses of MCS increase the LO & EO capabilities, which in turn increase performance, i.e., there is a mediating effect of organizational capabilities (LO & EO) among the various uses of MCS and organizational performance.

EO. In general, the entrepreneurial orientation capability (EO) plays a mediating effect on the relationship between both diagnostic and interactive uses of MCS and performance in both the full sample and the analysis by subgroups, except for small companies in relation to the interactive use. In the EO case, the impact on perceived performance is positive in the overall sample and in firms of different sizes, showing itself as one of the main drivers of the new economy. Literature on entrepreneurship emphasizes the importance of EO as a determinant of business performance (Ripolles & Blesa, 2005). Some studies suggest that there is a contingent relationship between EO and the firm's internal characteristics. Wiklund & Shepherd (2003) and other scholars argue that the relationship between EO and performance is likely more complex than a simple main-effect-only (Lumpkin & Dess 1996); therefore, it would be important to consider the modifying effects of the firm's internal characteristics, such as access to human resources or external factors (uncertainty or technology).

LO. The learning orientation had no mediating effect on the various uses of MCS and organizational performance, except for medium-sized firms, where there was a mediating effect on the relationships between the diagnostic and interactive uses of MCS and performance. Previous research had found an indirect relationship between the different capabilities and a company's performance (Widener 2006) through variables that mediated that relationship. For small businesses, this relationship has been widely investigated. As for this study, the impact of OL in small companies was not significant, bringing to light one of the most studied aspects in small businesses, their focus on the short -term survival.

The Sub-group analysis showed that the uses of diagnostic MCS had a significant and positive impact on capabilities (EO & LO) in any size of firms. Although the impact was positive and significant, it came out in an unexpected opposite direction. The interactive use of MCS also showed that significant and positive capabilities have an impact on medium-sized and large firms; however, this is not so for small firms, where this result was not significant. Our conclusions show that the diagnostic use of MCS infuences performance directly, positively and significantly in any size of company. The use of interactive MCS does not have an impact on organizational performance in a direct way in any of the studied subgroups.

Thus, this study provides empirical evidence of the relationships among the MCS in the LOC (Simons 1995) & ESS (executive support systems classification) (Vandenbosch 1999) frameworks and contributes to the body of work that investigates the relationships among MCS and other constructs (Kaplan & Norton 1992; Henri 2006a; Widener 2006). In addition, the study adds to our knowledge of the MCS/Capabilities/Performance relationships and provides some empirical evidence useful to understand the apparent conflict that has emerged from studies examining this link. We hope that this study will provide an impetus for researchers to address these issues and begin to systematically explore the role played by MCS in the development of capabilities and performance of the firm.

Managerial implications

How do managers actually use MCS to assist in the achievement of organizational goals? What formal processes and practices are emphasized at the top management levels where responsibility rests for the results? These are two questions we must continuously ask in the business world. These questions are required by definition, remembering that Anthony (1965) defined management control systems in terms of assuring that organizational objectives are achieved. Relevant implications can be seen in the results of our study. On the one hand, managers should be aware that the MCS might have different uses. On the other hand, managers need to identify what the best uses of MCS are in order to develop organizational capabilities which will be the drivers of improved performance. Both points will allow them to identify what kind of practice needs to be achieved to meet their goals, and specifically, how people will respond to these systems and to the different factors that affect their responses.

Recent empirical studies have suggested that the effectiveness of MCS depends not only on their design but also on the way superiors use them (Otley 1978; Govindarajan 1984). The results of this work show that the development of organizational capabilities, such as LO & EO, require different practices and uses of the various control systems, beyond -as its name implies- control, allowing them to have better organizational results. A business that increases its competitive position will improve its performance (Narver & Slater 1990).

Our results highlight that the two uses of MCS, diagnostic and interactive, are relevant in different ways: There are several applications that MCS can be given, but these applications or uses work together to impact the development of capabilities and performance of a company. The use of a diagnostic way directly impacts the performance, and it will indirectly provide the information needed to act. In addition, the use of the MCS in an interactive way will have an indirect impact through the capabilities they develop.

A diagnostic use implies taking time to legitimize an idea or an action, which is very important in a culture where things happen as long as we explain. Thus, legitimizing appears to allows us to have better acceptance, focus, and finally, action (Feldman & March 1981; Fama & Jensen 1983; Prahalad & Doz 1987). The interactive use implies to be continually answering the question: What problems do we have to focus on? (Simon et al. 1954)This implies to be seeking opportunities to stimulate the participation and dialogue between manager and employees, and to finally cause the dissemination of information and assuring its right interpretation (Slater & Narver 1995). Used as processes, both generate the necessary capabilities to act. Finally, understanding the consequences of the uses of MCS is an important topic for organizations on account of the high investment these systems require.

3.8. Limitations and suggestions for further research

Limitations

In the same way that all empirical studies have, this study presents potential limitations that should be taken into account when making generalizations, and thus, the findings need to be interpreted in light of these limitations.

Although the corresponding tests were performed to ensure reliability and we used a valid measure of the uses of MCS,

capabilities and performance (satisfactory psychometric properties), future research could refine and further validate the instrument. We must see the results in good conscience that these were obtained through a survey, and using the survey method to collect data creates the potential for bias due to common response. In this case, the results should be analyzed taking into account that they were obtained by a survey, which entails several implications. The survey method to collect data creates potential for bias due to common response. In this line, we are aware that the results of this study could show a bias by a form of common method variance (CMV) called Single Source Bias (SSB) (Campbell & Fiske 1959), and although Harman's one-factor test indicated the absence of common method effects in our survey data (See Appendix C. Non response bias & common method variance (CMV) analysis). There are arguments to think that this test is necessary but insufficient (Podsakoff et al. 2003). So, this is a limitation in our study and also an area of opportunity for future research using multi-method strategies for data collection, in order to enhance the validity and reliability of the construct measures. Future studies in this area should also use more refined measurement instruments to address these concerns and, where feasible use multi-source measures.

This study does not examine a specific type of MCS. Generalizations about the different types of MCS should be handled with care. We only examine two uses of MCS -diagnostic and interactive control- and leave the rest of LOC framework components for future research. In terms of capabilities, this study focuses on learning and entrepreneurial capabilities that have been studied and shown to have a strong relationship with performance in organizations. Therefore, making global generalizations about organizational capabilities must be done carefully. Performance is measured using a subjective instrument. Even if there were evidence in favor of consistent results between objective and subjective measurement, the results should be interpreted with caution considering the potential for bias.

Finally, the study focused on business managers or directors; therefore, further research is required to assess whether different uses of MCS have the same results at other managerial levels.

Suggestions for further research

The results of this study provide guidance and point at several avenues for future research.

Previous research indicates that the relationship between the various uses of MCS and the development of capabilities in the firm has positive or negative coefficients, depending on usage and on the context in which the investigation is conducted. Similarly, our research obtained significant relationships but always in a positive sense in regards to capabilities; hence, future research could retest the meaning of these relationships in other contexts and with other companies, as the results shown so far cannot be conclusive.

Empirical evidence (Kirca et al. 2005) has proposed that contextual factors are very welcome, as there are few empirical applications developed. Variables as the uncertainty perception and human capital factors should be emphasized because of its impact on the usability of the systems. Also, since the size of a firm has been shown to affect the way in which control systems are utilized (Bruns & Waterhouse 1975; Merchant 1981), size must also be a control variable in studies like this one.

Finally, this study focused only on two capabilities (Learning & Entrepreneurial Orientation); other strategic capabilities may have a relationship with MCS & performance and could be taken into account.

Chapter IV: Management Control Systems, Capabilities and Performance: The influence of the Environmental Uncertainty

4.1 Abstract

From a contingency framework, this paper looks to contribute to a stream of literature that investigates determinants and consequences of performance. Specifically, this study examines the extent to which the perceived environment uncertainty (PEU) for decision makers, impacts in the relationships between the various uses of management control systems (MCS) to develop organizational capabilities –entrepreneurial orientation and learning orientation (EO and LO)- and performance.

To test these hypotheses, a theoretical model was developed and tested, using structural equation modeling, applied to questionnaire data that surveyed 644 companies in various sectors. Specifically, it tried to examine the mediating effect of PEU in both relationships between i) the uses of MCS and capabilities, and ii) capabilities and performance.

As we hypothesized, the results revealed the existence of a positive and significant mediating effect of the PEU in the relationship between the LO and EO capabilities and performance; however, a different effect was observed in each capability. PEU has a total mediating effect in the LO-performance relationship and a partial mediating effect in the EO-Performance relationship; In the other hand, the mediating effect of PEU in the relationship betweeh the uses of MCS and capabilities was null.

The perceived uncertainty is described in relation to the uses of MCS, capabilities and performance. Their implications for the behavior of an organization's administrator are discussed.

Keywords: Management control systems uses; Capabilities; Learning orientation; Entrepreneurial orientation; performance; Uncertainty, Environment,

4.2 Introduction and research objective

This study works on the resource based view (RBV) and strategic capabilities literature (Barney 1991; Day 1994; Teece et al. 1997). It pursues to explain why some firms are able to have and use different tangible and intangible assets which enable them to have some capabilities that provide sustainable competitive advantages and earn superior returns (Wernerfelt 1984; Grant 1996; Barney 1991; Day 1994; Teece et al. 1997; Eisenhardt & Jeffrey 2000).

The use of management control systems (MCS) is frequently recommended for strategy implementation and for enhancing organizational performance (Davis & Albright 2004). These systems comprise the use of financial and non-financial performance measures linked to the organization's business strategy, e.g., the balanced scorecards (BSC) (Kaplan & Norton 2000) and multi-criteria key performance indicators (KPI) (Cheng et al. 2007; Hall 2008). The MCS concept has been extensively studied and developed for nearly two decades, but we still have very little knowledge about the implications for its development, use and results. Proponents of MCS studies often promote the idea that MCS facilitate the implementation of the organization's business strategy, and by doing so improve organization's overall performance (Franco-Santos et al. 2012). Even more, prior research has suggested that organizational capabilities that trigger performance are shaped by MCS (Henri 2006a; Koufteros et al. 2014). Our previous results showed that the diagnostic and interactive uses of MCS, will have a different impact on organizational practices and results, both directly and indirectly. Also, it is important to take into account the size of the organizations, as we saw earlier, the size variable modifies these relationships.

Prior studies have explained what the definition of MCS implies they should do, but have failed to explain how they do it, and if there are other variables that have an impact on these results. The key-missing premise in previous studies is if the use of MCS can be universally appropriate and if the studied relationships between the uses of MCS uses – Capabilities - Performance have had the same results in in different contexts.

This essay, focusing on environmental uncertainty, is a response to Otley's and Soin (2014) calls for researchers to 'develop better ways to describe likely sources of uncertainty and their possible impacts', in particular how it relates to the use of MCS. The constructs management control systems, capabilities and performance have been widely studied individually; nevertheless, considering the potential influence of other factors on this relationships, the perceived environmental uncertainty contingence factor is examined here. Based on the contingency theory, the potential impact of the inclusion of the perceived environmental uncertainty (PEU)[34] variable in the relationships between the uses of MCS- Capabilities - Performance are the base for the hypotheses proposed in the theoretical model of this paper.

Recent studies have shown a number of internal or external factors that modify the relationship between MCS and the firm performance (Speklé & Kruis 2014). Contingency variables, acting as mediating factors, have been linked to internal factors to analize the relationship between MCS and performance (Franco-Santos et al. 2012), such as people's behaviors in communication (Burney & Widener 2007), cooperation (Mahama 2006), coordination (Dossi 2008; Cruz et al. 2011), participation (Butler et al. 1997; Kolehmainen 2010) , motivation (Malina & Selto 2001; Godener & Söderquist 2004), role understanding (Hall 2008), job satisfaction (Lau & Sholihin 2005), and leadership (Bititci et al. 2006). On the other hand, also

[34] PEU: Scale used to reflect the changes in the external environment as perceived by managers (Govindarajan 1984).

internal and external variables, have been associated with the company as a whole, for instance, strategic orientation (Perera et al. 1997; Chenhall & Langfield-Smith 1998; Ittner et al. 2003; Stede et al. 2006), a mediating role of strategic decision arrays was examined a simple mediation model to test in the relationship between SPMS and organisational performance (Bisbe & Malagueño 2012), organizational structure and competition (C.-L. Lee & Yang 2011), perceived environmental change (Kihn 2007), environmental uncertainty (Hoque 2004), organizational culture - management style (Bititci et al. 2006) and quality of information systems (Hyvönen 2007). Some results show that not all of the contingencies studied influence the relationship between the use of MCS and performance, for example, Hoque and James (2000) found that market position, product life cycle or organizational size were not contingent in this relationship (Hoque & James 2000). All these studies have shown factors that modify the relationship between MCS and firm performance, but since Anthony (1965) addressed the structural attributes of planning and control systems and suggested possible design modifications contingent upon the context of their use, few studies have taken into account the implications of the context and its influence on the use of management control systems.

In the theoretical contingent approach, the term contingency means that something is true only under specified conditions (Chenhall 2003). This approach is recommended in our research, because it shows how a specific contingency may affect the impact of MCS uses. Also, as proposed by Otley (2016), a survey method needs to be tailored to take into account the context of specific organizations as we did in our study. We suspect that many of the inconsistencies found in the literature could be explained by looking at the context in which the studies took place.

The contingency theory of organizations (Burns & Stalker 1961; A. D. Chandler 1962; Lawrence & Lorsch 1967), predicts that the relationship between an organization's characteristics, such as its MCS uses or capabilities, and organizational performance depends on specific contingencies or situations (Hayes 1977; Otley 1980). Empirical studies adopting this contingency perspective provide evidence of different contingent aspects of the firms and have suggested that the effectiveness of MCS and its ability to generate organizational capabilities to impact organizational performance depends on several factors including its design, technological sophistication, or the type of use that managers give to these systems and the information they generate (Hopwood 1972; Otley 1978). Thus, numerous contingencies can influence the impact of MCS, e.g., strategy (Gosselin 2005), strategic orientation (Ittner et al. 2003), environmental context (Bhimani 2003), environmental uncertainty perception PEU (Govindarajan 1984; Hoque 2004), corporate context as size, product diversity and extent of decentralization (Merchant 1981), performance assessment (Hayes 1977), technology (Daft & MacIntosh 1978), size (Chenhall 2003), comprehensive/diversity MCS (Chenhall 2005; Hall 2008), access to human capital (G. N. Chandler & Hanks 1994), human capital background (McEvily & Chakravarthy 2002; Naranjo-Gil & Hartmann 2007b), organizational culture (Hoque & James 2000; Henri 2010; Henri & Journeault 2010), employee participation and involvement (Johnston et al. 2002) and user characteristics such as education or work experience (Franco-Santos et al. 2012). All of them are important contextual factors which influence the role of MCS.

In another branch, strategy literature (Miles & Snow 1978) suggests that improved business performance requires that the strategy of a specific firm should be fully aligned with at least three important points: organizational structure, information systems, and management style. In the previous statement, it is important to note two focal points that have been highlighted

by some researchers (Miles & Snow 1978; Dent 1990; Govindarajan & Shank 1992). First of all is that the strategy implementation phase does not occur in isolation. There are context situations in which firm actions depend on the lack of information, situation which may impact differently on companies and may play a major role in the firm performance (Hoque 2004). The second point is that many companies operate in different environments and have different priorities and initiatives. Although firms compete in the same context and face the same set of potential uncertainties[35], the strategy of the firm strongly influences which uncertainties are critical for the achievement of the chosen objectives. Therefore, their systems and management styles are also different. Research has found that the way to act it is dependent on the degree of certainty a firm holds about its current and future business operations (Chenhall & Morris 1986; Mia 1993). Both points lead us to argue that the level of uncertainty perceived by decision makers in the company is a key point. Hence, this research should consider it.

Although some researchers in accounting literature suggest that the environmental uncertainty is positively associated with the design and use of MCS (Otley 1980; Chapman 1997; Hoque 2004), studies on the MCS role (Govindarajan & Gupta 1985; Simons 1987, 1990, 1995; Ittner & Larcker 1997; Henri 2006a, 2006b; Henri & Journeault 2010) have not commonly addressed the possible intervening role of environmental uncertainty perceived by those who make use of these systems. Then, it seems necessary to develop new, different approaches to deal with situations of uncertainty (Otley 2016).

Finally, the complex and changing environmental context, calls for fluidity and flexibility in the management practice (Dent 1987). An accelerated dissemination of technology, globalization, and country deregulation among other factors (Hamel & Prahalad 1994; Cooper 1995; Richard A D'Aveni & Gunther 1995), produce a difference in the information held by firms, creating a gap between the known and the desired information (Galbraith 1973). These are reasons found in the business environment literature to suggest that the perception of uncertainty should be considered in research (Hoque 2004). As Otley & Kim (2014) said, examining different aspects of the MCS in the modern world, whilst paying more explicit attention to the ubiquitous nature of uncertainty, it is a focal point of current research (Otley & Kim 2014) . Therefore, given that the effect of some environmental factors in the proposed relationships is unclear, studies providing a better understanding of PEU effects and how these effects occur would be beneficial for further progress in this research line.

As a consequence, the question that arises is if the contingency, represented by the perception of uncertainty in the environment, has some impact on the relationships of MCS uses-capabilities-performance. In other words, is there any relationship with the perceived environmental uncertainty for decision makers and the effectiveness of the MCS uses so as to develop capabilities that impact performance?

Using a contingency-theoretical perspective, the conceptual roots of this work lie in the idea that the relationships of the uses of MCS – Capabilities and Capabilities – Performance depend significantly on the perceived environmental uncertainty. Specifically, this paper investigates the extent to which PEU may play a significant role in the relationships raised. The three sets of constructs (uses of MCS, capabilities and performance) will now be tested, trying to see if these proposed relationships are mediated by the inclusion of the variable PEU in a model presented later.

[35] Potential uncertainties as changes in government regulation, intensity of competition, advance of new technologies, nature of customers and suppliers, product life cycles, and diversity in product lines.

Chenhall (2003) argues that in general, it may be useful to follow three stages in contingency based studies. First, the adoption and use of MCS should be established; in our case it was defined since the lifting of data, making sure that companies used some form of MCS. Second, it was necessary to examine how they were used. Here our model proposed asking the respondents about the extent to which four MCS were used in their firms and then linked the models of Simons and Vandenbosch in second order constructs with capabilities and organizational performance. Finally, in the third place, linking the above variables and verifying contingent factors (PEU) that could modify these relationships (Chenhall 2003). In our case, using the theory of contingency, we had to include organizational performance as the dependent variable to identify the theory that showed how the combination of MCS uses, capabilities and context, allowed leaders to make better decisions to impact performance.

The remainder of the paper is organized as follows: Review of the relevant literature in section 4.3 where the theoretical framework of this work is developed. Section 4.4 describes the theoretical model and develops the research hypotheses; followed by 4.5, which is the research method applied and data validity. Section 4.6 presents the research findings. A discussion of the results, conclusions and managerial implications are developed in section 4.7. Finally, section 4.8 describes the limitations and further research.

4.3 Theoretical framework: RBV, Organizational Capabilities, MCS, Performance, Environmental Uncertainty

RBV & Organizational capabilities

From the perspective of the theory of resources and capabilities, firm capabilities refer to the consequences associated with specific processes, activities, or competences that enable the organization to perform and gain competitive advantages (e.g., strategic alignment, entrepreneurial orientation, organizational learning, etc.). While it is generally agreed that capabilities contribute to business performance, relatively little is known about the capabilities drivers and how those drivers operate via capabilities to collectively influence performance (Hult 2004). Moreover, little is known about how the use of MCS as a driver of capabilities operates under varying conditions in the firm's external environment.

In this study we focus on the capabilities of entrepreneurial and learning orientation because they are among the most recognized and researched organizational strategic capabilities (entrepreneurship, innovativeness, market orientation and organizational learning) (Covin & Slevin 1991; Lumpkin & Dess 1996; Ripollés & Blesa 2005; Henri 2006a). Also, the business literature supports that the learning (Widener 2007) and entrepreneurial orientations (Ripollés & Blesa 2005) are positively associated with performance (Yuan et al. 2008).

The learning orientation (LO) capability refers to the activities undertaken by the organization to create and disseminate knowledge, to achieve superior results, and to develop competitive advantages (Sinkula et al. 1997). LO has been defined as the development of ideas, knowledge, and relations among past and future actions (Fiol & Lyles 1985). LO facilitates competitive advantages by improving a firm's information processing activities at a faster rate than rivals do (Baker & Sinkula 1999), strategic activity in times of change and uncertainty. However, to do so requires frequently updated information

(Simons 1987). Hence, MCS have been identified as an important tool to acquire, interpret, diffuse, and store information and results (Huber 1991; Levitt & March 1988). Empirical evidence has shown that there is a direct positive relationship between LO and performance (Sinkula et al. 1997; Calantone et al. 2002; Tippins & Sohi 2003; Aragón-Correa et al. 2007). In contrast, there are also studies in which this relationship showed little or no significance, depending on the context in which the study is developed. (Farrell & Oczkowski 2002; Llonch Andreu et al. 2007).

Among the different definitions given for the entrepreneurship concept, we present the following: a permanent attitude (Covin & Slevin 1991) that is proactively seeking new business opportunities (Zahra & Garvis 2000); and the intangible ability of the company's strategic position which is hard to replicate and is related to superior results (Wiklund & Shepherd 2005). Hence, the entrepreneurial orientation (EO) concept (Covin & Slevin 1991; Lumpkin & Dess 1996) is an extension of the entrepreneurship concept, which is moved from the individual level to an organizational level (C. Lee et al. 2001); A critical organizational process that contributes to the firm's survival and performance (Miller 1983; Zahra 1991; Zahra & Covin 1995; Wiklund 1999; Hitt et al. 2001; Wiklund et al. 2007) for companies of all sizes (Wiklund & Shepherd 2003; Wiklund & Shepherd 2005; Rauch et al. 2009). From the standpoint of the RBV, EO can be identified as a high-level organizational routine, durable, and difficult to imitate or transfer (Covin & Slevin 1991; Lumpkin & Dess 1996; Wiklund 1999; C. Lee et al. 2001; Ripollés & Blesa 2005).

Management control systems (MCS)

In the classic view of Anthony's (1965) study, MCS have been conceptualized as "the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives" (Anthony 1965). A more comprehensive notion of the MCS role may include the support of the entire strategic process (Mintzberg 1978; Merchant & Otley 2007). Otley refers to the MCS as the set of procedures and processes that managers and other organizational participants use in order to help ensure the achievement of their goals and the goals of their organizations (Otley et al. 1995). A modern MCS definition is "the evolving formal and informal mechanisms, processes, systems, and networks used by organizations for conveying the key objectives and goals elicited by management, for assisting the strategic process, and ongoing management through analysis, planning, measurement, control, rewarding, and for supporting and facilitating organizational learning and change" (Ferreira & Otley 2009).

This is what the definitions have proposed, but we want to highlight two issues that are not clear in these proposals. First, MCS have been regarded as static and unchanging, rather than dynamic; and second the need to recognize that all control takes place under conditions of uncertainty (Otley & Kim 2014). The first point is related to the fact that MCS should be considered beyond a static and mechanistic system, which should develop and adapt along with the context (Otley 2016). The second point is concerned with something that management control literature in general has not made explicit: the environments in which organizations operate are subject to some uncertainty. and it is important to note that as there are different perspectives used to study MCS, the literature lacks an agreed-upon definition and deployment (Otley & Kim 2014). Specifically, this second point will be addressed as the main subject of this study.

Management Control literature argues a general understanding that MCS do not automatically improve the firm performance,

rather, performance is completely related to how systems are designed, developed, and used. Evidence suggests that the "use" can be more significant than the formal "design" of the MCS (Ferreira 2002). Thus, the best way to approach the study of MCS is by looking at the how they are used. (Langfield Smith 1997).

Regarding the use of the systems, while the management accounting literature has studies that investigate MCS, the concept of 'use' has not been well-developed in the literature (Ferreira 2002). Except for the work of Simons (1995) LOC and Vandenbosch (1999) ESS, we could not find other studies focusing on the uses of MCS or their categories. In this line, as tested above, this study uses a combination of these two classifications that have been studied separately and relates both to generate the hypotheses proposed, explained in greater detail below.

Most research on MCS has used a resource-based view approach (Barney 2001) and the levers of control (LOC) framework: beliefs, boundaries, diagnostic and interactive uses of MCS (Simmons 1995)[36], but most frequently using only the last two uses (diagnostic & interactive) because that is where the MCS take shape. The LOC framework asserts that strategic uncertainty drives the choice and use of MCS (Widener 2007), which in turn, impacts the organization through organizational learning and triggers the conversation that causes the search for entrepreneurial opportunities (Simons 2000). The second MCS classification used in this study is an empirical analysis between MCS and organizational competitiveness, called "Executive support systems classification (ESS)" (Vandenbosch 1999) [37]. This identifies a typology with the four categories used in management information systems: score keeping (Monitoring); decision legitimization (Legitimizing); focusing organizational attention (Attention focusing); and problem solving (Strategic decision making).

The literature main results show that MCS are effective mechanisms for facilitating organizational learning and supports entrepreneurial initiatives to growth and develop at all levels, but specially when the use of MCS is focused on action and improvement rather than on reporting and controlling (Johnston et al. 2002; Godener & Söderquist 2004; Ahn 2001; Chenhall 2005); These arguments imply that they are more useful when used interactively and less when used diagnostically. Some studies show that the interactive use of MCS fosters organizational capabilities. However, previous studies also show that the diagnostic use of MCS weakens some of these capabilities (Henri 2006a). Our results highlight the opposite, and in line with the studies by Koufteros et al. (2014), our results show that the uses of MCS can positively influence the firm strategic capabilities. Specially, we confirm that the diagnostic use of MCS is positively related to LO & EO capabilities.

Based on the insights from the above studies, it can be argued that MCS can encourage the utilization and development of strategic firm capabilities but the impact of different uses of the MCS remains unclear and necessitating further research.

Performance

Performance mainly refers to the various consequences in the organization (e.g., customer satisfaction, productivity, quality,

[36] Levers of control (LOC) (Simons, 1995): Beliefs (commitment towards goals and to inspire, values, vision, direction, core values), boundary (administrative controls hierarchically based, guidelines for behavior, behavioral constraints), diagnostic use (control over organizational goal, monitoring), and interactive use (enable to search opportunities, solve problems or forward- looking and make decisions with management involvement).

[37] "Executive support systems classification (ESS)" (Vandenbosch 1999): i) Score keeping (monitoring) refers to the question, how am I doing?. ii) Legitimizing decisions (Legitimization): Refers principally to justify and validate past actions or decisions that has been made to ensure the legitimacy of future actions; Focusing organizational attention (Attention focusing) respond to the question, what problems must we focus on? and Problem solving (Strategic decision making) is a non-routine activity of senior management strategic decision-making based in data analysis processes.

innovation, among others (Henri & Journeault 2010). In our study performance comprises the different effects that the uses of MCS and capabilities can have on financial and non-financial results at all levels of the organization. Research on performance has been developed mainly in two schools of thought: *Economics*, suggesting a role of industry structure and the *RBV,* exalting the importance of the resources and firm characteristics in the firm results. In this last line, MCS can be viewed as an important firm resource, based on the assumption that MCS benefits organizations to facilitate the evaluation and control process and the decision making impacting on performance (Ittner & Larcker 2003; Chenhall 2005; Kaplan & Norton 1996).

The literature recognizes several ways or dimensions that are critical in measuring the success or performance of a firm (Govindarajan 1988; Govindarajan & Fisher 1990); however, the connotation that performance has with financial parameters is frequently large and too limiting (Mellahi & Sminia 2009). Two perspectives have been taken when approaching the study of firm performance: *reported performance* and *perceived performance*. Reported performance was based on information internally or externally reported, financial and non-financial. Perceived performance was based on responses from research participants perceptions, also including: financial & non-financial (Franco-Santos et al. 2012). In general performance research has been dominated by the last (Narver & Slater 1990): self assessment processes where individuals provide an evaluation of their performance (Chenhall 2003) or organizational goals (Govindarajan 1984). Heneman (1974) reported a very high correlation in self-ratings between superiors and subordinates, specially in situations in which the subordinate was guaranteed anonymity and assured that the data collection was for scientific research and not his personal evaluation (Heneman 1974).

Research has found that the impact of MCS on performance is unclear on both, reported and perceived performance. Studies results are inconsistent, with positive effect (Chenhall & Langfield-Smith 1998; Ittner & Larcker 1998a; Ittner & Larcker 2003; Ittner et al. 2003; Banker & Potter 2000; Hoque & James 2000; Hoque 2004; Chenhall 2005; Henri 2006a; Hyvönen 2007; Crabtree & DeBusk 2008; Grafton et al. 2010; Cruz et al. 2011), mixed positive and negative results (Ittner & Larcker 1997; Braam & Nijssen 2004; Kihn 2007; Griffith & Neely 2009), and studies with no or weak relationship between MCS systems and performance (Perera et al. 1997; Ittner et al. 2003; Said et al. 2003; HassabElnaby et al. 2005). In this light, still more studies are considered important. In our work, performance was assessed from the perspective of perceived performance based on responses from research participant's perceptions. Heneman's conditions were met fully in our study.

Environmental Uncertainty: The influence of the environment

We begin by clarifying the central concept in this study. Perceived environmental uncertaitnty (PEU) is a scale used to reflect the changes in the external environment as perceived by managers (Govindarajan 1984). According to Galbraith's definition, the concept of uncertainty is about the difference between the amount of information required to perform a task and the amount of information already possessed by the organization, a gap between the information known and desired (Galbraith 1973). It is important to note that in early contingency research, the focus was mainly on the effects of uncertainty within the internal organizational structure (Burns et al. 1961; Galbraith 1973). The inclusion of an external environment is a powerful contextual variable that is at the foundation of contingency-based research (Chenhall 2003).

A well accepted concept of environment uncertainty was proposed by Govindarajan (1984), in which, the focus is on a

business unit level and only in a portion of the total environment that is related on how to get and achieve organizational goals. Here, the basic effect of uncertainty is to limit the ability of the organization to plan or make decisions about activities in advance of their execution, and specifically due to the inability to predict the actions of four groups directly related and who make the business environment: i) customers, ii) suppliers of materials, labor and capital, iii) both competitors for markets and resources and iv) regulatory groups. Gonvindarajan (1984) sees environment as a source of information and argues that it is the decision-makers perceptions of this information which leads them to make changes in organizational processes, structures and strategies. Thus, environmental uncertainty refers to a firm's ability or inability to predict accurately the effects of various aspects of its environment such as customers, suppliers, deregulation and globalization, technological processes, competitors, government regulations/policies, economic environment and industrial relations (Govindarajan 1984). It is important to distinguish uncertainty from risk. Risk is concerned with situations in which probabilities can be attached to particular occurring events, whereas uncertainty is defined by situations in which probabilities cannot be attached because the elements of the environment may not be predictable (Chenhall 2003).

As stated by Otley (2016), there are several reasons to choose uncertainty among all variables used in studies of the contingency theory. First of all, it has produced some of the strongest results in early studies. Secondly, with the emergence of a global economy and increased competition, uncertainty has increased in recent years and affects all businesses; in any situation there is a degree of uncertainty. Finally, it is an issue of measurement. Perceived environmental uncertainty can easily be incorporated into interviews or questionnaires to individual managers. Although it is a very subjective measure, the most relevant aspect of uncertainty is the uncertainty perceived by individuals that will most directly affect their behavior.

Research in uncertainty usually measured PEU based on the Govindarajan (1984) instrument, where respondents are asked to assess the predictability or unpredictability of eight environmental factors (Govindarajan 1984). Finally, this study uses Govindarajan (1984) concept, because it fits perfectly in our approach; this is data pertaining to a global business and were identified through an inquiry to functional areas related to the planning and strategy areas.

Relationships between constructs:

MCS (Diagnostic & Interactive uses)-PEU-Capabilities

Management control systems are about the process of steering organizations through the environments in which they operate to achieve both short and long-term goals. These goals will differ from organization to organization for two main reasons: their stakeholders are different, and each one has a different context (Otley & Kim 2014). Although it is easy to say, with some exceptions, the environmental context is one of the issues that has not been developed in the literature. Therefore, management control studies need to recognize that all control takes place under conditions of uncertainty: it does now, and it has always been this way (Otley & Kim 2014).

MCS are used not only to assure that outcomes are in accordance with plans (diagnostic), but also to motivate the organization (interactive) to be fully informed concerning the current and expected state of strategic uncertainties (Simons 1990). In general, accounting literature supports that the environmental uncertainty is positively associated with the design and use of

management control systems (Otley 1980; Chapman 1997, 1998; Hoque 2004). Results suggest that managers, who perceive greater influence of environmental uncertainty in the performance of their businesses, give greater importance to the MCS used to deal with the situation. Furthermore, Mia (1993) suggests that MCS may help managers to better understand uncertain situations (Mia 1993). Scholars suggest that managerial choice may be severely influenced by the effect of the external business environment (Greenley & Oktemgil 1997), arguing that uncertainty influences the relationships among firm culture, strategy and performance (Miller 1987; Kohli & Jaworski 1993; Slater & Narver 1994; Slater & Narver 1995). This implies that impact of how MCS are used in the strategic planning-performance relationship will be stronger because it provides the information needed to align organization's strategy and structure to its environment. When organizations are facing high uncertainty in changing and complicated environments, also known as turbulent environments, more information is needed (Hutzschenreuter & Kleindienst 2006) and they will utilize their MCS to a higher degree (Tushman & Nadler 1978). MCS allow managers to deploy control information systems as a tool to manage uncertainty (Sakka et al. 2013). When goals are clearly defined and communicated using an MCS in diagnostic form, they help to absorb uncertainty, and then they can direct attention toward the desired outcomes in an interactive use of MCS (Bedford 2015). In summary, when a firm faces a situation of uncertainty and the ability to identify future situations decreses, there is a need to make better decisions, for which more information is needed. Information is provided by the MCS in different ways. The diagnostic use provides information on the fulfillment of goals, progress and reporting. On the other hand, the interactive use enables the search for opportunities, facilitating information flow, improving decision making and stimulating a dialogue that produces action and leads to organizational learning (Janke et al. 2014). Hence, the various MCS uses are the channel to provide important information for strategy deployment of the whole process under different levels of uncertainty. The above reasoning suggests that both MCS uses, diagnostic and interactive, allow you to address the information requirements arising from observed external uncertainty, and thereby produce the desired effects on capabilities (Pondeville et al. 2013; Janke et al. 2014).

In their original proposal, Simons (1995) argues that the higher the uncertainty, the more monitoring/diagnostic uses are necessary to reduce the information gap and to manage this strategic uncertainty (Galbraith 1973; Simons 1995; Simons 2000). Some studies show that when MCS are used or at least analyzed separately, the results are inconclusive and the perceived level of uncertainty is not directly related with a type of system used. Here are some examples. It has been found that diagnostic controls, such as financial budgets for performance evaluation, tend to be used to a lesser extent when uncertainty levels are relatively high (Govindarajan 1984; Hayes 1977). Instead, they tend to use an interactive non-financial MCS use (broad scope) to a greater extent in order to cope with external environmental uncertainty more effectively (Chenhall & Morris 1986 ;Ezzamel 1990). Simons (1987, 1995) also argues that some firms operating in uncertain environments require the ongoing attention of managers and employ highly interactive control processes to enhance managers' abilities to anticipate and manage future uncertainties. Scott and Tiessen (1999) also propose that companies facing uncertainty should emphasize employee participation, encouraging teamwork to have more and better answers, ie, an interactive use of MCS. Even more, Govindarajan (1984) argues that the greater the environmental uncertainty, the greater the need for superiors to rely on subjective rather than formula-based approaches in evaluating performance. I.e., in highly uncertain situations, measuring firm performance requires management's greater reliance on non-financial measures used in interactive controls (e.g., market share, customer

satisfaction, efficiency and quality) (Govindarajan & Shank 1992). This means that the results are inclined towards that increased uncertainty related more with the interactive use; thus, PEU should be associated with the development of the interactive use of MCS. Nevertheless, this is not conclusive because Hoque (2004) found an insignificant effect of the environmental uncertainty on performance acting through use of non-financial performance measures (Interactive MCS uses), casting doubt on previous results that support a strong effect. On the other hand, studies show that formal diagnostic controls may be especially relevant in uncertainty circumstances because they support "systematic rather than chaotic reaction to change" (Abernethy and Brownell, 1999). Also, Sakka et al. (2013) findings show that MCS used in a formal traditional diagnostic way enhanced performance when uncertainty was present. Thus, PEU should be associated with the development of formal diagnostic MCS.

Diagnostic and interactive use of MCS fulfill different roles and a balanced use might vary depending on the level of uncertainty (Henri 2006a). Research grounded in contingency theory finds that companies use "sophisticated management control systems" when facing environmental uncertainty (Mia 1993; Khandwalla 1977; Chenhall 2003). Even more, researchers suggest the need for a combination of traditional formal controls, such as diagnostic controls, but they should be more flexible controls and take place within a situation that involves intense verbal communication between groups in conditions of environmental uncertainty (Merchant 1990; Chapman 1998; Chenhall 2003). Khandwalla (1977) argues that organizations facing pressure will initially tighten control so as to threaten short-term survival and then adopt more organic controls. In line with the most sophisticated systems that promote both uses, Chenhall (2003) argued that in an uncertain situation, where there is a need for more information, the diagnostic MCS use should be sufficient to assist in taking and implementing decisions in an interactive manner. From the above results we can see that a balance between diagnostic and interactive MCS uses facilitate the creation of unique organizational capabilities. As Simons (1995, 2000) said, top managers use diagnostic controls to know and learn; and interactive control, to experiment and stimulate opportunity-seeking (Simons 1995; Simons 2000). Environmental uncertainty requires the company to act in two directions: first understand the situation, and second to be able to respond more rapidly to unforeseen changes in order to survive (Lawrence and Lorsch, 1967; Covin and Slevin, 1989). Learning orientation is responsible for the first, and entrepreneurial orientation can enhance this response (DeSarbo et al. 2005).

The use of MCS is associated with the superior performance of companies that have an entrepreneurial orientation (EO), unlike those that have more conservative strategies. Furthermore, performance has been associated with entrepreneurial firms where the MCS is extensively used (Chenhall & Morris 1995). In the same line, knowledge-based resources as the use of MCS, when they are directed to discover and exploit opportunities (interactively), are positively related to firm performance, and an entrepreneurial orientation (EO) enhances this relationship (Wiklund & Shepherd 2003). There is growing interest in literature in identifying and defining the determinants of organizational capabilities. MCS and uncertainty play an important role here. On the one hand, our previous results support that the diagnostic and interactive uses of MCS have a direct impact on the ways and perceptions related to learning and entrepreneurial behaviors that can support, in different ways, the search for opportunities and results. On the other hand, it can be argued that the relationships studied could change and be modified when facing a perception of uncertainty.

From the above results we can conclude that both diagnostic and interactive uses of MCS are related to the development of organizational capabilities; however, in the presence of uncertainty a balanced use of diagnostic and interactive MCS facilitates the creation of unique organizational capabilities. Totally in line with Mundy's (2010) assertion that balanced use of MCS is essential to effectively generate and support organizational capabilities and performance. This allows us to assume that the perception of uncertainty affects the level of impact of both uses of MCS in other variables; therefore, capabilities and performance will be affected by this perception. Despite this, it is not totally clear yet how the perception of environmental uncertainty (PEU) affects the development of capabilities and performance.

Capabilities-PEU-Performance

The changing environments of business organizations are leading them to become highly competitive, promoting the creation of knowledge-based organizations that learn and use intellectual capital as a source of sustainable entrepreneurial competitive advantage, thus enabling them to obtain better yields (Garvin 1993; Senge 1990). In this study we focus on two capabilities that have shown to be directly related to performance, learning orientation (LO) and entrepreneurial orientation (EO), and we seek if PEU has a mediating effect in this relationship. Lumpkin and Dess (1996) argue that the relationship between capabilities and performance is likely more complex than a simple main-effect-only. It could be modified by differences in the context, and scholars can benefit from considering the mediating effects of the environment in the firm's characteristics.

Recent investigations suggest that the environment modifies the relationship between organizational capabilities and performance (Zahra & Garvis 2000; Lumpkin & Dess 2001; Wiklund & Shepherd 2005). Environmental uncertainty, in which the source of uncertainty is the external environment, implies that unpredictable environmental variables can influence firm performance (Miller, 1993). Also, Wiklund and Shepherd (2005) defend the idea that the diverse dimensions of the environment will also influence different factors of performance growth, as can do capabilities. Frequently, two dimensions called dynamism and hostility are used to investigate this influence; both dimensions are related to uncertainty, but they do not have the same impact on all capabilities. Environmental dynamism was defined as the rate of unexpected change or change that is hard to predict in a given environment (Bisbe & Malagueño 2012). For example, the most common argument is that the influence of capabilities, such as EO, on performance becomes more intense when the firm acts in a dynamic and hostile environment, i.e., when an environment of uncertainty is perceived. In this type of environment, firms that behave more proactively and aggressively will achieve better performance (Lumpkin & Dess 2001). In the same line, studies suggest that entrepreneurial orientation constitutes a good alternative for SMEs when they face hostile and uncertain environments (Covin & Slevin 1989; Miller & Friesen 1982; Miller 1983). Also, according to the life cycle models of the sectors (Porter 1980), a dynamic environment where not everything is known, suggests a good space with an entrepreneurial attitude where radical innovations proposed are developed. On the other hand, there are studies suggesting that uncertainty does not have the same impact on all capabilities. Smith et al. (2001) argue that firm performance will tend to be greater when the firm moves in stable, simple, and benign environments; an environment that assumes that learning orientation moves in a continuous and that there is space to reflect on lessons learned (K. G. Smith et al. 2001). Following the same argument, in stable sectors where it is easier to predict the actions of competitors, technological movements and consumption patterns, a learning orientation (LO) should thrive to develop, but instead, an entrepreneurial orientation is less likely to succeed (Moreno & Casillas 2008).

This implies that a business will use its particular internal strengths or capabilities, depending on the circumstances and its assessment of the situation in the external uncertain environment (DeSarbo et al. 2005). There is a relationship between both capabilities studied, uncertainty and performance, but the impact may vary. We can generalize that both relationships (EO-performance & LO-performance) can be modified in the presence of uncertainty.

In summary, following the research on the contingency theory outlined in the previous section and the above rationale, we expect that both studied relationships: i) Capabilities–Performance and ii) MCS–Capabilities, will be modified by the mediating variable called perceived environmental uncertainty (PEU). The mediating function of the perceived uncertainty variable represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest (Baron & Kenny 1986). Mediating model are used where the nature or strength of a relationship between a variable and an outcome criterion will depend on the influence of particular aspects of context (Brownell 1982; Brownell 1983; Brownell 1985; Davila 2000). This interaction approach include studies that examine how organizational context mediate the relationship between variables, in this case: i) Capabilities–Performance and ii) the uses of MCS–Capabilities (Brownell 1983; Brownell 1985; Govindarajan & Gupta 1985).

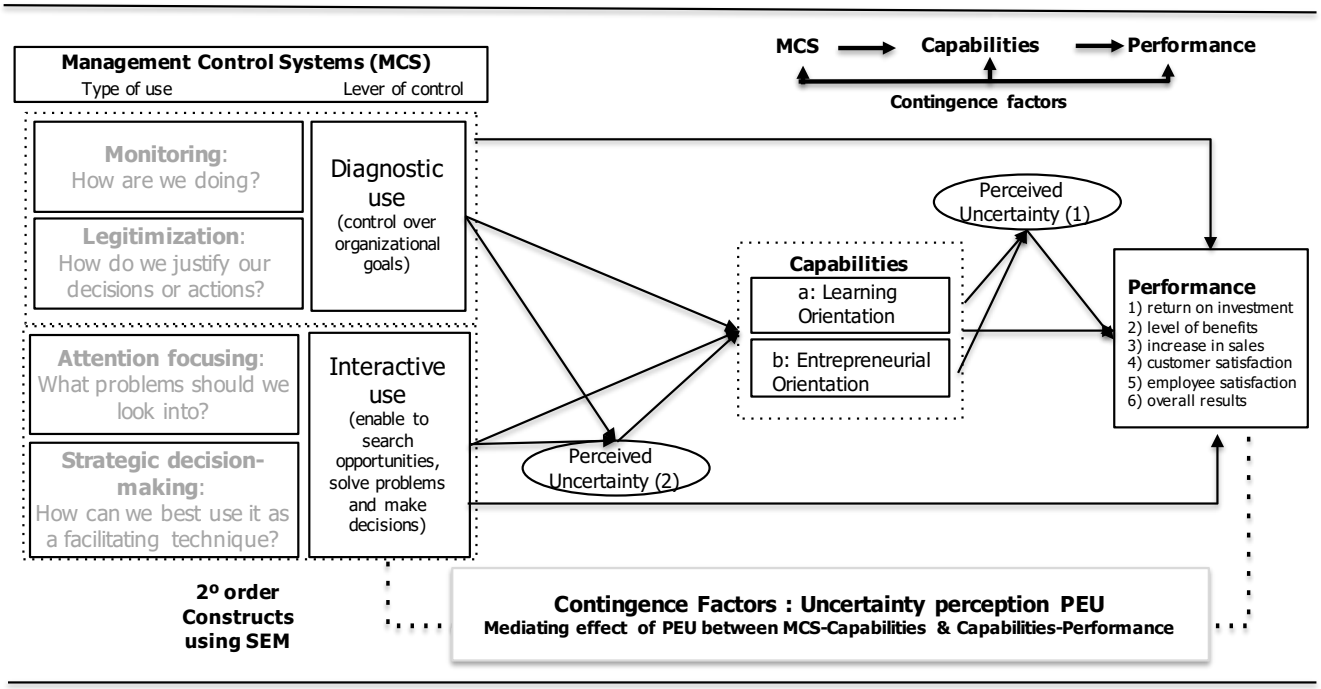
4.4. Theoretical model and research hypotheses

4.4.1 Theoretical model

This work adopts Simons (1995) and Vandenbosch (1999) classifications of MCS uses and both are related to examine the extent to which MCS uses impact the firm´s capabilities and performance. Secondly, the set of constructs and their proposed relationships (MCS-Capabilities & Capabilities-Performance) will then be tested relating them to PEU, trying to see if these relationships are mediated by the inclusion of the variable PEU in the model presented below (figure 4.1).

Based on the results obtained in the previous chapters, about the impact of MCS uses on LO & EO capabilities and how the diverse MCS uses impact on performance, directly or indirectly through capabilities, the main question in this work, represented in Figure 4.1, seeks to identify if PEU mediates these relationships. Using a contingency-theoretic perspective, the conceptual roots of this work lie in the idea that: MCS-Capabilities-Performance relationships will be modified by the mediating variable called perceived environmental uncertainty (PEU). Specifically, this work investigates the extent to which PEU may play a significant mediating role in the relationships between: 1) Capabilities-PEU(1)-performance and 2) MCS-PEU(2)-Capabilities. In Figure 4.1, PEU (1) represents the inclusion of the PEU variable between Capabilities and Performance, while PEU (2) represents the inclusion of the PEU variable between MCS and Capabilities.

Figure 4.1: Theoretical model

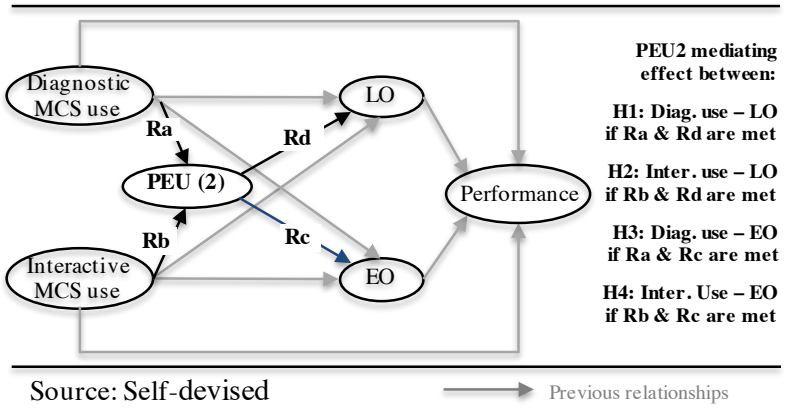


Source: Self-devised

4.4.2 Hypotheses

Summing up the suggestions, we propose the following general hypothesis. This chapter takes the relationships proposed and results in the last chapter of this thesis, as the basis of comprehensive analysis in this chapter. Here, we analyze, how the inclusion of the variable PEU modifies the previously studied relationships. In other words, considering the importance of the PEU mediating effect in our model, we intend to provide an approximate significance test for the mediating effect of perceived uncertainty over the MCS – Capabilities – Performance relationships in two steps: MCS–PEU2–Capabilities (Figure 4.2) and Capabilities–PEU1–Performance (Figure 4.3). Thus the hypotheses related to the environmental uncertainty are developed.

Figure 4.2: Hypothesis H1 to H4
(Diagnostic / Interactive MCS uses - Capabilities through PEU2 mediating effect)



Source: Self-devised

Hypotheses for the direct effect of Diagnostic/Interactive MCS uses – Capabilities relationship through the mediating effect of PEU2 (Figure 4.3) (H1 to H4) are:

H1) There will be a PEU2 mediating effect between the diagnostic use of MCS – LO Capability, if Ra and Rd are met [38].

H2) There will be a PEU2 mediating effect between the interactive use of MCS – LO Capability, if Rb and Rd are met [38].

H3) There will be a PEU2 mediating effect between the diagnostic use of MCS --EO Capability, if Ra and Rc are met [38].

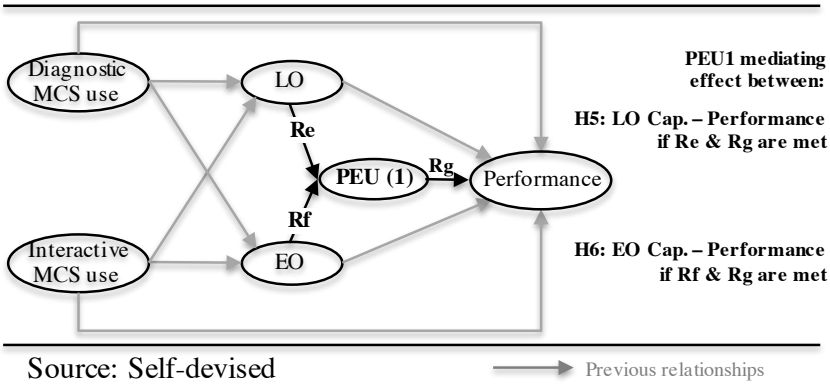
H4) There will be a PEU2 mediating effect between the interactive use of MCS – EO Capability, if Rb and Rc are met [38].

Hypotheses for the direct effect of Capabilities - Performance relationship through the mediating effect of PEU2 (Figure 4.3) (H5 and H6) are:

H5) There will be a PEU1 mediating effect between LO Capability – Performance, if Re and Rg are met [39].

H6) There will be a PEU1 mediating effect between EO Capability – Performance, if Rf and Rg are met [39].

Figure 4.3: Hypotheses H5 and H6
(Capabilities - Performance through PEU1 mediating effect)



Source: Self-devised

It is noteworthy that the mediating effect can be total, partial or null, depending on changes that occur in the proposed relationships before entering the PEU variable.

4.5 Methodology

4.5.1 Data collection, descriptive statistics and variable measurement

Data- Sources and information collection

Data were collected from primary sources in the form of structured surveys from business managers in the manufacturing, trade, banking and service sectors, in 4750 Mexican firms in México City, listed in the Mexican DENUE 2012 INEGI database. We collected information over the course of eight weeks, using online systems (323 surveys received, 50.2%) and offline (face-to-face) (321 surveys received, 49.8%), giving a total of 644 received questionnaires (response rate 13.56% of the sample). The invitation to participate consisted of an initial personalized email letter. In order to increase the response rate, we sent two follow-up reminding emails, and a final reminder to non-respondents (Dillman 2000).

[38] Ra, Rb, Rc, Rd: Relationship a,b,c,d

[39] Re, Rf, Rg: Relationship e,f,g

Questionnaire

Hypotheses were tested with data collected through a questionnaire survey (Appendix B shows the questionnaire items), which was designed following the steps suggested by the literature (Archer 2003; Dillman 2000):

> 1) Select in the literature of strategy and management control systems, the constructs that measure the variables and draw up a first draft of the questionnaire. 2) This draft is contrasted with interviews of members of the target population. 3) Make adaptations based on the comments received. 4) Choose an attractive format, good quality WEB, and printout form.

Non-response bias

To check for potential non-response bias, offline respondents were used as proxies for non-response across five measures. Using a comparison of the means, no significant differences ($p < 0.01$) were found between the firms age, size, system amplitude used, respondents' formal education and management experience of online and offline respondents' firms (non-respondent), suggesting the absence of any obvious non-response bias in this sample (Appendix C shows the Non-Response bias analysis).

Common method variance

The Harman´s one-factor test, was employed to ensure the absence of the potential undesirable effects of common method variance (CMV) (Podsakoff et al. 2003), caused by single-source bias. This test has yielded 7 factors with eigenvalues greater than one, with the first factor explaining only 19.04% of the variance, indicating that no single factor was dominant. This test indicated the absence of common method effects in our data, suggesting that CMV due to single-source biases was not an issue in our study (See Appendix C). Past studies (Bisbe & Otley, 2004; Bisbe & Malagueño 2009, 2015) show that charge percentages in a single load factor below 22% are typically accepted.

Descriptive statistics

We received 644 usable questionnaires, making it a response rate of 13.56%. This range is similar to the 12–25% range reported in recent studies, 22.5% (Hall 2008); 24% (Henri 2006a); 42% (Naranjo-Gil & Hartmann 2007a); 12% (McKelvie & Davidsson 2009); 15.6% (Wiklund & Shepherd 2003). The response sample is distributed as follows: 296 (46%) are large firms with an average of 4,257 employees, on average 44 years of age, 191 (29.7%) medium-sized firms with an average of 158 employees and 24 years of age, and finally 157 (24.4%) small firms with an average of 32 employees and 11 years of age. The respondents' positions are 79 CEOs (12.3%), 109 directors of divisio (16.9%), 111 directors of department (17.2%) and 345 managers (53.6%). Firms are distributed in four sectors: 407 services (63.2%), 105 manufacturing (16.3%), 81 banking (12.6%) and 51 trading (7.9%). (Descriptive statistics of the constructs used and correlations matrix are in Appendix D Part 3).

Variable measurement

The variables used to test robustness of the model were measured as follows. All variables were measured using previously validated scales (Table 4.1). All questions were asked using a five-point Likert scale. The scales are shown in Appendix B. Survey instrument.

MCS uses

The MCS uses were measured using a version of Bety Vandenbosch (1999) system with four dimensions: Monitoring; Focusing Attention; Legitimizing Decisions and Solving problems. Henri (2006a) adapted this Vandenbosch version changing the dimension of solving problems, an adding a dimension to measure the Strategic Decision-Making with seven elements given by Brockman & Simmonds (1997). The anchors for the uses of MCS scale were `` 1= never used, 2= rarely used, 3 = sometimes used, 4 = often used, 5 = always used". A factor score was calculated for each of the four uses based on all the items to check construct validity. Based on the theoretical approach of this paper, as was done in the previous chapter, the four dimensions scales of the MCS uses were used to create two second-order constructs called Diagnostic and Interactive uses respectively in accordance to the proposals made by Simons (Simons 1990; Simons 1995; Simons 2000) and Vandenbosch (1999). A summary of this procedure will be explained in section 4.5.4: Second-order constructs.

Table 4.1: Variable measurement

Construct	Source	Dependent & independent variables
MCS uses	27-item scale adapted by Henri (2006a) from Vandenbosch (1999)	**Independent:** **Diagnostic use:** Monitoring; legitimizing **Interactive use**: focusing att.; strat. decision-making;
Learning Orient.	4-item scale proposed by Hult (1998)	**Dependent & Independent** (LO)
Entrepreneurial Orient.	14-item scale by Lumpkin et al. (2009)	**Dependent & Independent** (EO)
Performance	6-item scale by Jaworski & Kohli, (1996); Kohli & Jaworski, (1993) adapted by Gómez-Villanueva, (2008)	**Dependent** (Pf)
Perceived environmental uncertainty (PEU)	8-item scale by Govindarajan (1984)	**Independent** (PEU)
Control variables	Firm size (10-50 small; 51-250 medium; > 250 Large)	

Capabilities

The Capabilities section asks the respondents the extent to which each item describes their organization where: 1 = does not describe and 5 = fully described. LO & EO Capabilities were assessed using the two different validated scales.

Learning Orientation (LO). Sinkula et al. (1997) developed a first 13-item scale to measure LO, then it was adapted by Hult (1998) into a four-item scale. Our work uses this last scale which offers a more general measure of learning orientation applicable to the whole company (Hurley & Hult 1998), since we found it fit for this study. A factor score is calculated with the four items to check construct validity.

Entrepreneurial Orientation (EO). We used the scale proposed by Lumpkin et al. (2009). This scale is an upgraded version of the three-dimension scale of proactiveness, innovation and risk aversion (Covin & Slevin 1989), to which two more dimensions were added: autonomy with four items, and competitive aggressiveness with one more item, giving a total of 5 dimensions.: innovativeness, risk taking, proactiveness, autonomy and competitive aggressiveness (Lumpkin et al. 2009) giving a more complete character to the concept. This latter scale has become the accepted measure for EO within the related

literature (Lumpkin et al. 2009). A factor score is calculated with the fourteen items to check construct validity.

Performance

In our model, organizational performance is modeled as a result of strategic capabilities and MCS uses, which allows us to explore the processes by which organizational outcomes are improved. As several authors argue (Dess & Robinson 1984; Venkatraman & Ramanujam 1987), in terms of consistently providing valid and reliable performance assessment, neither objective nor subjective measures are superior. Following upon prior studies by accounting researchers (Swieringa & Moncur 1972; Milani 1975; Hayes 1977; Kenis 1979; Merchant 1981), this study chose to use self-ratings of performance measures for performance differences among firms, since we have small businesses in the sample and it has been shown that is quite common for owners/entrepreneurs to refuse to provide objective and actual measures of organizational performance to researchers. Therefore, it is better to ask for the perceived performance (Sapienza et al. 1988). Furthermore, it was decided to undertake self-ratings along a multiplicity of dimensions rather than on any single dimension. The instrument used includes measuring performance on six dimensions of functional and overall performance: return on investment (ROI), profit, sales growth, customer satisfaction, employee satisfaction and overall performance (Kohli & Jaworski 1993; Jaworski & Kohli 1996; Kirca et al. 2005) adapted by (Gómez-Villanueva 2008). These are self- rated measures of performance, frequently used to measure organizational performance in management accounting research. The respondents were asked to indicate the performance of their organization over the past 12 months against the expectations or goals set at the beginning of the year, on a scale of 1 to 5, (where 1=Very poor performance, 2= Low performance, 3=Goals were reached, 4=Above goals and 5=Outstanding performance, above targets). A higher score indicated better performance. Descriptive statistics of the constructs and correlation matrix are presented in Appendix D. Descriptive stats, correlations: Part 3: Diagnostic, interactive, LO, EO, Performance, PEU (Ch.IV).

Perceived Environmental Uncertainty (PEU).

According to Tymon et al. (1998), the measure should represent top managers' perceptions of the level of uncertainty regarding the external environment. This research focuses on decision-makers' perceptions of the uncertainty related to four groups, 1) customers; 2) suppliers of materials, labor and capital; 3) both competitors for markets and resources and 4) regulatory groups. PEU was assessed using eight items: manufacturing technology, competitor's actions, market demand, product attributes/design, raw material availability, raw material price, government regulation, and labor union actions. These items were used from the early, widely used instrument developed by Govindarajan (1984). Respondents were asked to indicate on a 5-point Likert-type scale, the extent that each of the following factors was predictable or unpredictable in the context of their main business, where: 1= highly unpredictable and 5= highly predictable. The descriptive statistics (means and standard deviations) of responses on PEU factor is presented in Appendix D. (Descriptive stats, correlations: Part 3: Diagnostic, interactive, LO, EO, Performance, PEU (ch.IV)). Also, Appendix M. Chapter IV: PEU Factor analysis, provides a correlation matrix between the eight environmental items with a significant correlation between the variables coefficients, suggesting that they are related and may constitute one factor. Additionally, it also presents the factor loadings derived from an EFA. It extracted one factor explaining 67.79% of the variance. The KMO & Cronbach coefficient alpha (Cronbach 1951) was computed to measure internal reliability of the instrument. The KMO of 0.805 and Cronbach Alpha of 0.779 for the scale

suggested that the scale was internally reliable (Nunnally et al. 1967).

Control variables

Kirca et al. (2005) meta-analysis mainly emphasizes the size of the company, the dynamism of the environment, and the generic strategy of the organization (Kirca et al. 2005) as the control variables more often used. Most MCS studies have defined and measured size relating it to the number of employees. Contingency theories of organizations (Burns & Stalker 1961; Lawrence & Lorsch 1967) suggest that size may affect the way organizations design and use management systems (Wiklund & Shepherd 2003). Khandwalla (1977). Moreover, Merchant (1981) found that large firms were more diversified and divisionalized, employed more formal communications, and made greater use of sophisticated controls (Khandwalla 1977; Merchant 1981). Few MCS studies have explicitly considered size as a contextual variable. Almost all studies have examined relatively large organizations, usually justifying this by arguing that large firms tend to have incorporated formal MCS and are more likely to benefit from the use of MCS than are smaller firms (OConnor et al. 2011). Thus, considering the influence of common factors in MCS, such as firm size (Chenhall 2003; Hoque 2004; Hoque & James 2000), size is used as a control variable. Since the size of a firm has been shown to affect the way in which control systems are utilized (Bruns & Waterhouse 1975; Merchant 1981), in our study, the classification used to categorize firms size is determined according to the number of workers, as is done in other previous research studies (C. Lee et al. 2001; Santos et al. 2002) and converted into a binary variable. Finally, some variables in the questionnaire were asked with a flipped scale (reverse-scored), (†EO4 †EO13 †EO14)†, to ensure the absence of bias in responses.

4.5.2 Construct validity and reliability

Several procedures and tests were conducted to establish the validity and reliability of the scales employed in our model: content and face validity, tests of convergence and discriminant validity using exploratory and confirmatory factor analyses (EFA & CFA), and finally some data test of normality. Based on the tests, all constructs reflect strong validity and reliability (see Appendix F. Convergent-discriminant validity. Part 4: EFA: MCS uses – LO & EO - Performance – PEU (Ch.IV).

Content and face validity of questionnaire

The scales used in this study were founded on the review of the most relevant literature, guaranteeing the content validity of the measurement instrument. We pre-tested the questionnaire in three steps for clarity, complexity, and ambiguity to provide face validity: i) Five academic business professors in planning/financial/accounting were asked to revise and complete the questionnaire to provide comments on its form and content; ii) Five top managers (planning/financial/accounting officers) were interviewed and asked to complete the questionnaire; iii) The questionnaire was completed by a group of MBA students. Minor adjustments were made in terms of wording and presentation according to recommendations given.

Convergent and discriminant validity

To provide convergent and discriminant validity, we ran several analyses:

1) The correlation matrices of MCS uses, capabilities, performance and PEU show positive and significant correlation coefficients at the 0.01 signification level (see Appendix F. Convergent-discriminant validity. Part 1: Correlation MCS uses,

capabilities, performance, PEU). Knowing that convergent correlations should always be higher than the discriminant ones, the correlation matrix provided a first evidence for both convergent and discriminant validity.

2) The exploratory factor analysis (EFA) across all constructs (e.g., four MCS uses in two second-order factors, two capabilities, performance and PEU) to test convergence and discriminant validity indicated that the different scales were one-dimensional, and every construct exhibited acceptable results.

Table 4.2: Internal consistency and convergent validity

Variable	Indicator	α	CR	AVE
Monitoring		0.87	0.88	0.64
Legitimizing		0.93	0.93	0.61
Att. Focus		0.88	0.85	0.59
St. Mgmnt. Dec.		0.91	0.90	0.60
Diagnostic 2º order	Monitoring Legitimizing	0.93	0.77	0.62
Interactive 2º order	Focusing Desicion	0.93	0.82	0.70
LO		0.83	0.83	0.62
EO		0.97	0.97	0.68
PEU		0.78	0.95	0.69
Performance		0.88	0.88	0.64
Goodness of fit indices (Measurement model):				
$\chi 2$ (DF) = 2980.307; $\chi 2$/DF=2.375; NFI= 0; Significance=0; GFI=0.904; CFI=0.924; RMSEA=0.046				

To establish the reliability of the test, we examined the Cronbach Alpha, KMO and composite reliability of each construct [40]. Our results showed individually Cronbach's Alpha values above 0.87, confirming the reliability (Nunnally et al. 1967). Also Kaiser-Meyer-Olkin Measure showed a value of 0.957 and Bartlett´s test of sphericity met the desired levels. Composite reliability (CR) represented the shared variance among a set of observed variables measuring an underlying construct (Fornell & Larcker 1981). Our results fully complied with the recommendations of at least 0.60 (Bagozzi & Yi 1988). Thus, reliability of the constructs demonstrated high-internal consistency of the constructs[41].

3) To verify convergent validity, we made a confirmatory factor analysis (CFA) for all constructs (MCS uses –Diagnostic & Interactive-, capabilities -LO & EO- performance - PEU). The variance extracted had to exceed the recommended cut-off point of 0.50 (Hair et al. 2006) to reflect adequate convergent validity (Fornell & Larcker 1981), and besides three elements were examined for the CFA, the significance of the factor loading, the R^2 for each item and the overall acceptability of the measurement model using chi-square statistics and three fit indices (GFI, CFI and RMSEA)[42]. This indices are among the most frequently reported. The recommended threshold values are as follows: (i) GFI > 0.90 (Joreskog & Sorbom 1984), (ii) CFI > 0.9 (Hu & Bentler 1995), and (iii) RMSEA < 0.08 (Browne et al. 1993). Our results are: GFI 0.904; CFI 0.924; RMSEA 0.046. Table 4.2 shows the results of the CFA (α, CR & AVE) for each construct, fit indices.

Reliability

Reliability internal consistency means how well the items that reflect the same construct yield similar results. There is a wide variety of internal consistency measures that can be used. We used the "Average InteritemTOTAL Correlation" and focus on the two uses of MCS. These approaches use all of the items in our instrument, designed to measure the same construct. We

[40] Constructs must exceed the recommended Cronbach's Alpha reliability coefficient cut-off point of 0.70 (Fornell & Larcker 1981; Nunnally et al. 1967).
[41] See appendix F. Convergent-discriminant validity. Part 4: EFA: MCS uses – LO & EO - Performance – PEU (ch.IV) and table 4.2.
[42] GFI, Goodness of fit index, (Joreskog & Sorbom 1984) value is less than or equal to 1, a value of 1 indicates a perfect fit;
CFI, comparative-fit index, (Bentler 1990), fall in the range from 0 to 1, values close to 1 indicate a very good fit;
RMSEA, root mean square error of approximation, (Browne et al. 1993), practical experience show that a value of the RMSEA of about .05 or less would indicate a close fit of the model in relation to the degrees of freedom

first computed the correlation between each pair of items. The average interitem correlation was the average or mean of all these correlations in each construct, and we also computed an average score for the items in each use and used it as a variable in the correlation analysis. Then, we calculated an average of this correlation and the results in each use showed an average of 0.806 significant at a level of 99%, ranging from 0.766 to 0.853 in this sample, remaining at a very acceptable level for this analysis (see Appendix E Reliability. Part 1: Average Inter.itemTotal Correlation).

Normality

Similar to Westphal, to verify the hypothesis of normality necessary for the result of some reliable analysis (Westphal 1999) two tests were performed (Kolmogorov-Smirnov; Shapiro–Wilk). The analysis, performed by separating the sample into six factors, supported the normality of all constructs and provided support for the robustness of the findings (see Appendix E . Reliability. Part 2: Test of normality).

4.5.3 Analysis Models

Following is a review of the set of analysis to be performed. The first step was the development and testing of the second-order constructs related to the four MCS uses. With the results of the previous analysis and using the full model proposed, the second step was to use structural equation modeling (SEM) to test the relation between the MCS use – PEU –Capabilities – PEU – Performance. Next we will develop and prove the second-order constructs.

4.5.4 Second-order constructs: Diagnostic & Interactive uses

As we said above, this essay uses the second-order constructs [43], proposed and analyzed in the previous chapter. Second-order constructs named Diagnostic & Interactive uses, treated as latent and intangible second- order constructs (Joreskog & Sorbom 1993) are proposed as the combination of two classifications: The theoretical proposition of levers of control (LOC) (Simons 1995) and the proposal of executive support systems classification (ESS) (Vandenbosch 1999). Following is the summary of the main results (See Appendix N, for a complete description of the analyses performed). We argue, according to the arguments offered by Simons (1990, 1995, 2000) and Vandenbosch (1999), that the four uses (Vandenbosch 1999) can be grouped in two second-order constructs proposed by Simons (1995). On the one hand, the diagnostic use scale is a second-order factor measured by two first-order factors: monitoring and legitimizing. On the other hand, the interactive use scale is a second-order factor measured by two first-order factors: attention focusing and strategic decision-making. After performing an exploratory factor analysis (EFA) for each of the two constructs, results indicated one-dimensional scales and exhibited acceptable results. To confirming the existence of multidimensionality in our second-order constructs we did a confirmatory factor analysis (CFA) using structural equations analysis and SPSS AMOS 21.0, with a rival model strategy (Anderson and Gerbing, 1988; Steenkamp and Van Trijp, 1991; Hair et al., 2006). Results showed that the second-order model had a much better fit than the first-order model. Thus, we could conclude that the variables “diagnostic use” & “interactive use” showed a multidimensional nature, that the second-order models were significant and that we would use it in our complete model to

[43] Second order constructs: Diagnostic & Interactive uses : According to the arguments of Simons (1990, 1995, 2000) and Vandenbosch (1999), that the four uses (Monitoring, Legitimization, Attention Focusing, and Strategic Decision-Making) (Vandenbosch 1999), can be grouped in two second order constructs named diagnostic and interactive uses proposed by Simons (1995). See appendix N, for a complete descrption of the analyses performed.

estimate the proposed hypotheses.

4.5.5 Structural equation modeling (SEM)

This study uses Structural Equation Modeling (SEM) to test the hypotheses about the relationships between MCS uses – PEU – Capabilities & Capabilities – PEU – Performance and how these relationships are impacted by PEU in two steps. This work responds specifically to calls for quantitative research that provides insights into different uses of MCS and their interrelations with other constructs (Ahrens & Chapman 2007; Henri 2006a; Henri & Journeault 2010).

We use SEM to test individual path coefficients in the relationships proposed. Additionally SEM will provide us with an evaluation of the entire model; thus, we focus the analysis on a macro-level perspective (Kline 1998) rather than on its parts. This allows to draw learning from the theoretical model as a whole. SEM models have been employed in order to build latent variables from multi-item questionnaires, and thereby to simultaneously identify statistical significance with multiple dependent variables (S. W. Anderson & Young 1999; Shields et al. 2000). Finally, the SEM approach is appropriate when the theory sets out to explain the role of variables that intervene in the studied relationships (Luft & Shields 2003). SEM allows us to incorporate the influence of various factors under the theory supporting that it unfolds and to assume contextual factors (such as noise) within the model, and not to consider how the results might be modificated by these contextual factors (Chenhall 2005), unless you make explicit in theory foundation -as is our case- to analyze the contextual effect of PEU. Importantly, SEM assumes multivariate normality, which can usually be identified through univariate analysis (Kline 1998). A review of the data shows that all measures were within tolerable limits of skewness and kurtosis, and no outliers were identified. We conducted the statistical analysis for the 644 firms present in the sample, using SPSS (V.21.0) software, and the structural equation modeling software program SPSS-AMOS (V.21.0) was used to estimate the structural equation models depicted in Figures 4.2 and 4.3.

SEM model is analyzed and interpreted in two stages (Kline 1998; Byrne 2013; J. C. Anderson & Gerbing 2004): The first stage estimates the measurement model while the second estimates the structural model. Both stages were assessed using the maximum likelihood estimation method (Blentler & Chou 1987). In our study, we followed these steps: first, we estimated the general measurement model; then, in order to be able to analyze the hypotheses in the proposed model, the structural model analysis was conducted with three models. Findings were documented in each one.
Model 1) Analysis of the relationships between MCS - Capabilities – Performance (no PEU)
Model 2) Analysis including the PEU variable in position "2", between MCS and capabilities (H1 to H4)
Model 3) Analysis including the PEU variable in position "1", between capabilities and performance (H5-H6).

Measurement model

With the aim of assessing the measurement reliability and validity, the first step was to perform a CFA for all the constructs in the model, employing SEM technique. In other words, it is important to assure that all constructs exhibit acceptable model fit, the factor loadings reflect adequate R^2 (higher than 0.50), all factor loadings are statistically significant ($p< 0.01$) and variance extracted (above 0.50) for adequate convergent validity. Also, it is important to exceed the recommended cut-off point above 0.70 for the Cronbach Alpha and composite reliability at least 0.60 and to comply with the recommendation

regarding the use of at least three indicators per latent construct (Landis et al. 2000), and Goodness of fit indices should also meet the recommended levels: GFI >0.9; CFI> 0.9 and RMSEA < 0.08. The first analysis showed some items with inadequate R2 (<0.7) or variance extracted (AVE<0.50). To have a better adjustment it was necessary to carry out a process of refinement of the scales, i.e., the model needed to be respecificied by eliminating items that did not comply with these recommendations (Joreskog & Sorbom 1993). Respecifications were necessary for 7 of the 59 total items in the following constructs: Attention Focusing (F1, F6 and F7), Strategic decision making (D1); Learning Orientation (L03); and Performance, (P4_SC & P5_SW). After those re-specifications, all constructs exceeded the recommended indicators.

Variable	Indicator	Factor Loading *	α	CR	AVE
Diagnostic 2º order	Monitoring	0.723	0.930	0.77	0.62
	Legitimizing	0.846			
Interactive 2º order	Focusing	0.852	0.927	0.82	0.70
	Desicion	0.815			
LO	LO1	0.862	0.83	0.83	0.62
	LO2	0.850			
	LO4	0.797			
EO	EO1	0.880	0.97	0.97	0.68
	EO2	0.845			
	EO3	0.870			
	EO4r	0.779			
	EO5	0.846			
	EO6	0.832			
	EO7	0.846			
	EO8	0.854			
	EO9	0.815			
	EO10	0.833			
	EO11	0.847			
	EO12	0.838			
	EO13r	0.814			
	EO14r	0.797			
PEU	PU1	0.677	0.78	0.95	0.69
	PU2	0.554			
	PU3	0.571			
	PU4	0.680			
	PU5	0.725			
	PU6	0.692			
	PU7	0.568			
	PU8	0.545			
Performance	P1_S	0.818	0.88	0.88	0.64
	P2_Bº	0.830			
	P3_R	0.834			
	P6_G	0.813			

Goodness of fit indices (Measurement models): *=p<0.01

Overall sample: $\chi 2$ (DF) = 2980.307; $\chi 2$/DF=2.375; NFI= 0; Significance=0; GFI=0.904; CFI=0.924; RMSEA=0.046.

Table 4.3: Internal consistency and convergent validity (factor loadings)

Convergent validity is verified by analyzing the factor loadings and their significance (Table 4.3). Coefficients scores of all factor loadings were significant (p<.001) and all the standardized loadings were higher than 0.50 (Steenkamp and Geyskens 2006), supporting the convergent validity of the indicators (Anderson and Gerbing, 1988). In the measurement model, constructs discriminant validity was assessed by calculating the average variance extracted (AVE) and the squared correlations between constructs were compared (see Table 4.4). The shared variance between pairs of constructs (squared correlations), was always less than the corresponding AVE in the diagonal (Fornell & Larcker 1981); this provided a test of the extent to which a construct shared more variance with its measures than it shared with other constructs (Fornell & Larcker 1981).

Table 4.4: Discriminant validity

	Diagnostic	Interactive	LO	EO	PEU	Performance
Diagnostic	0.619					
Interactive	0.500	0.695				
LO	0.373	0.359	0.619			
EO	0.251	0.259	0.241	0.676		
PEU	0.147	0.167	0.049	0.063	0.693	
Performance	0.228	0.190	0.126	0.165	0.102	0.640

Note: Diagonal = AVE, below the diagonal, the shared variance (squared correlations) is represented.

The CFA results showed that all comparisons between the variances extracted and the squared correlations supported the discriminant validity of the constructs. They also suggested that our re-specified measurement model provided a good fit to the data on the basis of a number of fit statistics. All scales used demonstrated high levels of reliability; all constructs and indicators reflected adequate R^2; all factor loadings were statistically significant ($p< 0.01$), met the recommended cut-off point for the Cronbach Alpha, composite reliability and variance extracted, exhibited acceptable model fit, and complied with the recommendation regarding the use of at least three indicators per latent construct (Landis et al. 2000). Therefore, the measurement model was considered reliable and we could continue with the second step related to the structural model (see Appendix O. Chapter IV: Measurement model).

4.6 Research findings

4.6.1 Results of Structural Model

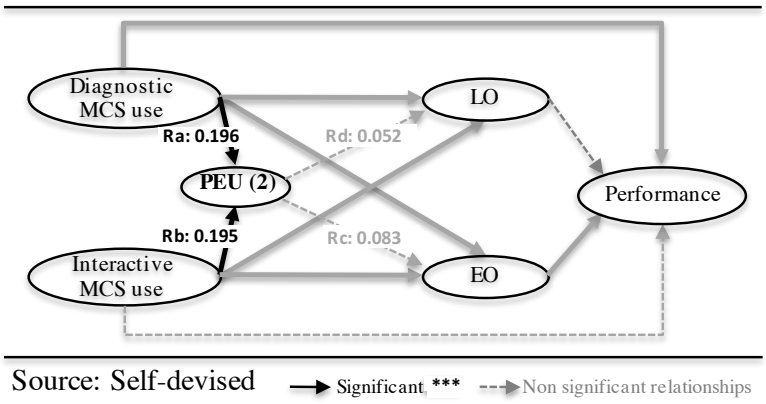
Structural Model

With the above procedures, we could assure the validity and reliability of the used scales to get robust conclusions. Once the measurement model had been analyzed, the complete model was estimated again, but in a structural mode. Remembering that the question we seek to answer is if perceived environmental uncertainty (PEU) mediates the uses of MCS – capabilities – performance relationships, Figures 4.2 and 4.3 (Models 2 & 3). The results obtained are presented for each of the three models: Model 1 tested the initial model without PEU. Model 2, tested the initial model including PEU in position 2, (H1 to H4), between MCS – Capabilities; while model 3 tested the inclusion of PEU in position 1 (H5 & H6), between Capabilities and Performance. All models respected the recommended threshold (Kline 1998) previously mentioned. Table 4.5 presents the results of the structural equation models in terms of path coefficients, significance, goodness-of-fit indices, and results of hypotheses.

Model 1 represents the results obtained in the previous chapter about the relationships between the uses of MCS - capabilities -- performance without PEU.

Model 2 introduces the PEU variable in position 2, (Model 2, Figure 4.4), between MCS and capabilities, proposing a mediating PEU effect on the relationship between the diagnostic / interactive uses of MCS and capabilities (LO and EO), according to the following hypothesis:

Figure 4.4: Hypothesis H1 to H4 results;
(Diagnostic / Interactive uses of MCS - Capabilities through PEU2)



Remembering that, there will be a PEU2 mediating effect between:

H1) Diag. use - LO Cap. if Ra and Rd are met: (Diagnostic -> PEU(2)) + (PEU(2) -> LO)

H2) Inter. use - LO Cap. if Rb and Rd are met: (Interactive -> PEU(2)) + (PEU(2) -> LO)

H3) Diag. use - EO Cap. if Ra and Rc are met: (Diagnostic -> PEU(2)) + (PEU(2) -> EO)

H4) Inter. use - EO Cap. if Rb and Rc are met: (Interactive -> PEU(2)) + (PEU(2) -> EO)

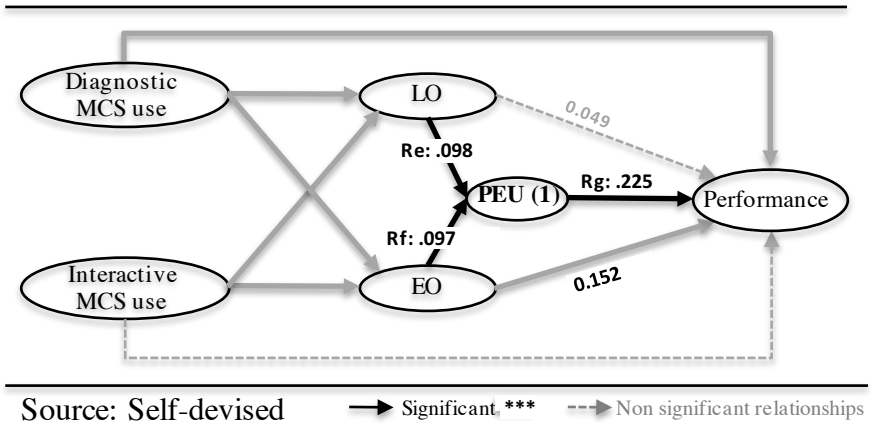
Although the relationship between the diagnostic and interactive uses of MCS with PEU (2) is positive and significant (Ra and Rb), the results showed that PEU in position 2 did not present significant coefficients in the PEU (2) – Capabilities relationship (Rc and Rd); hence, PEU (2) did not have a mediating effect between the uses of MCS and capabilities as originally proposed. In addition, previously proposed direct relations between the diagnostic / interactive uses of MCS and capabilities were not modified either in magnitude or in sign and continued to be significant.

Model 3 introduced the PEU variable in the model (in position 1, Figure 4.5), between capabilities & performance, proposing a mediating PEU effect on the relationship between LO – EO Capabilities - Performance, according to the following hypothesis: There will be a PEU1 mediating effect between:

H5) LO Cap.–Performance if Re and Rg are met: (LO -> PEU(1)) + (PEU(1) -> Performance)

H6) EO Cap.–Performance if Rf amd Rg are met: (EO -> PEU(1)) + (PEU(1) -> Performance)

Figure 4.5: Hypotheses H5, H6 results; (Capabilities - Performance through PEU1)



Knowing that model 1 showed us that the EO–Performance relationship was positive and significant, and that LO–Performance relationship was not significant, Model 3 results showed that, as initially proposed, PEU (1) between the capabilities and performance had a significant and positive relationship; however, a different effect was observed in each capability.

Table 4.5: Results of the structural equation models

Hyp.	Path description & expected sign	Model 1 Without PEU Overall sample Path coeff.	Model 2 Including PEU PEU in (2) Path coeff.	Result	Model 3 Including PEU PEU in (1) Path coeff	Result
	Diagnostic -> LO (-)	0.659 ***	0.667 ***		0.661 ***	
	Diagnostic -> EO (-)	0.532 ***	0.526 ***		0.531 ***	
	Interactive -> LO (+)	0.401 ***	0.418 ***		0.404 ***	
	Interactive -> EO (+)	0.429 ***	0.416 ***		0.429 ***	
	LO -> Performance (+)	0.047 0.32	0.036 0.34		0.049 0.304	
	EO -> Performance (+)	0.163 ***	0.157 ***		0.152 ***	
	Diagnostic -> Performance (+)	0.409 ***	0.412 ***		0.378 ***	
	Interactive -> Performance (+)	0.055 0.277	0.077 0.135		0.018 0.718	
	Ra: Diagnostic -> PEU(2)		0.196 ***	✓		
	Rb: Interactive -> PEU(2)		0.195 ***	✓		
	Rc: PEU(2) -> EO		0.083 0.322	✗		
	Rd: PEU(2) -> LO		-0.052 0.505	✗		
	Re: LO -> PEU(1)				0.098 0.003	✓
	Rf: EO -> PEU(1)				0.097 ***	✓
	Rg: PEU(1) -> Performance				0.225 ***	✓
	Diagnostic/Interactive MCS uses-> Capabilities through PEU2				Hyp. Res.	
H1	If Ra & Rd: PEU(2) effect on Diagnostic -> LO	(Diagnostic -> PEU(2)) + (PEU(2) -> LO)			✓ + ✗	✗
H2	If Rb & Rd: PEU(2) effect on Interactive -> LO	(Interactive -> PEU(2)) + (PEU(2) -> LO)			✓ + ✗	✗
H3	If Ra & Rc: PEU(2) effect on Diagnostic -> EO	(Diagnostic -> PEU(2)) + (PEU(2) -> EO)			✓ + ✗	✗
H4	If Rb & Rc: PEU(2) effect on Interactive -> EO	(Interactive -> PEU(2)) + (PEU(2) -> EO)			✓ + ✗	✗
	Capabilities->Performance through PEU1					
H5	If Re & Rg: PEU(1) effect on LO -> Performance	(LO -> PEU(1)) + (PEU(1) -> Performance)			✓ + ✓	✓
H6	If Rf & Rg: PEU(1) effect on EO -> Performance	(EO -> PEU(1)) + (PEU(1) -> Performance)			✓ + ✓	✓
	Goodness-of-fit indices of the model					
	Chi-square	3031.772	2980.3			
	DF	890	1255			
	$\chi 2$/DF	3.406	2.375			
	GFI	0.827	0.904			
	CFI	0.900	0.924			
	RMSEA	0.061	0.046			
	# cases	644	644			

Note 1: *significant at the 0.1 level; ** Significant at the 0.05 level; *** Significant at the 0.01 level.

Note 2: Hyp. = Hypothesis conclusion: "✓ Supported" or "✗ not supported"

PEU (1) in LO–performance relationship had a total mediating effect, in other words, without PEU, LO – Performance direct

relationship was not significant, but when PEU (1) was inserted between capabilities and performance, a full mediating effect occurred on the relationship between LO capability–performance, with a significant relationship of Re (0.098 ***) and Rg (0.225 ***), which did not exist before. In contrast, PEU (1) in the EO – Performance relationship had a partial mediating effect. I.e., positive and significant relationship was present in the way of EO to Performance through PEU (1): Rf (0.097***) and Rg (0.225***), but also EO – Performance direct relationship (H6) remained significant and positive but going from 0.163*** before introducing PEU (1) to 0.152 *** after introducing PEU (1). Therefore, this change represented a partial PEU mediating effect. Thus H5 & H6 hypotheses were supported showing the mediating PEU effect on the relationship between LO & EO Capabilities – Performance. It is worth mentioning that the introduction of PEU (1) did not affect the relationships on the other side of the model (MCS – Capabilities & MCS Diagnostic use– performance direct relationships) because its coefficients were not modified significantly; in fact, they continued to be positive and significant (see Table 4.5).

Next, Table 4.6 summarizes the relationship between the results obtained and the hypotheses proposed.

Table 4.6: Hypotheses summary results: H1 to H6 (PEU)

Hypothesis	Relationship	Conclusion	Commentaries
H1:	(Diagnostic -> PEU(2)) + (PEU(2) -> LO)	✗ Not supported	The relationships are not significant, PEU(2) -> LO (Rd) and PEU(2) -> EO (Rc)
H2:	(Interactive -> PEU(2)) + (PEU(2) -> LO)	✗ Not supported	
H3:	(Diagnostic -> PEU(2)) + (PEU(2) -> EO)	✗ Not supported	
H4:	(Interactive -> PEU(2)) + (PEU(2) -> EO)	✗ Not supported	
H5:	(LO -> PEU(1)) + (PEU(1) -> Performance)	✓ **Supported**	The relationships are significant in the proposed direction
H6:	(EO -> PEU(1)) + (PEU(1) -> Performance)	✓ **Supported**	The relationships are significant in the proposed direction

4.7 Conclusions, discussion and managerial implications

4.7.1 Conclusions and discussions

Management Control Systems (MCS) essentially refer to the processes needed to lead the organization in the pursuit and achievement of its objectives. An essential feature of these objectives is that they differ between organizations; thus, the strategies to achieve will be different too. Also we must keep in mind that this quest for achievements happens through an environment in which they operate, an environment in constant change, especially in recent times. This environment is usually very difficult to predict because it is not written and not all individuals have the same interpretation of it, so the perception one individual can make may differ from other observers who will respond accordingly (Abernethy & Mundy 2014). Thus, the ability of individuals to manage under conditions of uncertainty will be different as well. As argued by David Otley and Kim Soin, although our perceptions are largely colored by our past, how to face the new roads depends mainly on how we deal with the uncertainty of not being able to watch all the alternatives, and this will largely outline the present actions (Otley & Kim 2014).

The objective of this work is to show with our empirical research how the use of MCS is related to organizational capabilities

to impact performance; specifically, when decision-makers face uncertainty. From a contingency framework, we seek to contribute to the stream of literature that investigates determinants and consequences of performance. In this line, it is argued that the two uses of MCS -diagnostic and interactive- are related to organizational capabilities in the company. This paper also proposes that organizational performance is related to the different ways in which companies develop and use their organizational capabilities and that MCS have different results. However, the focal point in this study, as mentioned earlier, is related to the contingent approach, which means that something is true only under specified conditions (Chenhall 2003). In other words, we seek to identify the extent to which the decision-makers' perceived environment uncertainty (PEU) has a mediating effect, modifying or altering the relationships between, on the one hand, the MCS uses and organizational capabilities of EO & LO, and on the other hand, between organizational capabilities and performance. To test the hypotheses, a theoretical model was developed and tested with structural equation modeling applied to questionnaire survey data from 644 companies in various sectors.

As mentioned above, the contingency approach involves examining whether the relationships that were raised earlier are kept under uncertainty conditions (Chenhall, 2003). Next, we will explain the results of how the perception of uncertainty has a mediating effect between the different constructs and their implications for managers' behavior.

Our results show that PEU in position 2 has a null mediating effect on the relationship MCS uses-Capabilities (LO & EO). However, PEU in position 1 shows that in the LO-performance relationship there is a total mediating effect, but PEU in EO-Performance relationship has a partial mediating effect. A brief explanation of these claims follows.

PEU in position 2, (Model 2) between MCS and Capabilities

We begin analyzing the obtained results by including the variable PEU in position 2. The proposal implies that for the existence of a mediating effect of PEU in this relationship, we must observe that there are significant relationships between the uses of MCS -PEU and PEU-Capabilities. The results show that introducing the PEU variable in the model in PEU (2) position, it does not have a mediating effect as originally proposed. Hence, the mediating effect of PEU in the MCS uses -Capabilities relationship (LO & EO) is null. Although the relationship between MCS uses, diagnostic (Ra) and interactive (Rb), with PEU (2) is positive and significant: The results of the relationships PEU (2)–LO & EO (Rd & RC) do not present significant coefficients. Hence, PEU (2) does not have a mediating effect between MCS and capabilities. This result is contrary to previous studies that provide evidence that, for example, nonfinancial or subjective measures in an interactive MCS use can mitigate the effects of uncertainty. The main argument is about that measures produced by an interactive MCS which is informative because they provide incremental information over and above what is provided by financial measures in a diagnostic manner (Abernethy & Mundy 2014). A reason that we envision for this is that the relationship between the MCS uses and capabilities is an internal issue, which would be little affected by the perception of uncertainty. In other words, the diagnostic use of MCS seeks to verify whether we are near or far from the targets set and check the possible causes of why we are where we are. This represents the basic approach of the diagnostic use which provides the minimum necessary to initiate a dialogue between managers and subordinates; a dialogue through which they can identify possible actions to achieve the development of the organizational capacity or goal, as the interactive use proposes. Since the interactive use starts as a question that seeks to identify actions to move towards the goals and not necessarily something that happened to us, it could

not be very affected by the environment. The literature (Otley 2016) presents a possible explanation for these results. It was based on a possible confusion between uncertainty and hostility concepts. Although hostility may produce a degree of uncertainty, the study results indicate that the two functions have opposite impacts on the use of MCS. Hostility is associated with a greater reliance on accounting controls, such as budgets, while uncertainty is associated with a more flexible control style, open and externally focused. However, this continues as an open question, as Chenhall (2007) has pointed out. It is important to know how the tension between the uncertainty and hostility factors should be managed in MCS, as they can often occur simultaneously. In conclusion and following this line of argument, PEU could modify and show itself more as a consequence than a precedent of the capabilities.

PEU in position 1, (Model 3) between Capabilities and Performance

Having included the PEU variable in position 1 of the model -between capabilities and performance- revealed the existence of a positive and significant PEU mediating effect between capabilities (LO & EO) and performance, but a different effect was observed between each one of the capabilities.

On the one hand, the relationship of PEU between LO – Performance revealed a total mediating effect. It was total because before introducing PEU, LO had no effect on performance, but by including PEU in the relationship a significant effect was shown, suggesting that PEU had a total mediating effect in the LO-performance relationship. This means that in the presence of uncertainty, learning orientation can positively affect performance.On the other hand, by having included PEU in the relationship between EO – performance showed a partial mediating effect, because although the direct relationship remained significant as it was already before introducing PEU, we could observe a lower coefficient in this relationship, which means that EO not only maintained a direct effect on performance, but also an indirect effect through PEU which in turn impacts performance. Our results are totally in line with studies suggesting that there is a contingent relationship between EO and internal/external characteristics of the firm (Wiklund & Shepherd 2003). Also, unlike studies where just the relationship between the two main variables is reviewed, our results demonstrate that the relationship between EO and performance is likely more complex than a simple main-effect only (Lumpkin & Dess 1996). These results show that it would be important to consider the mediating effects of different characteristics external to the firm (Miller & Friesen 1982; Govindarajan & Gupta 1985).

In summary, the results highlight that it is very important to be aware of how the different MCS uses produce different results in the development of capabilities, and especially that the relationship MCS uses - capabilities is not impacted by uncertainty. Nevertheless, PEU plays an important and different role in the organizational performance produced by the organizational capabilities in situations of uncertainty, providing insights into the way capabilities are used to deal with an evolving environment.

4.7.2 Managerial implications

Control systems were developed to enable organization management (Simons 1995), even under conditions of uncertainty (Otley 2014). Today the level of uncertainty has increased and the diverse management control approaches, specifically the design and use of sophisticated management control systems, have become a focal point and an indispensable source to deal

with the speed of change and the growing uncertainty in the business environment. Companies face uncertainty in several aspects, which may be known or unknown in the context of its core business, such as likes, actions, and reactions of their customers and suppliers, new technology and deregulation processes, global competition, volatile economic environment amending prices, availability of raw materials, sectorial actions, and regulatory government policies. As firms struggle to maintain their earnings, human behavior becomes increasingly important, especially the human resources directing people, making better choices consciously in the everyday activity, and using the information provided by the MCS -diagnostic, interactive, or both- are indisputable sources to build or maintain competitive advantages.

Many of the studies on management control systems are carried out under the assumption (almost always implicitly) that the future can be predicted with a high degree of certainty, which makes the validity and transfer of results be questioned. As stated by Otley (2016), in his literature review of MCS – Contingency theory from 1980 to 2014, " *all research on these topics has to take a 'contingency' approach as it becomes recognized that universal solutions to problems in organizational control generally do not exist*". Or as Saulpic and Zarlowski (2014) argued, we need to recognize that in this field "research does not often lead to establishing what does or does not work in a specific organizational context." (p.215).

In our study, where uncertainty is explicitly recognized and has been treated as a contingent variable which may modify the form of well-understood relationships between variables, it is somehow like a content variable (Otley 2014) and managed in a specific situation (perceived uncertainty). Therefore, it is important to recognize that in a real-world situation, where there are many types of uncertainty producing totally unexpected situations with unforeseen consequences, this perception may vary and results may differ from those discussed here. In other words, there is no universal solution. More over, Otley (2016) argues that the contingency theory was initially developed from the idea that there is no universal solution to the problems of control; however, if there were such a universal solution, by the moment it were applied, the world would have moved. Thus, the idea of contingency should be much more dynamic than before, using process-based models and staying tuned in to the mechanisms of change and implementation of modified forms of management and control. Otley (2012) also said that in an uncertain environment, processes become more important than outcomes and results, because the latter are significantly influenced by unknown and unpredictable external effects.

Following the line of argumentation on the importance of human resources, Hansen & Wernerfelt (1989) find that twice as much of the variance in firm performance is due to factors related to human behavior than is due to economic factors (Hansen & Wernerfelt 1989). One of the most important internal factors determining the performance of business organizations is the human behavior that originates within them (Widener 2014). Hence, the importance that managers understand how, when and why to use MCS to develop advantages that give them better results than those their competitiors get.

In the preceding paragraphs, we discussed how MCS and its enabling role in the creation of organizational capabilities are a framework to obtain better results, without leaving aside that companies are trying to cope with changes in the environment (Ezzamel 1990). Designing, implementing and using an administrative control system takes time and has a cost. The effectiveness and efficiency of managers' actions and decisions are related to both, time and cost. Therefore, since managers make decisions, produce actions, and keep up with changes, it is essential to understand the variability of situations and the

level of uncertainty faced. This gives rise to the need for new approaches to deal with situations with better tools for monitoring and action (Abernethy & Mundy 2014).

To practice, our findings hold the greatest relevance for controllers and other executives responsible for the design and implementation of MCS in firms. Our findings can help management to better understand what uses of MCS should be encouraged with a view to increase the level of strategic orientations among firms. Finally it is top managers, after all, who decide which systems to use interactively and which to use diagnostically (Simons 1990), based on their sense of purpose for the organization and their personal assessment of uncertainties.

At the theory level, the primary relevance of this study lies in its examination, from a contingency perspective, of the interactions of three constructs that had been studied separately: uses of MCS, Capabilities and Performance. Our results add to a growing body of literature that investigates how the role of the MCS differs (Abernethy & Brownell 1999; Bisbe & Otley 2004; Henri 2006a) and supports previous findings regarding the relationship of the MCS and organizational capabilities. We can see that both uses can be developed; for example, Marginson's (2002) finding that firms may use some parts of their MCS interactively while using other parts diagnostically (Marginson 2002) and both uses are related to better performance.

Our paper contributes to the literature in several ways. The first contribution is relatively straightforward. If MCS are used, one should be aware of their several uses and of the different ways they can be used at the same time, which we believe to be the most common case. Subsequently, understanding the three questions of when, how and why it is important to use MCS in one way or the other or simultaneously, is even more important since their use is is directly related to the generation of organizational capabilities that enable the firm to have an effective performance. We not only provide results underlying these relationships, but our study also provides guidelines for future research in this area.

Second, while many studies have proven the existence of these relationships, so far no study has shown how these relationships behave in the presence of uncertainty, responding to the call for the need for new and different approaches in the field of management control systems studies, including situations that could help cope with the level of uncertainty (Otley 2016). Finally, in particular, our analysis provides formal empirical research and statistical knowledge in the field and shows how MCS can be used to maximize the development of organizational capabilities impacting performance, and how in presence of external factors such as uncertainty, these relationships can change; thus giving contingency theorists the necessary ingredient to move forward.

4.8 Limitations and further research

Limitations

Our first limitation is about the instrument. The instrument used is reliable (satisfactory psychometric properties), and we chose a valid previously used measures for each construct in this paper (MCS uses, Capabilities, Performance & PEU). With all this, future research trying to repeat this study should make sure to carry out a process of refinement and improvement of the instrument.

We must see the results in good conscience that these were obtained through a survey, and using the survey method to collect data creates the potential for bias due to common response. In this line, we are aware that the results of this study could show a bias by a form of common method variance (CMV) called Single Source Bias (SSB) (Campbell & Fiske 1959), and although Harman's one-factor test indicated the absence of common method effects in our survey data (See Appendix C. Non response bias & common method variance (CMV) analysis). There are arguments to think that this test is necessary but insufficient (Podsakoff et al. 2003). So, this is a limitation in our study and also an area of opportunity for future research using multi-method strategies for data collection, in order to enhance the validity and reliability of the construct measures. Future studies in this area should also use more refined measurement instruments to address these concerns and, where feasible use multi-source measures.

Another limitation of our study is that we only focus on learning and entrepreneurial orientations, but other capabilities could be included.

Also, our study focuses only on one of many possible environment variables that impact the proposed relationships. It would be welcome to try the same model, but relating it to other contingency variables that could modify these relationships.

Finally, in our work PEU is related to variables that directly affect both internal operations, such as raw materials, technology used, price, quality; and external or market variables, such as competition, regulations, government actions and / or trade unions, etc. but in a single construct. The uncertainty variable has sometimes been measured separately, highlighting issues such as competition and dynamism (King & Clarkson 2015).

Suggestions for further research

An important part of the research agenda is to understand how different MCS uses can be combined to suit the particular circumstances of the organization (Fisher 1995) . There are few contingency works published dealing with issues related to MCS as balanced scorecards, target costing, life cycle costing, non-financial performance indicators, including capabilities of the organization. Therefore, it is necessary to broaden the base of studies linking the contingency framework and MCS.

In regards to how we measure uncertainty, we see an area of opportunity in how we measured PEU because it could be split in two, internal and external. Thus, studies that can break the moderating effect of uncertainty in these two groups would provide us a more accurate understanding of the effect.

There is an opportunity area related to environmental variables as mediating variables with other relationships, different from those proposed here. Therefore, studies with different relations would be beneficial to increase the knowledge base.

Finally, it is still necessary to generate and accumulate knowledge through studies that replicate previous research but that improve the validity and reliability of results. This seeks to create a solid basis to further develop models that can be generalized (Lindsay 1995). Studies have not developed enough 'critical mass' to confirm findings.

Chapter V: Conclusions

5.1. Summary and discussion of the main results and contributions

This thesis looks to contribute to a stream of literature that investigates determinants and consequences of performance. In this line, this thesis delves into the fourth step of the strategic process, where MCS take shape and seek to track the objectives of the process itself, allowing us to improve our understanding of some relationships in the field of Management Control Systems. Moreover, it has important implications for the literature and managerial practice. We hope that the fruit of this task provides new features to this line of research, and also reinforces the findings of previous investigations. It should be noted that although this study has several limitations, it also provides several possibilities for future research.

In this chapter we offer the final remarks of the study through a summary of the dissertation main findings and contributions. We also provide a brief discussion in terms of the general purpose and specific objectives of the doctoral thesis. Next, we conclude the thesis emphasizing some theoretical implications which can be used to grow and further develop the current theoretical framework on MCS – capabilities – performance. We also discuss and recommend some practical implications for managers.

Our initial review of the literature revealed several shortcomings in the field of research of uses of MCS and their relationships with organizational capabilities and organizational performance. However, it also opened a space to identify the contextual variables that had not been developed yet. Throughout this thesis, we have realized that most investigations in this area have been conducted in advanced economies where development, acceptance and use of management control systems are a reality. No studies were identified as the one proposed here to have been done in countries with developing economies such as Mexico's. In addition, to our knowledge, there are no studies with empirical evidence on the determinants of performance based on uses of MCS and context-characterized by the perceived uncertainty. Considering the gaps in the literature, the general purpose of the present doctoral thesis was to identify and describe analytically the role played by the uses of the MCS in the development of strategic capabilities and their impact on performance, under the influence of uncertainty perceived by decision makers.

Departing from the general purpose of the doctoral thesis, we derived three objectives which were developed in each of the chapters as three interdependent essays, each one with its own research questions, methodology of analysis and empirical results:

1. Our first objective in this thesis was to analyze what the impact of the use of MCS was in generating capabilities in the firm; how the uses of MCS determined capabilities (LO & EO) and what role the firm characteristics (size and industry) played in the MCS – Capabilities relationship.

Thus, as a result of the first empirical essay, our findings recommend that the four MCS uses (monitoring, legitimizing, attention focusing & strategic decision-making) have a positive and significant impact on both capabilities (LO & EO). It should be mentioned that unlike previous studies (Henri, 2006a) the monitoring and legitimizing uses of MCS (Diagnostic use) do not necessarily inhibit capabilities in the organization; in contrast, our results imply a positive relationship and the

most significant of all the applications studied. Thus, this research complements and reinforces existing studies, and suggests that this initial approach to expect a negative outcome could be wrong, ie, on one hand, in the literature we can observe that the diagnostic use of MCS represented by the monitoring and legitimizing uses of MCS could help to increase the positive effects of an Interactive use on capabilities by providing the necessary information to perform the interactive use. Also, the monitoring use of MCS is a necessary condition to learn (Slater & Narver 1995), to improve, and to challenge the context (Mintzberg 1973), but it is not sufficient. Moreover, the legitimizing use of MCS is related to people's communication, to detonate "information dissemination" and to have a "shared interpretation", all important parts of the organizational learning process (Slater & Narver 1995). Another possible explanation for this counterintuitive result may be in the context in which our research was conducted. México is a newly developed country and has the characteristics of an emergent economy, such as competition at an early stage, a paternalistic culture, and companies that mostly use traditional MCS in a diagnostic manner, among others. The challenge is to know how to use MCS as interactive tools.

Regarding the research question about how the uses of MCS determine capabilities, the coefficient indicates that the variables impact differently and that the scale gives us an interesting reading. Hence, LO is more related with the legitimizing use and less with the monitoring MCS use, while EO is more related to focusing attention and less to the use of MCS for strategic decision-making.

Related to the question about the role-played by the firm's characteristics (size and industry) in the MCS – Capabilities relationship, our results highlight that except for the monitoring use of MCS more widely used by large than by small fimrs, in general the other uses of MCS (legitimizing, attention focusing and strategic decision-making) are not different in companies of various sizes. Also, our results show that smaller companies present greater learning orientation than large firms and that manufacturing and services firms have higher entrepreneurial orientation than those in the trade and banking fields.

2. Secondly, recognizing the important role of performance in the business context, and consistent with the growing interest in investigating performance drivers, our second objective was to know if the uses of MCS had a direct or an indirect effect on performance through capabilities; i.e., to what extent there was a mediating effect of organizational capabilities (LO & EO) in the relationship among the uses of MCS and performance and if it was the same effect in business of any size.

In the second empirical essay, our study contributes by offering evidence of the relationship MCS – Capabilities - Performance, and specifically of the role played by capabilities as a determinant of performance while providing empirical evidence of the direct relationship between MCS and performance. Also, reinforcing our findings and seeking the universality of results, our second quantitative essay contributes further, by offering evidence to check if previous results are maintained in the same direction in companies of various sizes.

Unlike what was done in the first paper where we used as the main methodology multiple linear regressions and ANOVA, in this second paper we decided to use a different methodology that allowed us, on the one hand, to corroborate the results previously obtained in a more complex model; and on the other hand, the inclusion of the performance variable. Thus, methodologically, our second study seeks to analyze the impact of MCS on performance in two ways: i) analyze the

relationship and direct impact between MCS and performance and ii) analyze the relationship and existing indirect impact between MCS and performance through organizational capabilities. Both analyses were performed for different samples, because we needed to know if the overall results were maintained when analyzed by splitting the sample by company size. The theory implies using a model that calls for a different analysis since we needed to first analyze the impact of non-observable latent variables grouped into two constructs called diagnostic and interactive. These could only be measured by other directly observable variables, i.e. the four uses originally proposed (monitoring, legitimizing, attention focusing and strategig decision making). Secondly, it required to generate a model that could measure the impacts all together, something like the simultaneous equation models used in the study of economics and path analysis road used in psychology to follow a chain of impacts. In other words, it sought to simultaneously integrate a series of equations of different multiple regression and the interdependent, where the variables are dependent and independent within the same model. This was exactly what proposed the analysis of structural equations used.

Thus, in this essay and using structural equations modeling, we could conclude that:

MCS -> Capabilities

MCS uses have an impact over capabilities, in all firm sizes. Again, the diagnostic use of the MCS case showed a positive and significant relationship with LO & EO capabilities, but in an unexpected opposite (+) direction. Once again and using a different metology, our results suggested that based on prior research, this initial approach expected to have a negative outcome could be wrong. As we argued above, there are arguments (Mintzberg, 1973; Eisenhardt, 1989; Vandenbosch, 1999; Slater & Narver, 1995; Grafton et al. 2010) suggesting that the diagnostic use -this time represented in a second-order construct- comprised by the monitoring and legitimization uses, can have a positive influence on the development of capabilities. This laid the foundation for carrying out a conversation to enable better decisions, such as having the same information and understanding it in the same way because the diagnostic use of MCS operationalizes some steps in the learning process: i) information dissemination and ii) shared interpretation (Slater & Narver 1995). The diagnostic use of MCS can impact both capabilities because LO is related to learning from past events (Levitt & March, 1988), which can only be achieved by making a solid use of the diagnostic MCS; and EO as a concept is related to an organizational level where systems are widely used in combination with strategic resources, such as knowledge-based resources. If they are directed to discover and exploit opportunities, they can boost competitiveness and entrepreneurship (Barney, 1991; Chenhall & Morris, 1995). More over, as stated by Feldman and March (1981), an essential characteristic of entrepreneurship is that in order to make things happen, it is implied that leaders devote considerable effort to justify and legitimize their proposals and actions. Managers use MCS to legitimize prior ideas ensuring their interpretation because they believe that by doing so it leads to reach competitiveness in their organizations (Vandenbosch 1999). All this is achieved by using diagnostic MCS. Apparently, somehow the systems work at the same time (diagnostic and interactive) and support each other in a holistic way. Although it has not been explained in this way in previous research, if the MCS is used for diagnostic purposes and in isolation, the impact could only be negative for the signal it sends which is to just focus on finding deviations or errors. It is noteworthy that this case was not proven in this thesis but could be in future research. On the other hand, and corroborating and consistent with prior results, the interactive use of MCS shows a positive and significant relationship with capabilities in the full sample.

It also showed it in the medium-sized and large firms, but not in small ones. This was expected since by definition small firms have few resources and are scarce of time and resources to address something related to learning Small firms are more concerned about their survival or growth plan. Some authors argued that SMEs tend to have poor processes, such as strategic planning, and do not fully understand what their critical success factors are (Garengo et al., 2005). Perhaps it is because the cost of development and implementation of these systems are still beyond the reach of most small and medium firms. However, apart from the cost, there are barriers, such as the lack of quantity, quality and human-resource capacity in the SME´s. (Hudson, 1999; Garengo et al., 2005). Hudson et al. (2001) argues that the degree of formality in the use of "complex" models, such as the use of information systems and learning from them, is much lower in small than in medium and large enterprises.Additionally, improvements are usually incremental with a preference to adjust processes and systems in response to specific identified needs and to learning-by-doing approaches, not as a formal process needed in a Learning Orientation.

MCS -> Capabilities -> Performance: Direct / Indirect effect over performance through Capabilities.

In regards to the question if MCS uses have a direct or indirect effect on performance through capabilities, it can also be understood as to what extent there is a mediating effect of organizational capabilities (LO & EO) among the MCS uses and performance relationship.

Direct effect. Firstly, we can see that MCS have a direct effect on organizational performance only if they were used diagnostically, in any company size. Secondly, it is not the case for the interactive use, since our results show that using the MCS interactively has no direct effect on organizational performance.

Indirect effect. Regarding the indirect effect, first we recapitulate the role of a mediating variable- Mediating variables are those that help explain how and why two constructs are related; more formally, a mediating variable is one that mediates the causal sequence that relates an independent variable (input) with a dependent variable (outcome). There is an overview of what we mean when referring to the mediating and moderating effects, then a brief explanation of why we decided to use the mediating effect in our analysis. Both mediating and moderating variables are third variables, ie. They are intervening variables affecting the relationship between two variables. In the case of mediating, two variables -the independent variable and potentially mediating variable-, have an influence on the dependent variable; whereas in moderation, a third variable affects the relationship between the other two variables. Thus: "While moderating variables specify when certain effects will take place, mediators say how and why these effects occur" (Baron and Kenny, 1986). Thus, the analysis of mediators identifies or discriminates whether it is a complete or partial mediation. A complete mediation takes place when the direct path between the independent variable and the dependent variable equals zero. The independent variable does not influence the dependent variable. Instead, the partial mediation takes place when, still having reduced the direct path between the independent and dependent variables in its absolute size, they are different from zero.

Taking the above into account, the results for the mediating effect of capabilities are discussed ahead.

EO. In summary, the entrepreneurial orientation (EO) capabilty has a mediating effect in the use of MCS -> performance relationship. It was positive in the overall sample and in firms of different sizes, showing it as one of the main drivers of the new economy. Literature on entrepreneurship emphasizes the importance of EO as a determinant of business performance

(Ripolles & Blesa, 2005), but is different in each capability. In other words, on the one hand, we had a total mediator EO effect on the interactive use of MCS -> performance relationship (except for small companies.) Thus, the relationship between the interactive use of MCS and performance indirectly exists only through the EO capability: On the other hand, we had a partial mediating EO effect in the use of the diagnostic MCS - > Performance because there is a direct relationship between the diagnostic use of MCS -> Performance and also an indirect effect in the Diagnostic use of MCS -> Performance relationship through EO capability.

LO. The above results are not the case for the learning orientation (LO) capability which -except for midsize companies- has no mediating effect between the diagnostic and interactive uses of MCS and organizational performance. This counterintuitive and positive result in medium-sized enterprises should be subject for further research because previous studies have found an indirect relationship between the different capabilities and performance of a company (Widener 2006). For small businesses, this relationship has been widely investigated, while in this study, the impact of OL in small companies was not significant. This brought to light some of the most studied aspects in small businesses for their focus on short -term survival.

Importantly, as our empirical results suggest, the direct impact of the diagnostic use of MCS over performance is partially modified in the presence of an entrepreneurial orientation. This means that apart from MCS having a direct impact on performance, they would also have an indirect impact through EO, ie you can maximize the impact of a system if used diagnostically when it also has guidance to seize opportunities and to do something with them, which makes it an entrepreneurial orientation. In the case of LO, it is shown that the MCS used interactively have no direct impact on performance.

Other studies have suggested that there is a contingent relationship between capabilities (LO & EO) and internal/external characteristics of the firm context (Wiklund & Shepherd, 2003) and that the relationship between capabilities and performance is likely more complex than a simple main-effect-only (Lumpkin & Dess, 1996). Therefore, it would be important to consider the effects of internal or external characteristics to the firm, such as the access to human resources or environment factors as uncertainty or technology development. Based on the above, our third empirical chapter unfolds below.

3. Finally, aware that all the controls are performed within a context that may vary between different situations, the third objective sought to examine the extent to which the influence of the environment, specifically the perceived environmental uncertainty (PEU) for decision makers, mediated the relationships between the various MCS uses, organizational capabilities (EO & LO) and organizational performance.

It is worth mentioning that MCS, capabilities, and performance constructs have been widely studied individually, but few studies have examined the relationship of these constructs analyzing them as a whole, and have not typically addressed the possible intervening role of the perceived environmental uncertainty by those who make use of these systems. Thus, considering the increasingly environmental uncertainty over the last few years, our research contributes by offering an analysis which highlights the importance of analyzing the previously raised relationships between MCS, capabilities and performance but now including them within a context of uncertainty perceived by decision makers. Recent studies show that a great number

of internal or external factors can mediate the relationship between control systems and firm performance (Franco-Santos et al., 2012; Speklé & Kruis 2014), but no study has taken into account the implications of uncerttainty and its influence on the use of control systems. Furthermore, most research in the field of MCS assumes that the future can be predicted with a high degree of certainty, and thus, also assumes (consciously or unconsciously) that the context in which they happen is not affected by external variables to the study. This issue in one of the biggest criticisms of the studies detonating also that the results may not be valid in different circumstances.

In the third essay of this thesis, the context was explicitly recognized as a contingent variable (perceived uncertainty) that may mediate the relationship between the MCS constructs, capabilitie, and performance. Morevoer, using a structural equation analysis (SEM), allowed us to observe the model as a whole and reach a holistic conclusion.

It is important to mention that in the development of this last essay, we validated the results of impact proposed in the initial hypotheses were met, namely that the initial hypothesis on existing relationships between the diagnostic /interactive uses of MCS => Capabilities => Performance in the model was met, without the PEU variable. In this respect the results of hypotheses H1 - H8 were the same as those of Chapter III. In addtioin, it was necessary to recalculate them to be certain that by introducing a new variable initial relationships were valid (Figure 4.5: Hypothesis results H1-H8 MCS uses - Capabilities – Performance).

Hence, our research results addressing the last objective of the present doctoral thesis, about the mediating effect of PEU showed that, on the one hand, the PEU variable between the diagnostic and interactive uses of MCS and capabilities (PEU 2) did not have a mediating effect as originally proposed (Figure 4.8). Perhaps, this was because the relationship between the MCS uses and capabilities is an internal issue, which would be little affected by the perception of uncertainty in the environment. Tipically, the diagnostic uses of MCS seek to verify whether we are near or far from the targets set. Therefore, to check the possible causes it was neccesary a minimum of information to initiate a dialogue between managers and subordinates to find opitions (interactive use of MCS). With the previous two that depended on domestic issues without necessarily turning to see the environment, it could start a process to generate targeted actions. Here impact of external situations as PEU would have no effect, and the impact of external situations in the company could be minimized. PEU could be more of a consequence than a precedent of the capabilities. These results could be the initial part of another more detailed research study.

Concerning the inclusion of PEU between capabilities and performance (PEU 1), this doctoral thesis reveals that PEU showed a significant and positive effect as a mediating variable, but a different effect was observed in each capability (Figure 4.9): the PEU in LO-performance relationship showed a total mediating effect. This is, although originally LO had no effect on performance, when the PEU variable is introduced in the model, a significant effect is shown, suggesting that PEU had a total mediating effect in the LO-performance relationship. I.e., in the presence of uncertainty, learning orientation can positively affect performance. On the other hand, the PEU in the EO-performance relationship showed a partial mediating effect. It was partial because the relationship between EO->performance remained significant as it already was before introducing PEU. However, with the introduction it had a lower magnitude, which meant that the effect was twofold: EO maintained a direct effect on performance but also an indirect effect through PEU which in turn had an impact on performance. The interpretation

could be that in the presence of uncertainty, entrepreneurial orientation develops in a different way impacting performance.

Our results support what others have argued as a contingent relationship between EO and internal/external characteristics of the firm (Wiklund & Shepherd 2003). It also supports that the relationship between EO and performance is likely more complex than a simple main-effect-only (Lumpkin & Dess 1996).

In summary, the results of our third paper, first highlight the importance of understanding how the various uses of MCS relate differently to capabilities and especially that this relationship is not related to uncertainty. Secondly, this study underlines a robust relationship between capabilities – PEU – performance; i.e., perception of uncertainty plays an important and different role in the capabilities - performance relationship, providing insights into the way that capabilities are used to deal with an evolving environment.

To sum up, Table 5.1 reinforces the main contributions of this dissertation through the hypotheses tested in our study. With the above results, we can state that our study contributes to the literature, and presents some implications for theory and practice.

Table 5.1 Summary of the contributions through hypotheses

Essay (chapter)	Hypotheses		Result			
Essay 1 (chapter II)	H1a: Monitoring use of MCS exerts a negative influence on LO		Not supported			
	H1b: Monitoring use of MCS exerts a negative influence on EO		Not supported			
	H2a: Legitimizing use of MCS exerts a negative influence on LO		Supported			
	H2b: Legitimizing use of MCS exerts a negative influence on EO		Supported			
	H3a: Attention focusing use of MCS exerts a positive influence on LO		Not supported			
	H3b: Attention focusing use of MCS exerts a positive influence on EO		Not supported			
	H4a: Strategic decision-making use of MCS exerts a positive influence on LO		Supported			
	H4b: Strategic decision-making use of MCS exerts a positive influence on EO		Supported			
Essay 2 (chapter III)			**Full sample**	**Small firms**	**Medium firms**	**Large firms**
	H1: Diagnostic use of MCS exerts a negative influence on LO		Not supported	Not supported	Not supported	Not supported
	H2: Diagnostic use of MCS exerts a negative influence on EO		Not supported	Not supported	Not supported	Not supported
	H3: Interactive use of MCS exerts a positive influence on LO		Supported	Not supported	Supported	Supported
	H4: Interactive use of MCS exerts a positive influence on EO		Supported	Not supported	Supported	Supported
	H5: There is a positive relationship between Learning Orientation capability and performance		Not supported	Not supported	Supported	Not supported
	H6: There is a positive relationship between Entrepreneurial Orientation capability and performance		Supported	Supported	Supported	Supported
	Direct effect of LO & EO in Diagnostic & Interactive uses -> Performance					
	H7: There is a positive relationship between MCS diagnostic use and organizational performance		Supported	Supported	Supported	Supported
	H8: There is a positive relationship between MCS Interactive use and organizational performance		Not supported	Not supported	Not supported	Not supported
	Indirect effect of LO & EO in Diagnostic & Interactive uses -> Performance					
	LO a) H1 + H5: Mediator effect of LO between Diagnostic use -> Performance		Not supported	Not supported	Supported	Not supported
	b) H3 + H5: Mediator effect of LO between Interactive use -> Performance		Not supported	Not supported	Supported	Not supported
	EO c) H2 + H6: Mediator effect of EO between Diagnostic use -> Performance		Partial supported	Partial supported	Partial supported	Partial supported
	d) H4 + H6: Mediator effect of EO between Interactive use -> Performance		Supported	Supported	Supported	Supported
Essay 3 (chapter IV)	**PEU in position 2:** PEU mediator effect between MCS uses and capabilities (H1 to H4)	H1: (Diagnostic -> PEU(2)) + (PEU(2) -> LO)	Not supported			
		H2: (Interactive -> PEU(2)) + (PEU(2) -> LO)	Not supported			
		H3: (Diagnostic -> PEU(2)) + (PEU(2) -> EO)	Not supported			
		H4: (Interactive -> PEU(2)) + (PEU(2) -> EO)	Not supported			
	PEU in position 1: PEU mediator effect between capabilities and performance (H5, H6)	H5: (LO -> PEU(1)) + (PEU(1) -> Performance)	Supported			
		H6: (EO -> PEU(1)) + (PEU(1) -> Performance)	Supported			

5.2. Theoretical implications

For academics, this study adds to the stream of research that explains the performance antecedents. There is general agreement that management control systems (resources) do not generate rents per se, but are rather a function of the way in which they are used (Penrose 1995). Assuming that MCS can be employed for different uses, the results of our empirical research affirm the existence of a direct relationship of MCS to organizational performance, when they are used diagnostically in firms of any size. On the other hand, results confirm that the interactive use has no direct relationship to performance, but indirectly through capabilities.

Although some studies have argued that firms may sometimes use parts of their MCS interactively while using other parts diagnostically, both uses are related to better performance (Marginson 2002; Koufteros et al. 2014). Our result of a positive and significant effect of the diagnostic use of MCS over capabilities is somehow against Simons (1995) and Henri´s (2006a) results, who proposed a diagnostic use of MCS, and a restrictive environment for both learning and implementing entrepreneurial initiatives. That was the basis of our initial approach. Our results contrast the above, and propose a new outlook to this paradigm, in which the diagnostic use of MCS diagnostic does not necessarily inhibit strategic capabilities in the organization. In contrast, this diagnostic use provides the necessary information to challenge the context (Mintzberg 1973) and guidance to implement actions related to organizational capabilities that in turn impact performance. Furthermore, the diagnostic use of MCS is a necessary condition to the organizational learning process (Slater & Narver 1995) because this process relies on the "information dissemination" and "shared interpretation". In summary, the firm's ability to use MCS for diagnosis constitutes an essential driver to face the development of organizational capabilities and performance.

Another counterintuitive result that deserves more attention from the theoretical point of view is that small companies present greater learning orientation than large firms. This is because in general literature argues that small businesses have specific characteristics (lack of quantity, quality and human resource capacity Hudson, 1999; Garengo et al., 2005) that do not allow them to develop activities and / or processes that are identifiable in large firms. They have attributed this to their main focus on short-term survival. It is noteworthy that this result means that small businesses are more prone to learn than large ones.This is not related to the use of MCS since it had been previously identified that small firms used these systems less. The above has a theoretical implication that we propose to be taken into account for future research.

From the theoretical point of view of the typology of administrative control systems, this study provides empirical evidence of the relations among the uses of MCS in the LOC (Simons 1995) and ESS (executive support systems classification) (Vandenbosch 1999) frameworks by offering, methodologically speaking, a second-order construct that meets the standards required to use in future research. In addition, it contributes to the body of work that investigates relations among MCS (Henri, 2006a; Widener, 2006; Kaplan & Norton, 1992, 1996; Koufteros et al. 2014).

While some studies have proven the existence of the MCS – Capabilities - Performance relationships (Henri 2006a; Koufteros et al. 2014), so far no study has shown how these relationships behave in the presence of uncertainty, responding to proposals to develop new approaches in the MCS field of research, including situations that could cope with the level of uncertainty (Otley 2016). Studies results show us that not all contingencies studied in prior studies influence the relationships proposed;

therefore, our work provides a better understanding of the PEU effects as a mediating variable in the uses of MCS–Capabilities–Performance relationships, as well as how these effects occur in firms of different sizes, providing knowledge that would be beneficial for further progress in this research line. Moreover, we contribute to research in a dimension still under-exploited, e.g., the effect of uncertainty on the uses of MCS – Capabilities – Performance relationship. Hence, the theoretical contributions of this essay extend the research on MCS uses with an emphasis on environmental uncertainty.

Finally, in the strategy field, our work provides some insights. As we argue above, strategy research has two broad approaches: content and process. In strategy content lie the external factors, such as industry structure determining competition (Porter, 1980), and internal factors such as strategy depending on the firm's resources and capabilities (Barney, 1991; Teece, Pisano, & Shuen, 1997; Wernerfelt, 1984). Thus, MCS uses can be seen as inimitable resources used to implement the strategy by providing the necessary information to challenge the content (Ittner, Larcker, & Randall, 2003) and setting the conditions for the development of capabilities through the routines they stimulate (Franco-Santos, Lucianetti, & Bourne, 2012).

On the other hand, strategy process research has two lines, deliberate [44] and emergent[45]. Both of them are related to MCS. An interactive MCS use is eminently social, while the diagnostic use of MCS is completely rational. Content (internal and external) and process (deliberate and emergent) researchers are still separated by structural gaps, and some authors argue for the need to integrate both branches (Cuervo, 1996; Mellahi & Sminia, 2009). Research and understanding how MCS uses can secure the two areas of the entire process can be benefical for the strategy research line, and our investigation is in this line.

In summary, from the theoretical point of view, our analysis provides a formal empirical research and statistical knowledge in the field of the uses of MCS. Our results highlight the importance of being aware of how the different MCS uses relate differently to capabilities and performance. It also refers that the MCS use - capabilities relationship is not impacted by uncertainty, but environmental perceived uncertainty plays an important and different role in the organizational capabilities-performance relationship, providing insights into the way capabilities are used to deal with an evolving environment. Finally, it should be emphasized that much of the impact of uncertainty on the use of MCS remains not fully understand.

5.3. Practical implications

Apart from the theoretical implications, our results also point to several implications for managers as well. Given the important role of the uses of MCS and the positive and significant but different impact on both capabilities and performance, managers who use these systems must be aware and wary of designing and using such systems. The results show a possible complementarity and balance, necessary for the different uses and not just for focusing on some of them. If the MCS are only used diagnostically, they do not generate their maximum potential because despite generating relevant information, the necessary actions do not necessarily occur. Similarly, if the MCS are used only interactively in order to focus attention or to make decisions without updated diagnostic information, the dialogues that are raised in this application will not add much value. Our work shows that the elements provided from these systems are relevant in all the phases of a strategic process

[44] Deliberate: Strategy as analytical approach in a deliberate form is planned and rational (Ansoff, R. L. Hayes, & Declerck, 1976)
[45] Emergent: Arise from the collective organization, are not intentional, a social process, (Mintzberg, 1987; Mintzberg & Lampel, 1999)

(Widener 2007). In addition, it they are used in a complementary manner, MCS can provide information about the drivers of success and causes of failures.

Given that, a business increasing its competitive position will improve its performance (Narver & Slater 1990); hence, managers seeking to develop capabilities that produce them better results should benefit from knowing which of the various uses they should give to their MCS. Empirical studies have suggested that the effectiveness of MCS depends more on the way superiors use them (Otley 1978; Govindarajan 1984). Our results highlight that the two uses of MCS -diagnostic and interactive- are relevant in different forms as explained above.

Finally, it is important for business managers to know how to use their MCS since this will develop a superior capacity to gain competitive advantages. On account of the high investment involved in the formalization of MCS, understanding their consequences should be an important issue for organizations. Following the arguments of Hansen & Wernerfelt (1989) about the importance of human resources in today's business environment to determine performance, it is essential that managers understand how, when and why to use MCS to develop advantages that allow them to perform better in a world of competition (Widener 2014). It is just as important that they know how to do it in a turbulent environment, with a high degree of uncertainty and learn to deal with it, balancing and managing short-term actions efficiently, while being alert and adapting to the changing environment. As stated by March (1991), firms must be ambidextrous.

Our findings are relevant to the controlling function in a company because it is quite so often responsible for the design and implementation of MCS. Our findings can help them to better understand what types of MCS use they should prioritize to generate the expected results. This position must not only take into account the level of uncertainty perceived by the user of the systems, but also the strategy decided by the company. They should consider what the firm's strategic orientation is in order to promote it since it is also a perceivable influence in the presence of uncertainty.

Management is not easy under conditions of uncertainty; both research and practice have tended to avoid their existence or at least have paid little attention to it (Otley 2012). Given that uncertainty and decision making are always present, in addition to accepting their existence, it is important to act accordingly and to better understand how management control systems work when facing uncertainty.

6. Chapter VI: Appendix

Appendix A: Data in the directory SCIAN México 2012.

Identification of the economic unit	Location	
• Name of the economic unit • Economic name • Stratum of employed persons * • Class code and description of activity * • Type of economic unit * Determined by the INEGI	• Mailing address or geographic • Type and name of the road • Outside number • Building, floor or level • Internal number • Name and type of human settlement • Industrial corridor, mall or public market • Number of local • Zip code • Location within the national geostatistical	• Federal entity • Municipality • Locality • Basic geostatistical Area • Block • Phone number • E-mail • Website • Approximate Location • Latitude • Length

Appendix B. Survey instrument.

General Information

Company name (Optional):_____ Age of the company (founded years):_____

Number of employees (including all types): _____

Sector (see Table classif.):_____; Type of company: Private ___; Public:____; Nonprofit:___; Another: _____

Position: CEO/General Dir.☐ ; Functional/Division Dir. ☐ ; Department Dir. ☐ ; Manager ☐ ; Another ☐

Gender: Male.__;Female __; Study Level**:** (Collegue:___; Undergraduate:_; Graduate:__;Doctoral:__ **; Age:_____;**

Years of management training besides the university (graduate programs, seminars / specialization courses, etc.):_____

Years of experience in administrative areas:_____; Years of experience in the sector in which you work:_____

A: Management Control Systems: These systems seek to influence human activity within the company. It can be identified by common management practices present in the business, such as systems planning, tracking simple together with planning, weekly meetings, daily checks, emails or systems support decision making SAP-like platforms, etc. Please rate on each line:

(1 = never used, 2 = used rarely, 3 = sometimes used, 4 = often used, 5 = always used)

In my company we use Management Control Systems in order to:

1. **Monitoring:**
   - ___ 1.1 track progress towards goals.
   - ___ 1.2 review key measures.
   - ___ 1.3 monitor results.
   - ___ 1.4 compare outcomes to expectations.

2. **Attention-focusing:**
   - ___ 2.1 tie the organization together.
   - ___ 2.2 enable the organization to focus on common issues.
   - ___ 2.3 enable the org. to focus on your critical success factors..
   - ___ 2.4 develop a common vocabulary in the organization.
   - ___ 2.5 provide a common view of the organization.
   - ___ 2.6 enable discussion in meetings of superiors, subordinates and peers.
   - ___ 2.7 enable continual challenge and debate underlying results, assumptions and action plans.

3. **Strategic decision-making:**
   - ___ 3.1 make strategic decisions once the need for a decision is identified, and an immediate response is required.
   - ___ 3.2 make strategic decisions once the need for a decision is identified, and an immediate response is not required.
   - ___ 3.3 make decisions when it is difficult to differentiate among plausible solutions to a problem because each has good arguments.
   - ___ 3.4 to make decisions when encountering a problem that is unstructured and has not been encountered before.
   - ___ 3.5 make decisions when you have been recently faced with a similar decision.
   - ___ 3.6 to anticipate the future direction of the company, as opposed to responding to an identifiable problem.
   - ___ 3.7 to make a final decision on a strategic issue of major importance.

4. **Legitimization:**
   - ___ 4.1 confirm your understanding of the business.
   - ___ 4.2 justify decisions.
   - ___ 4.3 verify assumptions.
   - ___ 4.4 maintain your perspectives.
   - ___ 4.5 support your actions.
   - ___ 4.6 reinforce your beliefs.
   - ___ 4.7 stay close to the business.
   - ___ 4.8 increase your focus.
   - ___ 4.9 validate your point of view.

5. Measurement diversity

Please rate the extent to which each of the following measures is used in the MCS of your company:

Where: 1. Are never used, 2 = rarely used, 3 = sometimes used, 4 = often used, 5. Always used.

- _____ 5.1 Financial
- _____ 5.2 Customers
- _____ 5.3 Business processes
- _____ 5.4 Learning and long-term innovation
- _____ 5.5 Another

6. Comprehensive Management Control System

Please indicate with an "X", which of the following two options representing more the Management Control Systems in your company:

_____6.1 The systems capture the key performance areas of the business units, providing a comprehensive overview of they.

_____6.2 The systems cover some, but not all, of the key performance areas of the business units, offering a partial view of they.

B. Strategic capabilities: Please indicate the degree to which the following describes your organization.

(Where 1 = not describe it; ..... 5 = fully described)

7. Learning Orientation

- ___ 7.1 Learning is the key to improvement
- ___ 7.2 Basic values include learning as a key to improvement
- ___ 7.3 Once we quit learning we endanger our future.
- ___ 7.4 Employee learning is an investment, not an expense.

Please indicate on each line of 1 to 5, the extent to which it describes your organization.
(Where: 1 = does not describe……. ……. 5 = fully described)

8. Entrepreneurial Orientation

___ 8.1 In general, we have a strong emphasis on research and development of new products or services, rather than on the marketing of products that the market already knows.

___ 8.2 During the past 5 years, we have sold many new products or services.

___ 8.3 In recent years, changes in product lines or services that we offer have been steady and significant.

___ 8.4 Our company, rather than having pioneered actions in the market, typically responds to actions which competitors have begun.–

___ 8.5 Often we are the first to introduce new products or services, new management techniques or operating technologies.

___ 8.6 Our company typically takes strong measures to "overcome" competitors, rather than taking a more "live and let live" posture.

___ 8.7 In general, in the company tend to take high-risk projects with high probability profit rates, instead of low-risk projects with normal benefits.

___ 8.8 In general, we believe in great changes, bold and quick to achieve the objectives of the company, rather than small changes, shy and slow.

___ 8.9 When confronted with decision-making situations involving uncertainty, usually adopt an aggressive stance to exploit opportunities rather than seeking positions prudent decisions avoid costly.

___ 8.10 The company is supporting the efforts of individuals and / or teams that operate autonomously, more than require senior management to guide its work.

___ 8.11 In our company we believe that the best results occur when individuals / teams decide for themselves the opportunities to follow, rather than when they are driven by senior managers in the pursuit of these opportunities.

___ 8.12 In search of opportunity, people / teams make decisions on their own without referring constantly to his supervisor, more than expected to get approval before taking such decisions.

___ 8.13 The CEO and his management team play the most important role in the identification and selection of opportunities rather than the ideas and initiatives of employees. –

___ 8.14 In my business "not" make a special effort to win a business competition. –

C: Organizational performance and control variables

9. Organizational performance: Please rate the performance of your organization in the past 12 months against the expectations or goals at the beginning of the year on a scale of 1 to 5 (where 1 = Very poor performance, 2 = Low performance, 3 = goals were reached 4 = above goals, 5 = outstanding performance above targets)

_____ 9.1 In relation to its objectives, the level of increase in sales last year was
_____ 9.2 In relation to its objectives, the level of benefits in the past year was:
_____ 9.3 In relation to its objectives, level of return on investment (ROI) in the last year was:
_____ 9.4 In relation to its objectives, the degree of customer satisfaction in the last year was:
_____ 9.5 In relation to its objectives, the employee satisfaction at work in the last year was:
_____ 9.6 The overall results in your business in the last year were:

10. Perceived environmental uncertainty (PEU)

Please indicate the extent that each of the following factors is predictable or unpredictable in the context of your main business.

(where: 1= highly unpredictable...5= highly predictable)

_____ 10.1 Manufacturing technology
_____ 10.2 Competitors' actions
_____ 10.3 Market demand
_____ 10.4 Product attributes/design
_____ 10.5 Raw material availability
_____ 10.6 Raw material price
_____ 10.7 Government regulation
_____ 10.8 Labor union actions

11. Access to resources:

Please rate from 1 to 5, "access" to the following resources compared to other companies in your sector:

(Where 1 = Less access to other companies, 5 = Improved access)

_____11.1 Staff with a positive commitment towards the development of the company.
_____ 11.2 Highly productive Staff
_____11.3 Staff trained to provide excellent customer service
_____11.4 Personal likes to contribute ideas for new products / services
_____11.5 Staff trained to market their products and / or services

Thank you for participating in this study!. If you are interested in receiving a summary of the results of this study (in March 2013), please write an emai or personal contact data . Name:_____ email:_____ Phone number:_____

For more information please contact Daniel Ballesteros in dballest@itesm.mx or phone (52) 55 91 77 82 81. This study was carried out jointly by the Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico) and the Universidad Autónoma de Barcelona (Spain).

Classification of business sectors

1 manufacturing industries	5 Financial services and insurance	9 Educational services	13 Other services except government activities
2 Wholesale business	6 Professional, scientific and technical services	10 Health care and social assistance	14 Governmental activities
3 Retail business	7 Corporate	11 Recreational, cultural and sporting and other recreational services	
4 Mass media information	8 Services business support and waste management and remediation services	12 Temporary accommodation and food and beverage preparation	

Appendix C. Non response bias & common method variance (CMV) analysis

Non-response bias analisys

variables		*Descriptives* N	Mean	Std. Dev.	*Anova* F	Sig.
Firm age	online	323	30.55	29.55	0.005	0.942
	offline	321	30.39	27.24		
	Total	644	30.47	28.40		
# employees	online	323	1979	4809	0.03	0.862
	offline	321	2043	4494		
	Total	644	2011	4651		
Repondent Formal Management Education	online	323	3.16	2.60	0.779	0.378
	offline	321	3.34	2.72		
	Total	644	3.25	2.66		
Respondent Management Experience	online	323	7.99	6.59	0.194	0.66
	offline	321	7.76	6.52		
	Total	644	7.87	6.55		
System amplitude used	online	323	0.52	0.500	2.25	0.134
	offline	321	0.46	0.499		
	Total	644	0.49	0.500		

Note: N=644 in all cases

Note: ** Significant @ 95% level; *** Significant @ 99% level

Common Method Variance (CMV): Total Variance Explained

Component	Initial Eigenvalues Total	Variance	%	Extraction Sums of Squared Total	Variance	Cumulative %
1	4.381	19.0484	19.048	4.381	19.048	19.048
2	3.123	13.578	32.627			
3	2.346	10.198	42.825			
4	2.149	9.345	52.170			
5	2.078	9.034	61.204			
6	1.716	7.460	68.664			
7	1.083	4.710	73.374			
8	.752	3.268	76.642			
9	.627	2.726	79.368			
10	.565	2.456	81.824			
11	.532	2.311	84.135			
12	.447	1.945	86.080			
13	.386	1.678	87.758			
14	.366	1.589	89.347			
15	.356	1.549	90.896			
16	.334	1.452	92.349			
17	.301	1.307	93.656			
18	.283	1.229	94.885			
19	.272	1.184	96.069			
20	.260	1.130	97.199			
21	.248	1.077	98.276			
22	.205	0.893	99.169			
23	.192	.835	100.000			

Extraction Method: Principal Component Analysis.

Appendix D. Descriptive stats, correlations. Part 1: MCS uses, LO, EO (ch.II)

	Capabilities		MCS use			
	Learning Orient.	*Entrep. Orient.*	*Monitoring*	*Legitimizing*	*Focusing Attention*	*Strategic Decision*
Descriptive Statistics (average)						
Mean (Avg)	3.709	3.457	4.012	3.367	3.216	3.488
Standard deviation	1.113	1.034	.935	.941	.936	.902
Median	4.000	3.643	4.250	3.444	3.286	3.571
Factor Analysis	FA_LO	FA_EO	FAC_M	FAC_L	FAC_F	FAC_D
No. Items	4	14	4	7	7	9
KMO	.781	.966	.956	.956	.956	.956
Approx. Chi-Square	983	8715	11860.3	11860.3	11860.3	11860.3
Bartlett's Test Spher. (sig.)	.000	.000	.000	.000	.000	.000
Cronbach's Alpha	.826	.967	.958	.958	.958	.958
Correlation matrix (pearson)						
FA_LO Learning Orientation	1.000					
FA_EO Entrepreneurial Orientation	.450**	1.000				
FAC_M (monitoring)	.164**	.195**	1.000			
FAC_L (legitimizing)	.336**	.250**	.000	1.000		
FAC_F (focusing attention)	.306**	.274**	.000	.000	1.000	
FAC_D (Strategic decisions)	.215**	.194**	.000	.000	.000	1.000

**. Correlation is significant at the 0.01 level (2-tailed). N= 644

Appendix D. Descriptive stats, correlations: Part 2: MCS uses, LO, EO, Performance (ch.III)

Descriptive statistics of the constructs and correlation matrix

	Diagnostic use		Interactive use					
	Monitoring	Legitimizing	Focusing	Decision	LO	EO	Performance	Total
No. of items	4	9	7	7	4	14	6	51
No. of items used	4	7	3	5	2	14	4	39
Theoretical range	1-5	1-5	1-5	1-5	1-5	1-5	1-5	
Minimum	3.91	3.197	2.91	3.31	3.52	3.30	3.25	
Maximum	4.19	3.590	3.53	3.74	3.81	3.67	3.61	
Mean	4.01	3.37	3.22	3.49	3.71	3.30	3.49	
N	644	644	644	644	644	644	644	644
Correlation matrix								
Monitoring	1							
Legitimizing	0.616	1						
Focusing	0.706	0.771	1					
Decision	0.617	0.731	0.741	1				
LO	0.366	0.534	0.535	0.452	1			
EO	0.364	0.428	0.489	0.391	0.483	1		
Performance	0.344	0.421	0.383	0.394	0.358	0.424	1	

**. Correlation is significant at the 0.01 level

Appendix D. Descriptive stats, correlations: Part 3: Diagnostic, interactive, LO, EO, Performance, PEU (ch.IV)

Descriptive statistics of the constructs and correlation matrix

	Diagnostic use		Interactive use						
	Monitoring	Legitimizing	Focusing	Decision	LO	EO	Performance	PEU	Total
No. of items	4	9	7	7	4	14	6	8	59
No. of items used	4	9	4	6	3	14	4	8	52
Theoretical range	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	
Minimum	3.91	3.197	2.91	3.31	3.52	3.30	3.25	3.15	
Maximum	4.19	3.590	3.53	3.74	3.81	3.67	3.61	3.56	
Mean	4.01	3.37	3.22	3.49	3.71	3.30	3.49	3.40	
N	644	644	644	644	644	644	644	644	644
Correlation matrix									
Diagnostic	**1.000**								
Interactive	0.500	**1.000**							
LO	0.373	0.359	**1.000**						
EO	0.251	0.259	0.241	**1.000**					
PEU	0.147	0.167	0.049	0.063	**1.000**				
Performance	0.228	0.190	0.126	0.165	0.102	**1.000**			

**. Correlation is significant at the 0.01 level

Appendix E . Reliability. Part 1: Average Inter.itemTotal Correlation

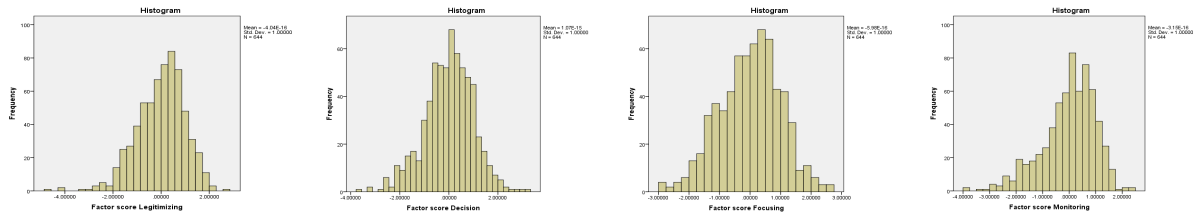
	Average	Min	Max
Monitoring	0.853	0.829	0.875
Focusing attention	0.766	0.737	0.817
Strategic Decision making	0.800	0.743	0.835
Legitimizing	0.805	0.763	0.854
Note: N = 644 in all cases	0.806		

Note 1: All correlations are significant at the 99% level

Appendix E . Reliability. Part 2: Test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Factors	**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
FAC_L	.049	644	.001	.978	644	.000
FAC_D	.036	644	.046	.992	644	.001
FAC_F	.036	644	.049	.995	644	.039
FAC_M	.075	644	.000	.961	644	.000
FA_LO	.125	644	.000	.915	644	.000
FA_EO	.092	644	.000	.958	644	.000

a. Lilliefors Significance Correction



Appendix F. Convergent-discriminant validity. Part 1: Correlation MCS uses, capabilities, performance, PEU.

Correlations MCS uses (Monitoring, focusing attention, strategic decision making, Legitimization)

	M1	M2	M3	M4	F1	F2	F3	F4	F5	F6	F7	D1	D2	D3	D4	D5	D6	D7	L1	L2	L3	L4	L5	L6	L7	L8	L9
M1	1	.639**	.627**	.572**	.322**	.407**	.413**	.385**	.386**	.238**	.273**	.417**	.367**	.398**	.303**	.282**	.340**	.336**	.402**	.335**	.319**	.264**	.430**	.314**	.303**	.395**	.386**
M2	.639**	1	.706**	.602**	.354**	.398**	.434**	.393**	.406**	.262**	.312**	.426**	.412**	.375**	.330**	.325**	.391**	.373**	.414**	.349**	.373**	.319**	.413**	.380**	.333**	.455**	.427**
M3	.627**	.706**	1	.673**	.332**	.425**	.478**	.420**	.447**	.294**	.331**	.443**	.418**	.407**	.382**	.387**	.411**	.416**	.427**	.354**	.360**	.319**	.403**	.402**	.383**	.477**	.417**
M4	.572**	.602**	.673**	1	.348**	.380**	.474**	.448**	.449**	.334**	.359**	.429**	.462**	.422**	.389**	.407**	.430**	.445**	.385**	.382**	.411**	.323**	.395**	.368**	.417**	.447**	.420**
F1	.322**	.354**	.332**	.348**	1	.653**	.456**	.514**	.559**	.433**	.439**	.387**	.450**	.420**	.394**	.392**	.397**	.423**	.474**	.389**	.450**	.438**	.436**	.469**	.500**	.488**	.484**
F2	.407**	.398**	.425**	.380**	.653**	1	.591**	.502**	.558**	.407**	.449**	.409**	.419**	.422**	.423**	.391**	.401**	.451**	.488**	.384**	.428**	.415**	.440**	.416**	.461**	.480**	.466**
F3	.413**	.434**	.478**	.474**	.456**	.591**	1	.569**	.537**	.400**	.431**	.449**	.412**	.433**	.432**	.423**	.448**	.492**	.513**	.460**	.445**	.461**	.427**	.381**	.429**	.492**	.466**
F4	.385**	.393**	.420**	.448**	.514**	.502**	.569**	1	.733**	.472**	.450**	.357**	.372**	.380**	.335**	.384**	.396**	.378**	.497**	.382**	.404**	.404**	.366**	.421**	.474**	.503**	.461**
F5	.386**	.406**	.447**	.449**	.559**	.558**	.537**	.733**	1	.496**	.490**	.422**	.446**	.444**	.403**	.422**	.471**	.484**	.513**	.418**	.439**	.442**	.433**	.451**	.488**	.528**	.481**
F6	.238**	.262**	.294**	.334**	.433**	.407**	.400**	.472**	.496**	1	.744**	.387**	.427**	.399**	.439**	.452**	.449**	.428**	.347**	.364**	.400**	.412**	.322**	.412**	.402**	.419**	.402**
F7	.273**	.312**	.331**	.359**	.439**	.449**	.431**	.450**	.490**	.744**	1	.440**	.426**	.431**	.416**	.448**	.470**	.436**	.391**	.398**	.417**	.424**	.376**	.414**	.405**	.484**	.423**
D1	.417**	.426**	.443**	.429**	.387**	.409**	.449**	.357**	.422**	.387**	.440**	1	.649**	.536**	.473**	.496**	.478**	.542**	.482**	.449**	.446**	.402**	.441**	.372**	.396**	.481**	.478**
D2	.367**	.412**	.418**	.462**	.450**	.419**	.412**	.372**	.446**	.427**	.426**	.649**	1	.652**	.545**	.579**	.552**	.569**	.436**	.435**	.487**	.419**	.456**	.457**	.440**	.488**	.487**
D3	.398**	.375**	.407**	.422**	.420**	.422**	.433**	.380**	.444**	.399**	.431**	.536**	.652**	1	.686**	.640**	.588**	.590**	.434**	.477**	.474**	.425**	.459**	.424**	.408**	.498**	.456**
D4	.303**	.330**	.382**	.389**	.394**	.423**	.432**	.335**	.403**	.439**	.416**	.473**	.545**	.686**	1	.677**	.544**	.562**	.398**	.399**	.451**	.415**	.404**	.445**	.456**	.489**	.451**
D5	.282**	.325**	.387**	.407**	.392**	.391**	.423**	.384**	.422**	.452**	.448**	.496**	.579**	.640**	.677**	1	.599**	.591**	.416**	.450**	.483**	.457**	.451**	.434**	.443**	.477**	.464**
D6	.340**	.391**	.411**	.430**	.397**	.401**	.448**	.396**	.471**	.449**	.470**	.478**	.552**	.588**	.544**	.599**	1	.626**	.421**	.427**	.478**	.454**	.401**	.425**	.422**	.493**	.441**
D7	.336**	.373**	.416**	.445**	.423**	.451**	.492**	.378**	.484**	.428**	.436**	.542**	.569**	.590**	.562**	.591**	.626**	1	.478**	.473**	.486**	.470**	.474**	.455**	.478**	.503**	.484**
L1	.402**	.414**	.427**	.385**	.474**	.488**	.513**	.497**	.513**	.347**	.391**	.482**	.436**	.434**	.398**	.416**	.421**	.478**	1	.575**	.568**	.582**	.561**	.542**	.530**	.621**	.619**
L2	.335**	.349**	.354**	.382**	.389**	.384**	.460**	.382**	.418**	.364**	.398**	.449**	.435**	.477**	.399**	.450**	.427**	.473**	.575**	1	.655**	.553**	.546**	.550**	.507**	.553**	.601**
L3	.319**	.373**	.360**	.411**	.450**	.428**	.445**	.404**	.439**	.400**	.417**	.446**	.487**	.474**	.451**	.483**	.478**	.486**	.568**	.655**	1	.667**	.601**	.561**	.499**	.575**	.589**
L4	.264**	.319**	.319**	.323**	.438**	.415**	.461**	.404**	.442**	.412**	.424**	.402**	.419**	.425**	.415**	.457**	.454**	.470**	.582**	.553**	.667**	1	.642**	.627**	.556**	.624**	.625**
L5	.430**	.413**	.403**	.395**	.436**	.440**	.427**	.366**	.433**	.322**	.376**	.441**	.456**	.459**	.404**	.451**	.401**	.474**	.561**	.546**	.601**	.642**	1	.637**	.547**	.652**	.671**
L6	.314**	.380**	.402**	.368**	.469**	.416**	.381**	.421**	.451**	.412**	.414**	.372**	.457**	.424**	.445**	.434**	.425**	.455**	.542**	.550**	.561**	.627**	.637**	1	.687**	.665**	.640**
L7	.303**	.333**	.383**	.417**	.500**	.461**	.429**	.474**	.488**	.402**	.405**	.396**	.440**	.408**	.456**	.443**	.422**	.478**	.530**	.507**	.499**	.556**	.547**	.687**	1	.745**	.653**
L8	.395**	.455**	.477**	.447**	.488**	.480**	.492**	.503**	.528**	.419**	.484**	.481**	.488**	.498**	.489**	.477**	.493**	.503**	.621**	.553**	.575**	.624**	.652**	.665**	.745**	1	.744**
L9	.386**	.427**	.417**	.420**	.484**	.466**	.466**	.461**	.481**	.402**	.423**	.478**	.487**	.456**	.451**	.464**	.441**	.484**	.619**	.601**	.589**	.625**	.671**	.640**	.653**	.744**	1

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

Correlations Capabilities (Learning Orientation and Entrepreneurial Orientation)

	LO1	LO2	LO3	LO4	EO1	EO2	EO3	EO4r	EO5	EO6	EO7	EO8	EO9	EO10	EO11	EO12	EO13r	EO14r
LO1	1	.704**	.512**	.552**	.345**	.275**	.330**	.247**	.302**	.306**	.354**	.362**	.382**	.356**	.355**	.366**	.282**	.277**
LO2	.704**	1	.459**	.568**	.370**	.309**	.349**	.249**	.305**	.327**	.365**	.370**	.351**	.389**	.369**	.359**	.320**	.321**
LO3	.512**	.459**	1	.478**	.297**	.237**	.290**	.207**	.247**	.310**	.294**	.290**	.292**	.270**	.286**	.304**	.213**	.207**
LO4	.552**	.568**	.478**	1	.311**	.250**	.285**	.227**	.264**	.276**	.274**	.301**	.315**	.328**	.335**	.308**	.277**	.270**
EO1	.345**	.370**	.297**	.311**	1	.764**	.762**	.672**	.730**	.686**	.711**	.731**	.684**	.695**	.715**	.705**	.740**	.689**
EO2	.275**	.309**	.237**	.250**	.764**	1	.818**	.647**	.729**	.674**	.683**	.687**	.638**	.637**	.639**	.656**	.645**	.662**
EO3	.330**	.349**	.290**	.285**	.762**	.818**	1	.622**	.731**	.722**	.719**	.708**	.677**	.674**	.686**	.687**	.681**	.680**
EO4r	.247**	.249**	.207**	.227**	.672**	.647**	.622**	1	.690**	.630**	.598**	.607**	.579**	.577**	.577**	.599**	.655**	.700**
EO5	.302**	.305**	.247**	.264**	.730**	.729**	.731**	.690**	1	.723**	.686**	.695**	.650**	.664**	.655**	.641**	.645**	.653**
EO6	.306**	.327**	.310**	.276**	.686**	.674**	.722**	.630**	.723**	1	.713**	.693**	.637**	.659**	.674**	.668**	.609**	.643**
EO7	.354**	.365**	.294**	.274**	.711**	.683**	.719**	.598**	.686**	.713**	1	.770**	.732**	.678**	.678**	.704**	.618**	.603**
EO8	.362**	.370**	.290**	.301**	.731**	.687**	.708**	.607**	.695**	.693**	.770**	1	.766**	.696**	.700**	.674**	.630**	.627**
EO9	.382**	.351**	.292**	.315**	.684**	.638**	.677**	.579**	.650**	.637**	.732**	.766**	1	.674**	.671**	.674**	.596**	.562**
EO10	.356**	.389**	.270**	.328**	.695**	.637**	.674**	.577**	.664**	.659**	.678**	.696**	.674**	1	.799**	.725**	.657**	.605**
EO11	.355**	.369**	.286**	.335**	.715**	.639**	.686**	.577**	.655**	.674**	.678**	.700**	.671**	.799**	1	.815**	.683**	.611**
EO12	.366**	.359**	.304**	.308**	.705**	.656**	.687**	.599**	.641**	.668**	.704**	.674**	.674**	.725**	.815**	1	.655**	.597**
EO13r	.282**	.320**	.213**	.277**	.740**	.645**	.681**	.655**	.645**	.609**	.618**	.630**	.596**	.657**	.683**	.655**	1	.720**
EO14r	.277**	.321**	.207**	.270**	.689**	.662**	.680**	.700**	.653**	.643**	.603**	.627**	.562**	.605**	.611**	.597**	.720**	1

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

Correlations performance & Perceived environmental uncertainty

	P1_S	P2_Bº	P3_R	P4_SC	P5_SW	P6_G	PU1	PU2	PU3	PU4	PU5	PU6	PU7	PU8
P1_S	1.000	.660	.647	.400	.464	.644	.150	.172	.187	.159	.107	.090	.164	.134
P2_Bº	.660	1.000	.697	.462	.482	.576	.131	.164	.144	.174	.145	.127	.166	.177
P3_R	.647	.697	1.000	.469	.477	.606	.154	.103	.158	.156	.141	.161	.180	.120
P4_SC	.400	.462	.469	1.000	.547	.491	.112	.149	.118	.155	.134	.132	.155	.114
P5_SW	.464	.482	.477	.547	1.000	.500	.163	.143	.134	.170	.107	.138	.182	.159
P6_G	.644	.576	.606	.491	.500	1.000	.205	.153	.157	.175	.120	.169	.173	.134
PU1	.150	.131	.154	.112	.163	.205	1.000	.286	.276	.380	.455	.369	.255	.310
PU2	.172	.164	.103	.149	.143	.153	.286	1.000	.401	.260	.266	.229	.274	.180
PU3	.187	.144	.158	.118	.134	.157	.276	.401	1.000	.432	.232	.266	.205	.133
PU4	.159	.174	.156	.155	.170	.175	.380	.260	.432	1.000	.416	.366	.240	.258
PU5	.107	.145	.141	.134	.107	.120	.455	.266	.232	.416	1.000	.563	.267	.307
PU6	.090	.127	.161	.132	.138	.169	.369	.229	.266	.366	.563	1.000	.320	.256
PU7	.164	.166	.180	.155	.182	.173	.255	.274	.205	.240	.267	.320	1.000	.397
PU8	.134	.177	.120	.114	.159	.134	.310	.180	.133	.258	.307	.256	.397	1.000

Inter-Item Correlation Matrix

	M1	M2	M3	M4	L1	L2	L3	L4	L5	L6	L7	L8	L9	F1	F2	F3	F4	F5	F6	F7	D1	D2	D3	D4	D5	D6	D7	LO1	LO2	LO3	LO4	EO1	EO2	EO3	EO4r	EO5	EO6	EO7	EO8	EO9	EO10	EO11	EO12	EO13r	EO14r	P1_S	P2_Br	P3_R	P4_SC	P5_SW	P6_G	PU1	PU2	PU3	PU4	PU5	PU6	PU7	PU8
M1	1.000	.639	.627	.572	.402	.335	.319	.264	.430	.314	.303	.395	.386	.322	.407	.413	.385	.386	.238	.273	.417	.367	.398	.303	.282	.340	.336	.250	.253	.159	.277	.254	.249	.254	.220	.255	.253	.228	.300	.252	.249	.244	.252	.183	.262	.258	.241	.199	.217	.211	.211	.143	.093	.215	.198	.138	.093	.141	.136
M2	.639	1.000	.706	.602	.414	.349	.373	.319	.413	.380	.333	.455	.427	.354	.398	.434	.393	.406	.262	.312	.426	.412	.375	.330	.325	.391	.373	.252	.222	.141	.233	.238	.221	.265	.206	.271	.277	.224	.273	.236	.253	.239	.264	.173	.225	.244	.220	.202	.193	.179	.224	.144	.169	.187	.185	.132	.095	.130	.135
M3	.627	.706	1.000	.673	.427	.354	.360	.319	.403	.402	.383	.477	.417	.332	.425	.478	.420	.447	.294	.331	.443	.418	.407	.382	.367	.411	.416	.255	.253	.149	.247	.235	.235	.257	.175	.269	.280	.240	.279	.249	.276	.237	.232	.149	.234	.245	.223	.215	.198	.214	.252	.153	.147	.178	.199	.133	.116	.137	.162
M4	.572	.602	.673	1.000	.385	.382	.411	.323	.395	.368	.417	.447	.420	.348	.380	.474	.448	.449	.334	.359	.429	.462	.422	.389	.407	.430	.445	.242	.279	.200	.230	.255	.251	.264	.208	.239	.257	.210	.269	.228	.219	.224	.217	.157	.238	.204	.183	.199	.193	.221	.221	.097	.116	.180	.204	.085	.076	.113	.124
L1	.402	.414	.427	.385	1.000	.575	.568	.582	.561	.542	.530	.621	.619	.474	.488	.513	.497	.513	.347	.391	.482	.436	.434	.398	.416	.421	.478	.334	.361	.191	.289	.297	.242	.286	.231	.254	.315	.292	.326	.331	.324	.321	.312	.235	.299	.296	.242	.226	.239	.250	.279	.169	.145	.206	.183	.120	.082	.119	.117
L2	.335	.349	.354	.382	.575	1.000	.655	.553	.546	.550	.507	.553	.601	.389	.384	.460	.382	.418	.364	.398	.449	.435	.477	.399	.450	.427	.473	.302	.319	.224	.255	.230	.200	.238	.190	.205	.277	.251	.267	.234	.283	.274	.298	.165	.173	.256	.240	.199	.253	.240	.244	.175	.181	.161	.145	.129	.011	.088	.148
L3	.319	.373	.360	.411	.568	.655	1.000	.667	.601	.561	.499	.575	.589	.450	.428	.445	.404	.439	.400	.417	.446	.487	.474	.451	.483	.478	.486	.338	.382	.255	.308	.235	.221	.261	.170	.213	.266	.287	.275	.268	.325	.298	.319	.194	.196	.255	.261	.230	.223	.278	.271	.176	.185	.228	.136	.124	.020	.114	.094
L4	.264	.319	.319	.323	.582	.553	.667	1.000	.642	.627	.556	.624	.625	.438	.415	.461	.404	.442	.412	.424	.402	.419	.425	.415	.457	.454	.470	.314	.366	.225	.312	.249	.242	.311	.234	.257	.319	.294	.313	.288	.328	.337	.318	.196	.268	.251	.285	.258	.260	.267	.297	.125	.165	.167	.179	.132	.083	.171	.138
L5	.430	.413	.403	.395	.561	.546	.601	.642	1.000	.637	.547	.652	.671	.436	.440	.427	.366	.433	.322	.376	.441	.456	.459	.404	.451	.401	.474	.374	.392	.259	.323	.293	.266	.314	.252	.291	.325	.286	.326	.329	.318	.359	.342	.220	.290	.269	.322	.232	.262	.256	.324	.155	.167	.192	.178	.168	.079	.174	.206
L6	.314	.380	.402	.368	.542	.550	.561	.627	.637	1.000	.687	.665	.640	.469	.416	.381	.421	.451	.412	.414	.372	.457	.424	.445	.434	.425	.455	.270	.352	.240	.306	.224	.232	.254	.184	.229	.269	.233	.249	.247	.257	.277	.265	.165	.206	.262	.258	.225	.270	.253	.296	.170	.185	.181	.183	.121	.118	.192	.186
L7	.303	.333	.383	.417	.530	.507	.499	.556	.547	.687	1.000	.745	.653	.500	.461	.429	.474	.488	.402	.405	.396	.440	.408	.456	.443	.422	.478	.336	.348	.261	.351	.275	.261	.324	.189	.246	.287	.255	.280	.296	.319	.335	.322	.226	.242	.185	.209	.212	.281	.285	.277	.125	.113	.172	.130	.084	.103	.170	.148
L8	.395	.455	.477	.447	.621	.553	.575	.624	.652	.665	.745	1.000	.744	.488	.480	.492	.503	.528	.419	.484	.481	.488	.498	.489	.477	.493	.503	.375	.371	.276	.371	.306	.274	.340	.210	.276	.320	.301	.320	.333	.357	.347	.350	.257	.278	.268	.260	.253	.283	.304	.314	.122	.166	.155	.162	.118	.080	.189	.163
L9	.386	.427	.417	.420	.619	.601	.589	.625	.671	.640	.653	.744	1.000	.484	.466	.466	.461	.481	.402	.423	.478	.487	.456	.451	.464	.441	.484	.370	.383	.276	.315	.245	.223	.285	.211	.246	.285	.255	.279	.290	.291	.316	.322	.203	.220	.243	.253	.219	.290	.291	.316	.122	.168	.183	.128	.114	.179	.179
F1	.322	.354	.332	.348	.474	.389	.450	.438	.436	.469	.500	.488	.484	1.000	.653	.456	.514	.559	.433	.439	.387	.450	.420	.394	.392	.397	.423	.371	.399	.239	.392	.305	.235	.274	.178	.220	.262	.280	.306	.307	.312	.305	.321	.214	.233	.202	.259	.207	.247	.350	.236	.195	.179	.150	.132	.134	.099	.162	.144
F2	.407	.398	.425	.380	.488	.384	.428	.415	.440	.416	.461	.480	.466	.653	1.000	.591	.502	.558	.407	.449	.409	.419	.422	.423	.391	.401	.451	.316	.321	.275	.347	.298	.246	.316	.233	.281	.301	.298	.334	.320	.310	.294	.324	.212	.273	.193	.237	.200	.207	.274	.194	.193	.125	.132	.130	.151	.093	.139	.153
F3	.413	.434	.478	.474	.513	.460	.445	.461	.427	.381	.429	.492	.466	.456	.591	1.000	.569	.537	.400	.431	.449	.412	.433	.432	.423	.448	.492	.308	.348	.279	.341	.309	.265	.322	.269	.284	.371	.333	.351	.329	.342	.328	.351	.191	.287	.252	.237	.228	.238	.255	.280	.147	.141	.154	.166	.138	.081	.094	.145
F4	.385	.393	.420	.448	.497	.382	.404	.404	.366	.421	.474	.503	.461	.514	.502	.569	1.000	.733	.472	.450	.357	.372	.380	.335	.384	.396	.378	.295	.338	.198	.280	.261	.240	.288	.192	.230	.265	.301	.299	.259	.298	.259	.276	.187	.228	.198	.165	.200	.263	.217	.215	.171	.189	.157	.185	.173	.145	.122	.156
F5	.386	.406	.447	.449	.513	.418	.439	.442	.433	.451	.488	.528	.481	.559	.558	.537	.733	1.000	.496	.490	.422	.446	.444	.403	.422	.471	.484	.358	.371	.271	.362	.295	.275	.337	.215	.285	.314	.352	.334	.302	.304	.286	.312	.220	.284	.208	.250	.272	.302	.256	.183	.159	.137	.175	.185	.120	.191	.157
F6	.238	.262	.294	.334	.347	.364	.400	.412	.322	.412	.402	.419	.402	.433	.407	.400	.472	.496	1.000	.744	.387	.427	.399	.439	.452	.449	.428	.237	.260	.230	.290	.230	.194	.246	.178	.203	.263	.282	.284	.275	.293	.268	.306	.168	.185	.155	.148	.160	.233	.276	.197	.133	.102	.146	.173	.070	.090	.126	.106
F7	.273	.312	.331	.359	.391	.398	.417	.424	.376	.414	.405	.484	.423	.439	.449	.431	.450	.490	.744	1.000	.440	.426	.431	.416	.448	.470	.436	.269	.304	.226	.311	.263	.256	.308	.210	.247	.294	.327	.312	.338	.320	.302	.323	.197	.241	.209	.172	.194	.215	.256	.243	.187	.085	.123	.172	.086	.086	.169	.135
D1	.417	.426	.443	.429	.482	.449	.446	.402	.441	.372	.396	.481	.478	.387	.409	.449	.357	.422	.387	.440	1.000	.649	.536	.473	.496	.478	.542	.347	.348	.233	.309	.264	.211	.271	.191	.196	.267	.265	.284	.300	.260	.273	.272	.136	.220	.247	.239	.220	.211	.262	.297	.211	.140	.147	.184	.163	.100	.118	.097
D2	.367	.412	.418	.462	.436	.435	.487	.419	.456	.457	.440	.488	.487	.450	.419	.412	.372	.446	.427	.426	.649	1.000	.652	.545	.579	.552	.569	.294	.331	.244	.279	.229	.232	.270	.194	.224	.242	.248	.282	.296	.248	.238	.257	.158	.197	.240	.226	.234	.273	.284	.314	.188	.139	.138	.194	.210	.146	.169	.149
D3	.398	.375	.407	.422	.434	.477	.474	.425	.459	.424	.408	.498	.456	.420	.422	.433	.380	.444	.399	.431	.536	.652	1.000	.686	.640	.588	.590	.320	.316	.233	.315	.225	.254	.289	.198	.251	.256	.303	.318	.326	.292	.266	.280	.174	.223	.265	.229	.254	.285	.283	.288	.194	.135	.145	.180	.168	.066	.145	.166
D4	.303	.330	.382	.389	.398	.399	.451	.415	.404	.445	.456	.489	.451	.394	.423	.432	.335	.403	.439	.416	.473	.545	.686	1.000	.677	.544	.562	.260	.267	.223	.250	.193	.204	.237	.174	.207	.250	.250	.263	.292	.259	.243	.268	.112	.184	.203	.219	.226	.240	.241	.271	.142	.123	.163	.141	.110	.049	.141	.169
D5	.282	.325	.387	.407	.416	.450	.483	.457	.451	.434	.443	.477	.464	.392	.391	.423	.384	.422	.452	.448	.496	.579	.640	.677	1.000	.599	.591	.233	.280	.167	.212	.193	.232	.268	.171	.204	.266	.261	.240	.255	.257	.245	.271	.137	.215	.182	.192	.210	.261	.218	.269	.161	.117	.155	.198	.189	.088	.145	.205
D6	.340	.391	.411	.430	.421	.427	.478	.454	.401	.425	.422	.493	.441	.397	.401	.448	.396	.471	.449	.470	.478	.552	.588	.544	.599	1.000	.626	.277	.297	.278	.319	.267	.280	.311	.226	.267	.295	.319	.313	.296	.293	.254	.294	.184	.254	.180	.201	.219	.273	.313	.289	.160	.111	.123	.133	.162	.120	.166	.150
D7	.336	.373	.416	.445	.478	.473	.486	.470	.474	.455	.478	.503	.484	.423	.451	.492	.378	.484	.428	.436	.542	.569	.590	.562	.591	.626	1.000	.299	.318	.251	.294	.284	.268	.319	.239	.263	.308	.309	.328	.307	.319	.304	.295	.196	.248	.225	.236	.218	.258	.254	.315	.202	.162	.151	.222	.209	.122	.156	.177
LO1	.250	.252	.255	.242	.334	.302	.338	.314	.374	.270	.336	.375	.370	.371	.316	.308	.295	.358	.237	.269	.347	.294	.320	.260	.233	.277	.299	1.000	.704	.512	.552	.345	.275	.330	.247	.302	.306	.354	.362	.382	.356	.355	.366	.282	.277	.242	.228	.189	.292	.344	.267	.119	.075	.161	.095	.063	.053	.114	.087
LO2	.253	.222	.253	.279	.361	.319	.382	.366	.392	.352	.348	.371	.383	.399	.321	.348	.338	.371	.260	.304	.348	.331	.316	.267	.280	.297	.318	.704	1.000	.459	.568	.370	.309	.349	.249	.305	.327	.365	.370	.351	.389	.369	.359	.320	.321	.201	.262	.221	.321	.333	.283	.181	.069	.145	.120	.092	.098	.109	.057
LO3	.159	.141	.149	.200	.191	.224	.255	.225	.259	.240	.261	.276	.276	.239	.275	.279	.198	.271	.230	.226	.233	.244	.233	.223	.167	.278	.251	.512	.459	1.000	.478	.297	.237	.290	.207	.247	.310	.294	.290	.292	.270	.286	.304	.213	.207	.135	.136	.146	.297	.274	.180	.123	.048	.152	.112	.089	.127	.143	.093
LO4	.277	.233	.247	.230	.289	.255	.308	.312	.323	.306	.351	.371	.315	.392	.347	.341	.280	.362	.290	.311	.309	.279	.315	.250	.212	.319	.294	.552	.568	.478	1.000	.311	.250	.285	.227	.264	.276	.274	.301	.315	.328	.335	.308	.277	.270	.197	.237	.179	.274	.356	.243	.182	.064	.147	.127	.081	.085	.120	.076
EO1	.254	.238	.235	.255	.297	.230	.235	.249	.293	.224	.275	.306	.245	.305	.298	.309	.261	.295	.230	.263	.264	.229	.225	.193	.193	.193	.267	.284	.345	.370	.297	.311	1.000	.764	.762	.672	.730	.686	.711	.731	.684	.695	.715	.705	.740	.689	.254	.264	.231	.312	.287	.343	.153	.073	.112	.169	.102	.093	.131	.097
EO2	.249	.221	.235	.251	.242	.200	.221	.242	.266	.232	.261	.274	.223	.235	.246	.265	.240	.275	.194	.256	.211	.232	.254	.204	.232	.280	.268	.275	.309	.237	.250	.764	1.000	.818	.647	.729	.674	.683	.687	.638	.637	.639	.656	.645	.662	.251	.227	.235	.330	.281	.339	.202	.049	.072	.174	.094	.036	.105	.140
EO3	.254	.265	.257	.264	.286	.238	.261	.311	.314	.254	.324	.340	.285	.274	.316	.322	.288	.337	.246	.308	.271	.270	.289	.237	.268	.311	.319	.330	.349	.290	.285	.762	.818	1.000	.622	.731	.722	.719	.708	.677	.674	.686	.687	.681	.680	.266	.247	.264	.325	.300	.355	.192	.054	.092	.177	.102	.062	.123	.148
EO4r	.220	.206	.175	.208	.231	.190	.170	.234	.252	.184	.189	.210	.211	.178	.233	.269	.192	.215	.178	.210	.191	.194	.198	.174	.171	.226	.239	.247	.249	.207	.227	.672	.647	.622	1.000	.690	.630	.598	.607	.579	.577	.577	.599	.656	.700	.221	.183	.233	.241	.190	.281	.157	.012	.084	.160	.133	.085	.099	.096
EO5	.255	.271	.269	.239	.254	.205	.213	.257	.291	.229	.246	.276	.246	.220	.281	.284	.230	.285	.203	.247	.196	.224	.251	.207	.204	.267	.263	.302	.305	.247	.264	.730	.729	.731	.690	1.000	.723	.686	.695	.650	.664	.655	.641	.645	.653	.276	.240	.242	.293	.259	.362	.176	.075	.100	.183	.158	.095	.123	.121
EO6	.253	.277	.280	.257	.315	.277	.266	.319	.325	.269	.287	.320	.285	.262	.301	.371	.265	.314	.263	.294	.267	.242	.256	.250	.266	.295	.308	.306	.327	.310	.276	.686	.674	.722	.630	.723	1.000	.713	.693	.637	.659	.674	.668	.609	.643	.311	.270	.287	.330	.296	.356	.184	.081	.122	.174	.150	.099	.124	.136
EO7	.228	.224	.240	.210	.292	.251	.287	.294	.286	.233	.255	.301	.255	.280	.298	.333	.301	.352	.282	.327	.265	.248	.303	.250	.261	.319	.309	.354	.365	.294	.274	.711	.683	.719	.598	.686	.713	1.000	.770	.732	.678	.678	.704	.618	.603	.257	.263	.284	.304	.282	.340	.151	.084	.124	.153	.129	.084	.137	.108
EO8	.300	.273	.279	.269	.326	.267	.275	.313	.326	.249	.280	.320	.279	.306	.334	.351	.299	.334	.284	.312	.284	.282	.318	.263	.240	.313	.328	.362	.370	.290	.301	.731	.687	.708	.607	.695	.693	.770	1.000	.766	.696	.700	.674	.630	.627	.267	.249	.234	.305	.287	.349	.174	.076	.099	.122	.108	.056	.117	.123
EO9	.252	.236	.249	.228	.331	.234	.268	.288	.329	.247	.296	.333	.290	.307	.320	.329	.259	.302	.275	.338	.300	.296	.326	.292	.255	.296	.307	.382	.351	.292	.315	.684	.638	.677	.579	.650	.637	.732	.766	1.000	.674	.671	.674	.596	.562	.247	.266	.255	.297	.276	.344	.163	.102	.112	.136	.090	.079	.120	.108
EO10	.249	.253	.276	.219	.324	.283	.325	.328	.318	.257	.319	.357	.291	.312	.310	.342	.298	.304	.293	.320	.260	.248	.292	.259	.257	.293	.319	.356	.389	.270	.328	.695	.637	.674	.577	.654	.659	.678	.696	.674	1.000	.799	.725	.657	.605	.248	.291	.258	.350	.330	.350	.198	.119	.120	.196	.131	.122	.131	.145
EO11	.244	.239	.237	.224	.321	.274	.298	.337	.359	.277	.335	.347	.316	.305	.294	.328	.259	.286	.268	.302	.273	.238	.266	.243	.245	.254	.304	.355	.369	.286	.335	.715	.639	.686	.577	.655	.674	.678	.700	.671	.799	1.000	.815	.683	.611	.300	.319	.307	.355	.353	.407	.170	.070	.107	.182	.089	.077	.142	.131
EO12	.252	.264	.232	.217	.312	.298	.319	.318	.342	.265	.322	.350	.322	.321	.324	.351	.276	.312	.306	.323	.272	.257	.280	.268	.271	.294	.295	.366	.359	.304	.308	.705	.656	.687	.599	.641	.668	.704	.674	.674	.725	.815	1.000	.655	.597	.224	.254	.267	.340	.324	.319	.171	.081	.110	.116	.109	.057	.140	.104
EO13r	.183	.173	.149	.157	.235	.165	.194	.196	.220	.165	.226	.257	.203	.214	.212	.191	.187	.220	.168	.197	.136	.158	.174	.112	.137	.184	.196	.282	.320	.213	.277	.740	.645	.681	.655	.645	.609	.618	.630	.596	.657	.683	.655	1.000	.720	.192	.174	.191	.266	.239	.278	.143	.009	.087	.131	.082	.066	.145	.104
EO14r	.262	.225	.234	.238	.299	.173	.196	.268	.290	.206	.242	.278	.220	.233	.273	.287	.228	.284	.185	.241	.220	.197	.223	.184	.215	.254	.248	.277	.321	.207	.270	.689	.662	.680	.700	.653	.643	.603	.627	.562	.605	.611	.597	.720	1.000	.220	.184	.195	.254	.239	.314	.194	.010	.077	.144	.121	.075	.142	.166
P1_S	.258	.244	.245	.204	.296	.256	.255	.251	.269	.262	.185	.268	.243	.202	.193	.252	.198	.208	.155	.209	.247	.240	.265	.203	.182	.180	.225	.242	.201	.135	.197	.254	.251	.266	.221	.276	.311	.257	.267	.247	.248	.300	.224	.192	.220	1.000	.660	.647	.400	.464	.644	.150	.172	.187	.159	.107	.090	.164	.134
P2_Br	.241	.220	.223	.183	.242	.240	.261	.285	.322	.258	.209	.290	.253	.259	.237	.237	.165	.209	.148	.172	.239	.226	.229	.219	.192	.201	.236	.228	.262	.136	.237	.264	.227	.247	.183	.240	.270	.243	.249	.266	.291	.319	.254	.174	.184	.660	1.000	.697	.462	.482	.576	.131	.164	.144	.174	.145	.127	.166	.177
P3_R	.199	.202	.215	.199	.226	.199	.230	.258	.232	.225	.212	.253	.212	.207	.200	.220	.160	.194	.220	.234	.254	.226	.210	.219	.218	.189	.221	.146	.179	.231	.235	.264	.233	.242	.287	.284	.234	.255	.258	.307	.267	.191	.195	.647	.697	1.000	.469	.477	.606	.154	.103	.158	.156	.141	.161	.180	.120
P4_SC	.217	.193	.198	.193	.239	.253	.223	.260	.262	.270	.281	.283	.249	.247	.207	.238	.263	.272	.233	.215	.211	.273	.285	.240	.261	.273	.258	.292	.321	.297	.274	.312	.330	.324	.241	.293	.330	.304	.305	.297	.350	.355	.340	.266	.254	.400	.462	.469	1.000	.547	.491	.112	.149	.118	.155	.134	.132	.155	.114
P5_SW	.211	.179	.214	.221	.250	.240	.278	.267	.256	.253	.285	.304	.259	.350	.274	.255	.217	.302	.276	.256	.262	.284	.283	.241	.218	.313	.254	.344	.333	.274	.356	.287	.281	.300	.190	.259	.296	.282	.287	.276	.330	.353	.324	.239	.239	.464	.482	.477	.547	1.000	.500	.163	.143	.134	.170	.107	.138	.182	.159
P6_G	.211	.224	.252	.221	.279	.244	.271	.297	.324	.296	.277	.314	.293	.236	.194	.280	.215	.256	.197	.243	.297	.314	.288	.271	.269	.289	.315	.267	.283	.180	.243	.343	.339	.355	.281	.362	.356	.340	.349	.344	.350	.407	.319	.278	.314	.644	.576	.606	.491	.500	1.000	.205	.153	.157	.175	.120	.169	.173	.134
PU1	.143	.144	.153	.097	.169	.175	.176	.125	.155	.170	.125	.122	.186	.195	.193	.147	.171	.183	.133	.187	.211	.188	.194	.142	.161	.160	.202	.119	.181	.123	.182	.153	.202	.192	.157	.176	.184	.151	.174	.163	.198	.170	.171	.143	.194	.150	.131	.154	.112	.163	.205	1.000	.286	.276	.380	.455	.369	.255	.310
PU2	.093	.169	.147	.116	.145	.181	.185	.165	.167	.185	.113	.166	.189	.179	.125	.141	.189	.159	.102	.085	.140	.139	.135	.123	.117	.111	.162	.075	.069	.048	.064	.073	.049	.054	.012	.075	.081	.084	.076	.102	.119	.070	.081	.009	.010	.172	.164	.103	.149	.143	.153	.286	1.000	.401	.260	.266	.229	.274	.180
PU3	.215	.187	.178	.180	.206	.161	.228	.167	.192	.181	.172	.155	.168	.150	.132	.154	.157	.137	.146	.123	.147	.187	.145	.163	.155	.123	.151	.161	.145	.152	.147	.112	.072	.092	.084	.100	.122	.124	.099	.112	.120	.107	.110	.087	.077	.187	.144	.158	.118	.134	.157	.276	.401	1.000	.432	.232	.266	.205	.133
PU4	.198	.185	.199	.204	.183	.145	.136	.179	.178	.183	.130	.162	.183	.130	.126	.185	.175	.173	.172	.184	.194	.180	.141	.198	.133	.222	.095	.120	.112	.127	.169	.174	.177	.160	.183	.174	.153	.122	.136	.196	.182	.116	.131	.144	.159	.174	.156	.155	.170	.175	.380	.260	.432	1.000	.416	.366	.240	.258
PU5	.138	.132	.133	.085	.120	.129	.124	.132	.168	.121	.084	.118	.128	.134	.151	.138	.173	.185	.070	.086	.163	.210	.168	.110	.189	.162	.209	.063	.092	.089	.081	.102	.094	.102	.033	.133	.158	.150	.129	.108	.090	.131	.089	.109	.082	.121	.107	.145	.141	.134	.107	.120	.455	.266	.232	.416	1.000	.563	.267	.307
PU6	.093	.095	.116	.076	.082	.011	.020	.083	.079	.118	.103	.080	.114	.099	.093	.081	.145	.120	.090	.086	.100	.146	.066	.049	.088	.120	.122	.053	.098	.127	.085	.093	.036	.062	.085	.095	.099	.084	.056	.079	.122	.077	.057	.066	.075	.090	.127	.161	.132	.138	.169	.369	.229	.266	.366	.563	1.000	.320	.256
PU7	.141	.130	.137	.113	.119	.088	.114	.171	.174	.192	.170	.189	.179	.162	.139	.094	.122	.191	.126	.159	.118	.169	.145	.141	.145	.166	.156	.114	.109	.143	.120	.131	.105	.123	.099	.123	.124	.137	.117	.120	.131	.142	.140	.145	.142	.164	.166	.180	.155	.182	.173	.255	.274	.205	.240	.267	.320	1.000	.397
PU8	.136	.135	.162	.124	.117	.148	.094	.138	.206	.186	.148	.163	.179	.144	.153	.145	.156	.157	.106	.135	.097	.149	.166	.169	.205	.150	.177	.087	.057	.093	.076	.097	.140	.148	.096	.121	.136	.108	.123	.108	.145	.131	.104	.104	.166	.134	.177	.120	.114	.159	.134	.310	.180	.133	.258	.307	.256	.397	1.000

Appendix F. Convergent-discriminant validity. Part 2: EFA: MCS uses – LO & EO (ch.II).

Exploratory Factor Analysis across all items in MCS uses (27)				
Rotated Component Matrixa				
	Component			
	1	2	3	4
L9	0.749			
L4	0.745			
L6	0.744			
L5	0.741			
L8	0.714			
L7	0.682			
L3	0.668			
L2	0.655			
L1	0.631			
D3		0.749		
D5		0.746		
D4		0.733		
D2		0.680		
D6		0.660		
D7		0.643		
D1		0.571		
F4			0.722	
F5			0.701	
F6			0.666	
F7			0.637	
F2			0.616	
F1			0.616	
F3			0.521	
M2				0.791
M3				0.790
M1				0.787
M4				0.698

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

KMO, Bartlett's Test & Cronbach's Alpha		
KMO	KMO	0.956
Bartlett's Test of Sphericity	Approx. Chi-Square	11860
	df	351
	Sig.	0.000
Cronbach's Alpha	Cronbach's Alpha	0.958
	2.003	27

EFA all Capabilities items (27)		
Rotated Component Matrix		
	Component	
	1	2
EO1	0.853	
EO3	0.849	
EO2	0.840	
EO5	0.836	
EO8	0.818	
EO7	0.813	
EO6	0.808	
EO11	0.806	
EO13r	0.803	
EO12	0.798	
EO10	0.791	
EO14r	0.790	
EO4r	0.785	
EO9	0.772	
LO1		0.838
LO2		0.816
LO4		0.778
LO3		0.722

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

KMO, Bartlett's Test & Cronbach's Alpha		
KMO	KMO	0.961
Bartlett's Test of Sphericity	Approx. Chi-Square	9884
	df	153
	Sig.	0.000
Cronbach's Alpha	Cronbach's Alpha	0.952
	N of Items	18

Appendix F. Convergent-discriminant validity. Part 3: EFA: MCS uses – LO & EO – Performance (ch.III).

Exploratory Factor Analysis all items (51)

Rotated Component Matrix

		Component						
		1	2	3	4	5	6	7
Entrepreneurial Orientation	EO1	.850						
	EO3	.832						
	EO2	.826						
	EO5	.824						
	EO13r	.815						
	EO8	.805						
	EO7	.801						
	EO11	.789						
	EO6	.786						
	EO12	.784						
	EO14r	.783						
	EO4r	.779						
	EO10	.776						
	EO9	.761						
Legitimizing	L9		.752					
	L6		.743					
	L4		.738					
	L5		.723					
	L8		.711					
	L7		.677					
	L3		.668					
	L2		.659					
	L1		.639					
Strategic Decision-Making	D5			.735				
	D3			.728				
	D4			.721				
	D2			.666				
	D6			.649				
	D7			.626				
	D1			.552				
Performance	P3_R				.822			
	P2_Bº				.811			
	P1_S				.795			
	P6_G				.733			
	P5_SW				.626			
	P4_SC				.592			
Attention focusing	F4					.686		
	F6					.651		
	F5					.650		
	F7					.602		
	F1					.558		
	F2					.557		
	F3					.458		
Monitoring	M2						.766	
	M3						.765	
	M1						.761	
	M4						.679	
Learning Orientation	LO1							.768
	LO2							.723
	LO4							.703
	LO3							.694

Extraction Method: Principal Component Analysis.

a. Rotation converged in 6 iterations.

Appendix F. Convergent-discriminant validity. Part 4: EFA: MCS uses – LO & EO - Performance – PEU (ch.IV).

Exploratory Factor Analysis

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
EO1	.851							
EO3	.834							
EO2	.828							
EO5	.825							
EO13r	.815							
EO8	.808							
EO7	.804							
EO11	.793							
EO6	.788							
EO12	.787							
EO14r	.782							
EO4r	.779							
EO10	.778							
EO9	.764							
L9		.748						
L6		.742						
L4		.730						
L5		.719						
L8		.716						
L7		.683						
L3		.658						
L2		.649						
L1		.627						
D5			.732					
D3			.728					
D4			.713					
D2			.667					
D6			.645					
D7			.626					
D1			.561					
P3_R				.814				
P2_Bº				.804				
P1_S				.790				
P6_G				.725				
P5_SW				.623				
P4_SC				.589				
F4					.679			
F6					.648			
F5					.640			
F7					.599			
F1					.550			
F2					.547			
F3					.454			
M3						.760		
M2						.758		
M1						.757		
M4						.680		
LO1							.761	
LO2							.720	
LO4							.702	
LO3							.692	
PU3								.764
PU8								.710
PU7								.649
PU6								.641
PU5								.632
PU2								.632
PU1								.490
PU4								.585

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.957
Bartlett's Test of Sphericity	Approx. CHI^2	26279.7
	df	1711
	Sig.	0.000
Cronbach's Alpha	Coefficient	.961
	Items	59

Appendix G. Chapter II: Anova results

ANOVA MCS Uses & LO & EO by Size & industry

		Size						Industry						
		Small	**Medium**	**Large**				**Manuf.**	**Trade**	**Services**	**Banking**			
		(S.D.)	(S.D.)	(S.D.)	F:	Sig.:	Groups:	(S.D.)	(S.D.)	(S.D.)	(S.D.)	F:	Sig.:	Groups:
MCS Uses	Monitoring	**-0.257 (1.155)**	**0.052 (0.941)**	**0.103 (0.925)**	7.126 ***	0.001	Small ….. Medium & Large	0.004 (0.932)	0.191 (0.983)	-0.053 (1.02)	0.142 (0.98)	1.556	0.199	
	Focusing Attention	0.032 (0.998)	-0.012 (1.031)	-0.009 (0.984)	0.105	0.900		0.052 (1.018)	-0.142 (1.049)	0.018 (0.993)	-0.07 (0.989)	0.616	0.605	
	Strat. Dec.-making	0.019 (1.063)	-0.048 (1.001)	0.021 (0.967)	0.317	0.728		0.097 (0.952)	0.099 (0.986)	-0.017 (1.019)	-0.102 (0.977)	0.811	0.488	
	Legitimizing	-0.004 (1.151)	0.094 (0.885)	-0.058 (0.982)	0.811	0.488		0.105 (0.876)	-0.01 (1.064)	-0.005 (1.042)	-0.103 (0.894)	0.678	0.566	
Capabilities	Learning Orient.	**0.141 (0.964)**	**0.02 (0.996)**	**-0.088 (1.016)**	2.757 *	0.064	Medium... Medium & Large	0.086 (0.973)	-0.061 (1.03)	0.008 (1.034)	-0.111 (0.831)	0.667	0.573	
	Entrepreneurial O.	-0.004 (0.959)	-0.08 (1.042)	0.054 (0.993)	1.041	0.354		**0.200 (0.959)**	**-0.133 (1.083)**	**0.014 (0.994)**	**-0.246 (0.982)**	3.398 **	0.018	Bank & Trade-Serv. … Trade-Serv. & Manuf.

Note: N = 644 in all cases

Note 1: Significant at: 90% 95% 99% level

Note 2: All others constructs are not significative

Note 3: Mean (S.D.)

Appendix H. Chapter II: Multiple Linear Regressions results. Part 1: Full sample, size & industry

Multiple Linear Regressions results

	Learning Orientation		**Entrepreneurial Orientation**	
	Model A	*Model B*	*Model A*	*Model B*
Variables	*Control variables*	*Control & Independent variables*	*Control variables*	*Control & Independent variables*
Controls				
System amplitude	**0.636*** **	**0.287*** **	**0.627*** **	**0.326*** **
Firm Small	**0.206** **	**0.204** **	**0.176***	**0.183***
Firm Large	**-0.192** **	-.110	*0.042*	.655
Firm Age	0.001	.000	.002	.133
Ind 1: Manufacturing	0.211	.086	**0.463*** **	**0.368*** **
Ind 2: Trade	-0.005	-.058	.098	0.567
Ind 3: Services	0.124	.055	**0.312*** **	**0.264** **
Gender	-.060	-0.046	.003	0.967
Mgmt. Control Use		**MCS use**		**MCS use**
		Legitimizing **0.310*** **		Focusing att. **0.234*** **
		Focusing att. **0.274*** **		Legitimizing **0.223*** **
		Strat. Dec. **0.185*** **		Monitoring **0.168*** **
		Monitoring **0.151*** **		Strat. Dec. **0.156*** **
F-value	**10.105*** **	**23.507*** **	**10.649*** **	**17.662*** **
R^2	**0.113**	**0.309**	**0.118**	**0.251**

N=644; Industry reference: Banking

Note 1: Unstandardized Coefficients are reported

* Sig. at 90% level ** Sig. at 95% level *** Sig. at 99% level

Appendix H. Chapter II: Multiple Linear Regressions results. Part 2: subgroup size

Learning Orientation LO

	BIG		Medium		SMALL		All sample	
	Coefficients		Coefficients		Coefficients		Coefficients	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Monitoring		***0.252******				**0.129****		**0.151*****
Legitimizing		***0.274*****		***0.400*****		***0.297*****		**0.310*****
Focusing att.		***0.291*****		***0.238*****		***0.280*****		**0.274*****
Strat. Dec.		***0.225*****				***0.266*****		**0.185*****
System amplitude	***0.689*****	**0.247****	***0.665*****	***0.431*****	***0.484*****		***0.636*****	**0.287*****
Firm Small							**0.206****	**0.204****
Firm Large							**-0.192****	
R square	0.114	0.347	0.112	0.280	0.058	0.293	0.113	0.309
F	37.677	30.830	23.810	24.274	9.578	15.754	10.105	23.507
F Sig.	.000	0.000	.000	0.000	.002	0.000	0.000	0.000

Entrepreneurial Orientation LO

	BIG		Medium		SMALL		All sample	
	Coefficients		Coefficients		Coefficients		Coefficients	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Monitoring		**0.115****		***0.238*****		***0.151*****		**0.168*****
Legitimizing		***0.219*****		***0.329*****		***0.178*****		***0.223*****
Focusing att.		***0.154*****		***0.340*****		***0.327*****		***0.234*****
Strat. Dec.		***0.212*****		***0.203*****				***0.156*****
System amplitude	***0.626*****	***0.341*****	***0.584*****		***0.632*****	***0.380*****	***0.627*****	0.326***
Firm Small							***0.176****	0.183*
Firm_age	**0.004****							
Ind 1: Manufacturing								
Ind 3: Services								
R square	0.116	0.220	0.079	0.245	0.100	0.288	.118	.251
F	19.217	16.322	16.169	15.093	17.302	15.368	10.649	17.662
F Sig.	.000	.000	.000	.000	.000	.000	.000	.000
N=	296		191		157		644	

Note 1: Model 1 (Control variables); Model 2 (Factors MCS uses & Control variables)

Note 2: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

Appendix H. Chapter II: Multiple Linear Regressions results. Part 2: subgroup Industry

Learning Orientation LO

	MANUFACTURING		TRADE		SERVICES		BANKING		All sample	
	Coefficients		Coefficients		Coefficients		Coefficients		Coefficients	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Monitoring		***0.307******		***0.290****		**0.11****				**0.151*****
Legitimizing		***0.286*****		***0.465*****		***0.299*****		***0.355*****		**0.310*****
Focusing att.		***0.386*****				***0.282*****		***0.274*****		**0.274*****
Strat. Dec.		***0.229*****				***0.157*****		***0.284*****		**0.185*****
System amplitude	***0.691*****	**0.327****	***0.665*****		***0.673*****	***0.313*****			***0.636*****	0.287***
Gender			***-0.712****							
F_small					***0.353*****	***0.324*****			***0.206****	***0.204****
Firm Large									***-0.192****	
R square	0.127	0.447	0.120	0.290	0.114	0.295		0.276	0.113	0.309
F	15.031	16.017	6.654	9.826	26.075	27.839		9.773	10.105	23.507
F Sig.	.000	0.000	.013	0.000	.000	0.000		0.000	0.000	0.000

Entrepreneurial Orientation EO

	MANUFACTURING		TRADE		SERVICES		BANKING		All sample	
	Coefficients		Coefficients		Coefficients		Coefficients		Coefficients	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Monitoring		*0.255****				**0.205*****				**0.168*****
Legitimizing				***0.326*****		***0.236*****		***0.377*****		***0.223*****
Focusing att.		*0.268****		***0.256****		***0.257*****		***0.248****		***0.234*****
Strat. Dec.						***0.153*****		***0.400*****		***0.156*****
System amplitude	***0.727*****	**0.543*****	***1.123*****	***0.968*****	***0.506*****		***0.760*****	***0.476****	***0.627*****	***0.326*****
Gender										
F_small									***0.176****	***0.183****
Ind 1: Manuf.									***0.463*****	***0.368*****
Ind 3: Services									***0.312*****	***0.264****
R square	0.145	0.271	0.271	0.416	0.065	0.204	0.150	0.395	.118	.251
F	17.445	12.524	18.258	11.138	27.958	25.689	13.929	12.400	10.649	17.662
F Sig.	.000	0.000	.000	0.000	.000	0.000	.000	0.000	.000	.000
N=	105		51		407		81		644	

Note 1: Model 1 (Control variables); Model 2 (Factors MCS uses & Control variables)
Note 2: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

Appendix I. Chapter II: Hypotheses results of the sub-group (Size & Industry) analyses

			HYPOTHESES BY SIZE						HYPOTHESES BY INDUSTRY							
			Hypotheses a: Learning Orientation LO						Hypotheses a: Learning Orientation LO							
	All sample		BIG		Medium		SMALL		MANUFACTURING		TRADE		SERVICES		BANKING	
	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.
H1a Monitoring	✗	***0.151******	✗	***0.252*****			✗	***0.129****	✗	***0.307*****	✗	***0.290****	✗	***0.11****		
H2a Legitimizing	✗	***0.310*****	✗	***0.274*****	✗	***0.400*****	✗	***0.297*****	✗	***0.286*****	✗	***0.465*****	✗	***0.299*****	✗	***0.355*****
H3a Focusing att.	✓	***0.274*****	✓	***0.291*****	✓	***0.238*****	✓	***0.280*****	✓	***0.386*****			✓	***0.282*****	✓	***0.274*****
H4a Strat. Dec. Mak.	✓	***0.185*****	✓	***0.225*****			✓	***0.266*****	✓	***0.229*****			✓	***0.157*****	✓	***0.284*****
R square		0.309		0.347		0.280		0.293		0.447		0.290		0.295		0.276
F		23.507		30.830		24.274		15.754		16.017		9.826		27.839		9.773
F Sig.		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
			Hypotheses b: Entrepreneurial Orientation LO						Hypotheses b: Entrepreneurial Orientation EO							
	All sample		BIG		Medium		SMALL		MANUFACTURING		TRADE		SERVICES		BANKING	
	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.	Hyp.	Coeff.
H1b Monitoring	✗	**0.168*****	✗	**0.115****	✗	***0.238*****	✗	***0.151*****	✗	***0.255*****			✗	**0.205*****		
H2b Legitimizing	✗	***0.223*****	✗	***0.219*****	✗	***0.329*****	✗	***0.178*****			✗	***0.326*****	✗	***0.236*****	✗	***0.377*****
H3b Focusing att.	✓	***0.234*****	✓	***0.154*****	✓	***0.340*****	✓	***0.327*****	✓	***0.268*****	✓	***0.256****	✓	***0.257*****	✓	***0.248****
H4b Strat. Dec. Mak.	✓	***0.156*****	✓	***0.212*****	✓	***0.203*****							✓	***0.153*****	✓	***0.400*****
R square		.251		0.220		0.245		0.288		0.271		0.416		0.204		0.395
F		17.662		16.322		15.093		15.368		12.524		11.138		25.689		12.400
F Sig.		.000		.000		.000		.000		0.000		0.000		0.000		0.000
N=		644		296		191		157		105		51		407		81

Note: * Sig. at 90% level; ** Sig. at 95% level; *** Sig. at 99% level

Are not significant

Appendix J. Chapter III: EFA for Diagnostic and Interactive uses (2nd orders factor analysis)

EFA Diagnostic use: Monitoring & Legitimizing

Kaiser-Meyer-Olkin Measure	.935
Sig.	0.00
Cronbach's Alpha	.930
% variance (cumulative %)	67.6
Factors	2

Rotated Component Matrix		
Component	1	2
L4	0.821	
L9	0.803	
L8	0.794	
L6	0.792	
L7	0.762	
L3	0.759	
L5	0.756	
L2	0.728	
L1	0.705	
M3		0.846
M2		0.831
M1		0.813
M4		0.777

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

EFA Interactive use: Att. Focusing & St. Dec. Making

Kaiser-Meyer-Olkin Measure	.910
Sig.	0.00
Cronbach's Alpha	.908
% variance (cumulative %)	67.778
Factors	2

Rotated Component Matrix		
Component	1	2
D3	.820	
D5	.808	
D4	.805	
D2	.742	
D6	.723	
D7	.720	
F4		.855
F5		.817
F3		.731
F2		.718

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Appendix K. Chapter III: Measurement invariance test (Direct effect - Indirect Efect)

MCS uses (Diagnostic/Interactive) - Performance: Measurement invariance test (Direct effect - Indirect Effect)

Model	χ2	DF	Δ χ2	Δ DF	p	GFI	CFI	RMSEA
Single Group, Individual solution								
Small Firms (n=157)	563.1	317				0.788	0.913	0.071
Medium size firms (n=191)	595.6	317				0.815	0.911	0.068
Large size firms (n=296)	658.6	317				0.858	0.939	0.060
Measurement invariance (n=644)								
Equal form (Multi-group)	1817.7	951				0.827	0.925	0.038
Equal factor loadings	1880	995	61.83	44	0.272	0.822	0.924	0.037

* (p<0.01)

MCS uses (Diagnostic/Interactive) - EO - Performance: Measurement invariance test (Direct effect - Indirect Effect)

Model	χ2	DF	Δ χ2	Δ DF	p	GFI	CFI	RMSEA
Single Group, Individual solution								
Small Firms (n=157)	1309.7	769				0.914	0.910	0.067
Medium size firms (n=191)	1358.1	769				0.908	0.900	0.063
Large size firms (n=296)	1576.4	769				0.914	0.918	0.060
Measurement invariance (n=644)								
Equal form (Multi-group)	4245.3	2307.00				0.760	0.907	0.036
Equal factor loadings	4338.4	2377.00	93.15	70	0.154	0.755	0.906	0.036

* (p<0.01)

MCS uses (Diagnostic/Interactive) - LO - Performance: Measurement invariance test (Direct effect - Indirect Effect)

Model	χ2	DF	Δ χ2	Δ DF	p	GFI	CFI	RMSEA
Single Group, Individual solution								
Small Firms (n=157)	637.2	395				0.887	0.922	0.063
Medium size firms (n=191)	701.6	395				0.896	0.911	0.064
Large size firms (n=296)	780.3	395				0.891	0.937	0.057
Measurement invariance (n=644)								
Equal form (Multi-group)	2119.5	1185.00				0.821	0.926	0.035
Equal factor loadings	2195.7	1233.00	76.21	48	0.342	0.816	0.924	0.035

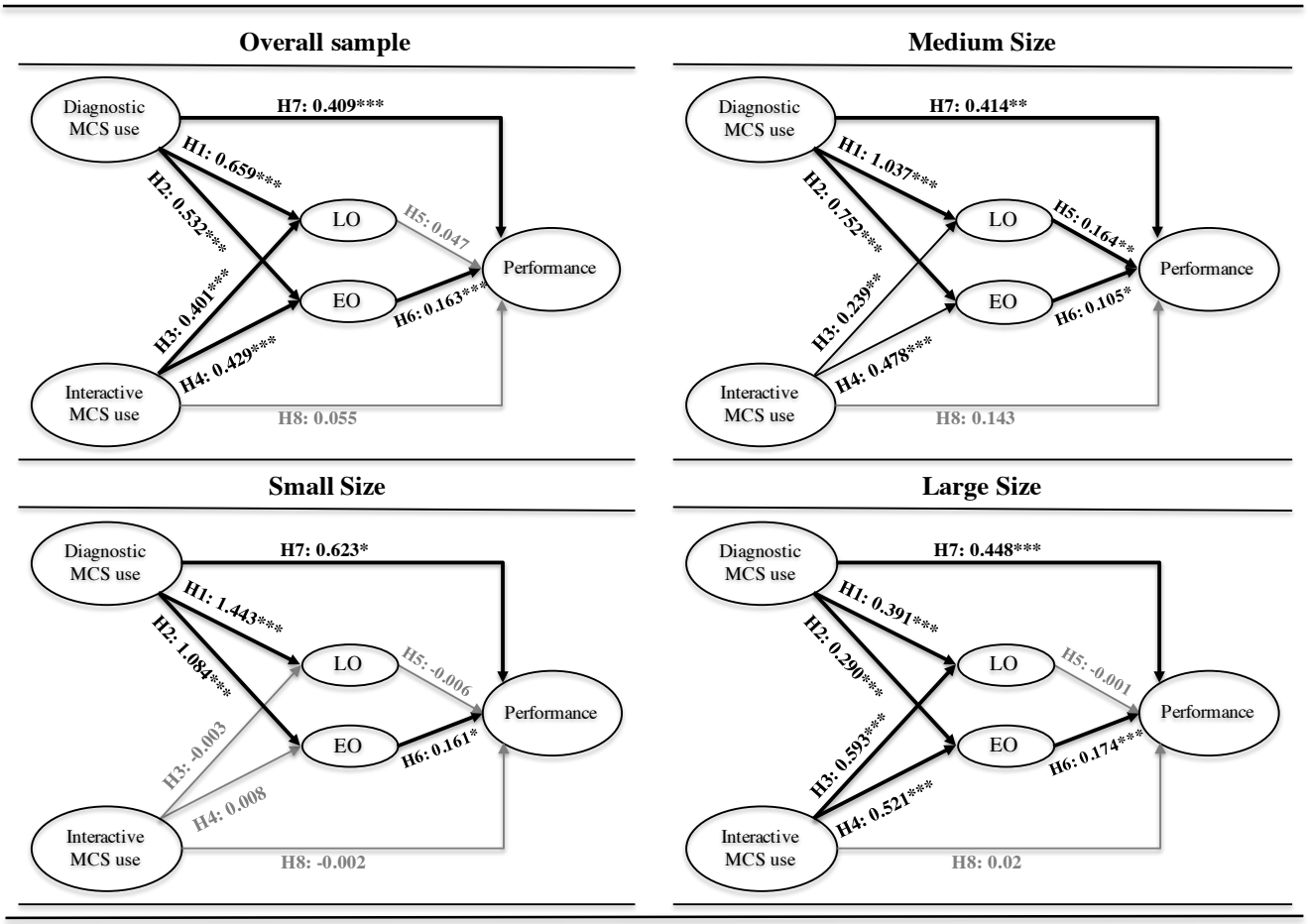
* (p<0.01)

MCS uses (Diagnostic/Interactive) - EO & LO - Performance: Measurement invariance test (Direct effect - Indirect Effect)

Model	χ2	DF	Δ χ2	Δ DF	p	GFI	CFI	RMSEA
Single Group, Individual solution								
Small Firms (n=157)	1452.2	888				0.895	0.904	0.064
Medium size firms (n=191)	1506.8	888				0.903	0.901	0.061
Large size firms (n=296)	1744.4	888				0.910	0.917	0.057
Measurement invariance (n=644)								
Equal form (Multi-group)	4704.5	2664.00				0.880	0.907	0.035
Equal factor loadings	4810.6	2738.00	106.11	74	0.236	0.890	0.906	0.034

* (p<0.01)

Appendix L. Chapter III: Structural model results -overall sample and multi-group size analysis



Source: Self-devised

Appendix M. Chapter IV: PEU Factor analysis

PEU Factor analysis: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	Variance	%
1	4.746	67.794	67.794	4.746	67.794	67.794
2	.573	8.190	75.984			
3	.435	6.221	82.205			
4	.377	5.388	87.593			
5	.330	4.721	92.314			
6	.295	4.219	96.533			
7	.162	2.311	98.844			
8	.081	1.156	100.000			

Extraction Method: Principal Component Analysis.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin		.805
Bartlett's Test of Sphericity	Chi-Square	1155.442
	df	28
	Sig.	.000

Reliability Statistics

Alpha	N of Items
.779	8

PEU items Correlation Matrix

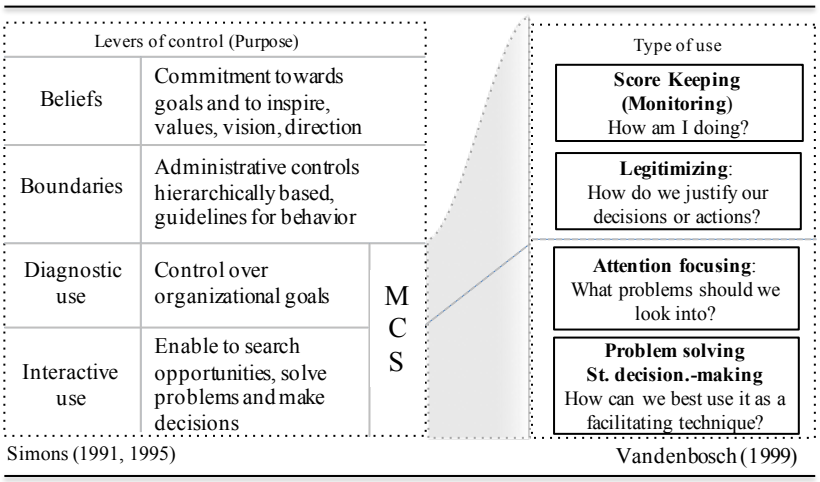
	PU1	PU2	PU3	PU4	PU5	PU6	PU7	PU8
PU1	1.000							
PU2	.286	1.000						
PU3	.276	.401	1.000					
PU4	.380	.260	.432	1.000				
PU5	.455	.266	.232	.416	1.000			
PU6	.369	.229	.266	.366	.563	1.000		
PU7	.255	.274	.205	.240	.267	.320	1.000	
PU8	.310	.180	.133	.258	.307	.256	.397	1.000

Correlation is significant at the 0.001 level (2-tailed)

Appendix N. Chapter IV: Second order constructs: Diagnostic & Interactive uses

Results to linking the two levers of control (diagnostic and interactive) proposed by Simons (1995) and the four MCS uses (Monitoring, Legitimizing decisions, Attention Focusing and Strategic Decision-Making) proposed by Vandenbosch (1999). The results will be treated as latent and intangible 2nd order constructs (Joreskog & Sorbom 1993).

Management Control Systems uses



Source: Self-devised

We propose, according to the arguments offered by Simons (1990, 1995, 2000), that the four uses (Monitoring, Legitimization, Attention Focusing, and Strategic Decision-Making) proposed by Vandenbosch (1999), can be grouped in two second order constructs named Diagnostic and Interactive uses proposed by Simons (1995). Hence, Diagnostic use scale is a 2nd order factor measured by two first order factors: Monitoring and legitimizing who influence negatively on capabilities, because they are acting in a Diagnostic mode (Simons 1995). In the same way, Interactive use scale is a 2nd order factor measured by two first order factors: Attention focusing and Strategic Decision-making are acting in an interactive form (Simons 1995) [46]. (See appendix J. Chapter III: EFA for Diagnostic and Interactive uses (2nd orders factor analysis).

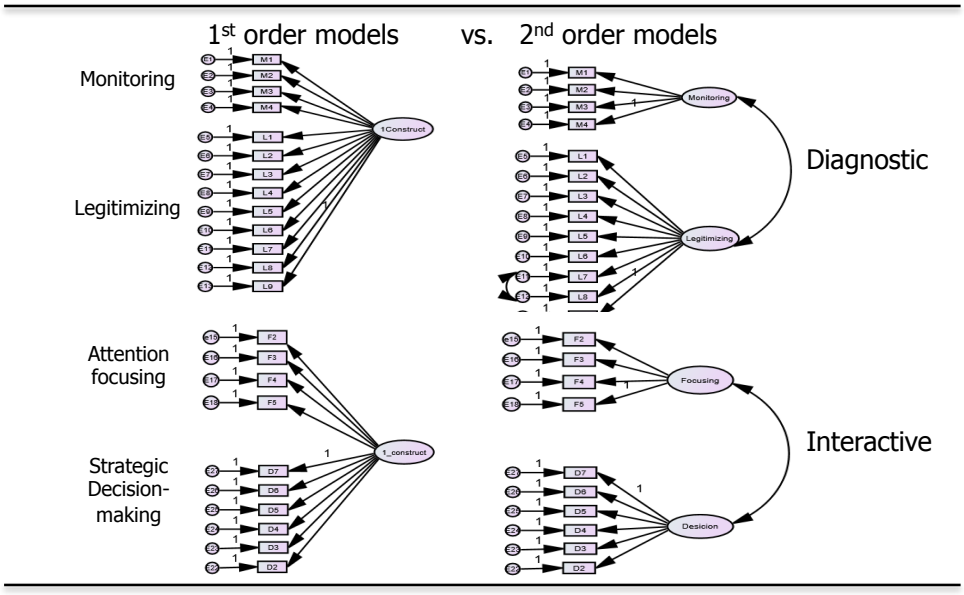
1st step: Results of the exploratory factor analysis (EFA) for each of the two constructs (Diagnostic and interactive), and across the all items of the four MCS uses (Monitoring, Legitimizing & Attention focusing and Strategic Decision-making), show two factors in each EFA, indicated that the different scales were one-dimensional and every construct exhibits acceptable results (KMO, 0.935 for diagnostic & 0.910 for interactive). Cronbach Alpha reliability coefficient showing acceptable values (0.930 for diagnostic and 0.908 for interactive), above 0.90 (Nunnally et al. 1967).

2nd step: Confirming the existence of multidimensionality in our 2nd order constructs, is done through a confirmatory factor analysis (CFA) using SEM in SPSS AMOS 21.0, with a rival model strategy (Anderson and Gerbing, 1988; Hair et al., 2006). This analizes consist of comparing a 2nd order model in which various dimensions measured the multidimensional construct,

[46] Koufteros et al. (2014) propose a different arrangement in these applications where Monitoring, legitimizing and focusing attention in the diagnostic charge second order construct. But the seminal literature proposed by Simons (1990, 1995) and Vandenbosch (1999), does not support this whole approach.

with a 1st order model in which all items weighed on a single factor (Steenkamp and Van Trijp, 1991).

Second order constructs (Diagnostic & Interactive MCS uses)



The loadings of the measurement items were all significant ($p<0.001$). The indicators, goodness of fit indices exceeds the requirements. Goodness-of-fit index (GFI) our second-order models was 0.931 Diagnostic and 0.938 interactive. CFI in our second-order models was 0.956 for diagnostic and 0.952 for interactive respectively (see table below). RMSEA was 0.78 in diagnostic and 0.089 in interactive constructs.

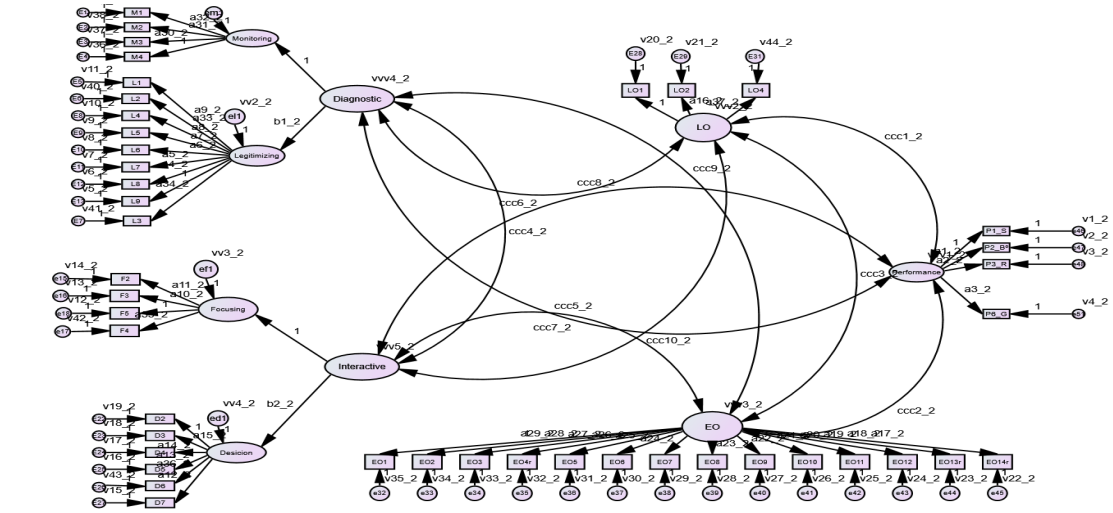
Analysis of multidimensionality en the 2nd order factors

	model	Chi^2	Chi^2 norm	Significance	GFI	CFI	RMSEA
Diagnostic use	1st order	358.394	6.074	0.000	0.918	0.946	0.089
	2nd order	308.866	4.903	0.000	0.931	0.956	0.078
Interactive use	1st order	637.790	18.223	0.000	0.806	0.833	0.164
	2nd order	207.183	6.094	0.000	0.938	0.952	0.089

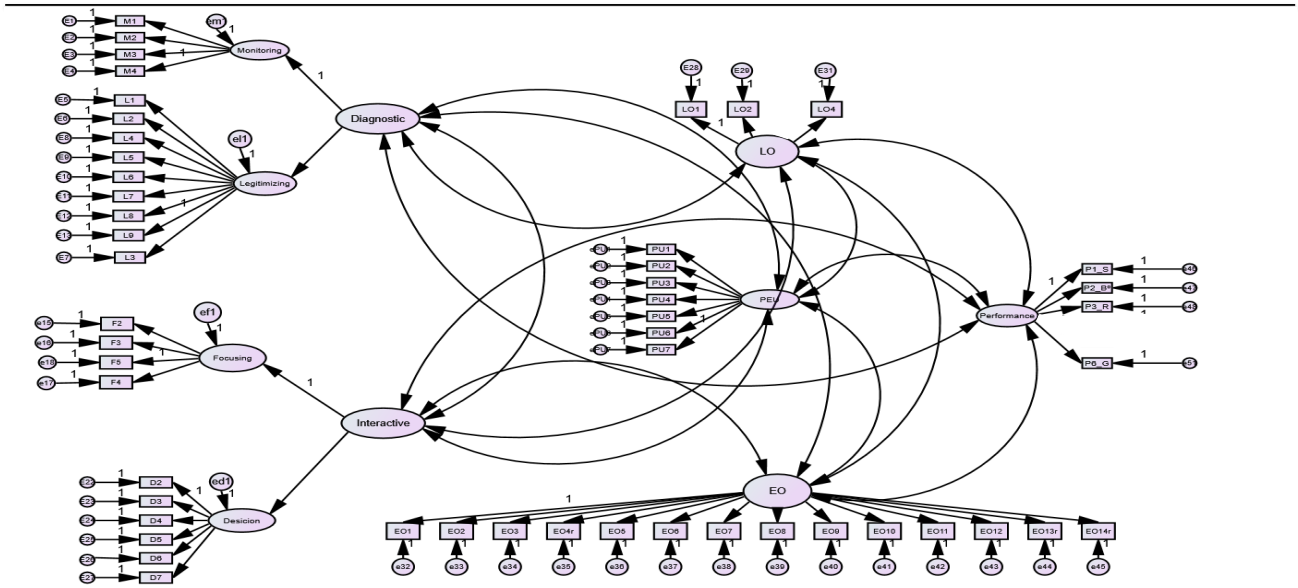
Results showed that the 2nd-order model had a much better fit than the 1st-order model, thus we can conclude that the variables "Diagnostic use" & "Interactive use" showed a multidimensional nature. The 2nd order models are significant.

Appendix O. Chapter IV: Measurement model

Measurement model (Without PEU)



Measurement model (With PEU)



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