

Management Control Systems In Outermost Regions

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Abstract

Despite the importance of Small and Medium Enterprises (SMEs) in the economy, both in terms of employment and value created, management accounting research in SMEs has been sparse. Previous studies have analyzed the adoption of Management Control Systems (MCS) and the use of HR practices in early stage/startup companies (Davila and Foster, 2005, 2007; Hellmann and Puri, 2002), which are in general SMEs, but no evidence has been collected on the use of management control systems in SMEs in outermost regions. These regions are an interesting setting due to their physical and economic isolation as well as their limitations to access human capital. By using a combination of contingency and institutional theories, this paper provides first evidence about the antecedents of MCSs adopted by SMEs in an outermost region, the Azores islands. Using primary data collected through a questionnaire, we find that size and the perceived environmental uncertainty (PEU) are positively associated with the use of MCS, when only firm variables are used. We find no evidence that participants' characteristics are related with the use of MCS, except for age that is negatively associated with the MCS use.

Keywords: management control systems, small and medium enterprises, Azores, outermost region, contingency theory, institutional theory, human capital

Introduction

Previous studies have analyzed the adoption of management control systems (MCS) and the use of Human Resources (HR) practices in early/startup companies (Davila and Foster, 2005, 2007; Hellmann and Puri, 2002), which are in general Small and Medium-sized Enterprises (SMEs), but no evidence has been collected on the use of MCS in outermost regions. These regions are an interesting setting due to their physical and economic isolation as well as their limitations to access human capital. By using a combination of contingency and institutional theories, this paper provides first evidence about the antecedents of MCSs adopted by SMEs in an outermost region, the Azores islands.

The economic relevance of SMEs in Europe in general, and Portugal in particular, is very high. In Portugal in 2010, 99.9% of all enterprises are SMEs. They are responsible for more than 77% of all jobs and almost 55% of total business turnover. The outermost regions in Europe comprise two archipelagos (the Azores and the Canary Islands), two groups of islands (Madeira and Guadeloupe), three separate islands (Réunion, Martinique and Saint Martin) and a mainland region (French Guiana). The article 349 of the European Union Treaty recognizes that the outermost regions have specific features that set them apart from the rest of the EU. On one hand the remoteness, the island status, the adverse

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topographical and climatic conditions, the dependence on a limited number of local industries or local universities, may have a negative impact on the economic and social development of these regions. On the other hand, these regions have unique assets. For example, they are in strategic areas in the world, and have outstanding geographical and geological features that make them outstanding regions for research and innovation in industries such as: biodiversity; terrestrial and marine ecosystems; pharmacology; renewable energy and space science (Office of the European Union, 2012).

Using primary data collected through a questionnaire, we find that size and the perceived environmental uncertainty (PEU) are positively associated with the use of MCS, when only firm variables are used. We find no evidence that participants' characteristics are related with the use of MCS, except for age that is negatively associated with the MCS use. Hence, we find support for both contingency and institutional theories in this particular setting of outermost regions.

This paper provides two main contributions. Firstly, there has been limited research on the antecedents of the use of MCS in SMEs located in the outermost regions. The existing studies analyze the adoption and implications for specific MCS performance, particularly the more innovative MCSs, such as the ABC and the BSC. This paper addresses the use of MCSs in general. Secondly, previous studies have not analyzed jointly contingency theory and institutional theory. This is a relevant contribution given prior research on the antecedents of MCSs related both with contextual variables, such as the perceived environmental uncertainty (Chenhall, 2005), and the importance of the CFO as a relevant change agent in the organizations (Byrne and Pierce, 2007; Naranjo-Gil et al., 2009).

Literature Review and Hypotheses Development

The definition of MCSs (Chenhall, 2007) includes both management accounting systems and organizational controls. This definition has evolved over time from more formal, financially quantifiable information to assist managerial decision making to one that embraces a much broader scope of information. This includes external information related to markets, customers, competitors, non-financial information, predictive information and a broad array of decision support mechanisms, and informal personal and social controls. In this paper, we focus exclusively in formal MCSs that can be financial or nonfinancial. Several theories in management control address the factors that influence the use of MCS. On one hand, the Upper Echelons perspective of organizations (Hambrick and Mason, 1984) considers the characteristics of top managers and their strategic choices as a key factor in the adoption of MCSs. The contingency relationships of upper echelon characteristics, such as the cognitive base values of top managers, the age/tenure, the functional tracks, the experience, the education, the socioeconomic roots, the financial position and the group characteristics are associated with the strategic choices and consequently associated to the corporate performance. The top manager characteristics are predictive of organizational outcomes. The characteristics of organization's Chief Financial Officer (CFO) such as age, tenure and educational background explain his innovation on management systems (Naranjo-Gil et al., 2009). On the other hand, contingency theory considers company characteristics, as well as the environment in which companies operate, as key determinants in the adoption MCS (e.g. Chenhall, 2005).

Size

As organizations grow the need for more formal and structured controls increases. There is a greater need for managers to create formal controls, due the increased quantity

of information to handle (Chenhall, 2007). Therefore, the firm growth implies that the founder/manager is not involved in many processes of the business and consequently loses the ability to control all information flows. MCSs become an important source for the decision making process and control (Davila and Foster, 2007). Previous research has found the adoption of MCS in startups as a key factor for their growth (Davila and Foster, 2007). The findings show a positive association between the company growth and the percentage of MCSs adopted. Hence, we formulate the following hypothesis:

H1: The use of MCS is positively associated with the size of the Azorean firms.

Perceived environmental uncertainty (PEU)

The PEU refers to managers' perceptions of the external environment to their firms (Gordon and Narayanan, 1984). These external environments include the perception of economic, technological, legal and political environment, as well as the predictability of competitor's aggressiveness and the predictability of consumer's tastes and preferences, and the managers' perception of intensity of competition by the prices, competition by the diversity of commercialized services and products, competition in human resources access and the managers' perception to the competition to supplies access. When the PEU is high, managers tend to implement sophisticated MCS to cope with the uncertainty and take decisions that are more adjusted to the business success. As opposed when the PEU level is low, less sophisticated MCS would be used (Gull, 1991). Hence, how top managers perceive the environment in terms of dynamism, uncertainty, and hostility (Gordon and Narayanan, 1984) determines the firm's strategy and use of MCS. The fit between PEU and MCS determines firm's performance. Sophisticated MCS and high PEU situations improve firm's performance, but sophisticated MCS with low level of PEU situations undermines firm's performance (Gull, 1991). Consequently, we test the following research hypothesis:

H2: The PEU level is positively associated with the use of MCS in Azorean firms.

CFO Characteristic

The Upper Echelon perspective of organizations (Hambrick and Mason, 1984) is a relevant viewing angle to approach the characteristics of top managers and their strategic choices. The contingency relationships of upper echelon characteristics like cognitive base values of top managers, age, functional tracks, experience, education, socioeconomic roots, financial position and group characteristics are associated with the strategic choices corporate performance. The characteristics of organization's Chief Financial Officer (CFO), as age, tenure and educational background explain his innovation on management systems (Naranjo-Gil et al., 2009). Previous studies find CFO age and tenure to have a significantly negative effect on the use of new MCS, while educational background in economics and management has a positive effect (Naranjo-Gil et al., 2009). In outermost regions firms, due to their physical, economic and social isolation, these effects should even more acute. Hence, we test the following hypotheses:

H3a: The Azorean firms that have older CFOs use less MCS.

H3b: The Azorean firms that have long tenured CFOs use less MCS.

H3c: The Azorean firms that have CFOs with college degrees use more MCSs.

H3d: The Azorean firms that have CFOs with economics and management training use more MCSs.

Life-cycle

In the initial phase of the life of a firm the management tools are informal and usually are centralized in the firm's founder. However, as business growth the informal information systems are not able to respond to the new challenges of corporate management – the information network becomes overloaded. Consequently, firm growth creates an urgent need to implement formal management control systems. They will be used for planning activities and operational control. A startup's success and survival is dependent, among other factors, on the introduction of adequate MCS (Davila and Foster, 2005; Silvola, 2008). Hence, we test the following hypotheses:

H4a: The Azorean firms in the “maturity” stage use more MCS.

H4b: The Azorean firms in the “decline” stage use less MCS.

Methodology

Research Method

To address the research questions of this study, we collected primary data about the use of MCSs through an online questionnaire. To mitigate the research problems associated with the use of questionnaires (Dillman, 2000), we took several precautions to increase the quality of this instrument (Van der Stede et al., 2007). Specifically, the questions used were, when possible, based on prior literature which increases the internal validity of the constructs. The questionnaire had a pilot to test the understandability of the questions and the easiness of access to the questionnaire's online platform. This test was made by management accounting researchers and CEOs/CFOs of SMEs. To increase participation, the targeted participants received an introduction letter explaining the goals of the study and an invitation to an open session presenting the main findings of the study. Finally, participants who completed the questionnaire participated in a lottery of ten vouchers that vary between €89.9 and 25.9. In addition to this incentive, reminders are being sent as another method to increase the response rate. In the management accounting literature, one of the identified causes for low response rates is sending questionnaires to participants that are not the most suited respondents (Chenhall and Langfield-Smith, 1998). To avoid this problem, we had a research team contacting by phone each one of the firms in the sample. The aim was to explain directly the study and get the agreement of the CEO/CFO to participate. If the research assistants did not get the chance to speak with the person in charge of the MCSs, they asked for her name and email so that the questionnaire could be sent directly to her. For the cases where phone contact was not possible, research assistants were asked to look for a contact email of that company in the internet.

The questionnaire was primarily sent by email given the widespread use of internet in the target population. On this email, a link was available to participate in the questionnaire. This delivery method also reduces the cost of data collection and hence enables us to expand the sample of contacted/participating firms. Upon request – via email or on the phone contact, the questionnaire was sent by file attached to the email or postal mail.

Target population

We collaborated with a specialized firm in corporate information to identify SMEs in Azores. We limited the search to firms with 10 to 249 employees since this is a common method across the world to exclude large (250 or more employees) and micro firms (less than 10 employees). This is also one of the criteria used by the European Union to classify companies according to their size (EU recommendation 2003/361). We excluded

state/governmental institutions and NGOs since these organizations are not directly comparable with for profit firms.

Measurement of the variables

Dependent variable

Our dependent variable is the number of MCSs adopted by the firms (N_MCS). This variable corresponds to a count based on a question where participants mark the MCSs used or implemented in the company from a list of 41 MCSs. This list was adapted from prior research (Chenhall and Langfield-Smith, 1998; Davila and Foster, 2007).

Independent variables

We use the number of employees as a measure of size (SIZE). As other authors, due to high skewness and kurtosis, we use the natural logarithm (Davila and Foster, 2007).

We measure three different dimensions of PEU according to prior literature (Gordon and Narayanan, 1984) – dynamism, uncertainty, and hostility. All questions were measured using a seven-point Likert scale where the 1 indicates low PEU and 7 high PEU.

Life-cycle is a self-reported measure in the questionnaire, based on the life cycle model of Miller and Friesen (1982) and previously used in the accounting literature (Silvola 2008). Finally, all participants' characteristics were collected through the online questionnaire – age (AGE), work experience (EXPERIENCE), tenure (TENURE), education (COLLEGE) and training in economics and management (ECON_TRAIN).

Control variables

Due to the high heterogeneity in our sample, we introduced some control variables in some specifications. More precisely, we control for industry (one dummy variable for services), region (two dummy variables for the larger islands), and for the respondent's position (dummy variables for CEO, CFO and other, the default is controller).

Methods of analysis

Besides presenting descriptive statistics of the data, we use a regression model for count data to evaluate the adoption and use of MCSs by the Azorean firms.

Data

Sample

The target sample is 668 SMEs. Of this total, the research team was unable to contact 87. Of the 581 firms contacted, 1 did not want to participate in the study and 22 belong to a group of firms for which the main company had already been contacted. Hence, 559 firms received our questionnaire (1 in a file format attached to the email, 24 by postal mail, and 534 by electronic mail). The questionnaires received back so far are 83, corresponding to a response rate of 14.85%. This response rate is in the upper bound of the range reported in similar previous studies. Moreover, since the reminding process is still occurring this response rate will likely go up. Comparing the respondents and the non-respondents, we conclude that respondents and non-respondents do not differ significantly in terms of region and industry (Chi² tests do not reject the null hypothesis of no difference in the distribution of the two samples at the 5% significance level), as well as in size (a t-test does not reject the null hypothesis of no difference between the means of the two samples).

Descriptive Statistics

Table 1 presents the descriptive statistics of the dependent and independent variables. For the multi-item variables of PEU, we used the two main procedures in survey studies to assess construct validity and reliability (Nunnally, 1978). We used factor analysis to identify the construct(s) and Cronbach Alpha to assess internal consistency. For the factor analysis we followed Gordon and Narayanan (1984) and King et al. (2010) and used principal components analysis with orthogonal rotation (varimax). We extracted four factors with Eigen Values above one and all of them have high internal consistency (Cronbach Alphas are above .7 for all constructs).

Table 1: Descriptive statistics of dependent and independent variables

Variable Description	Abbreviated Name	Range of possible variation	Min	Mean	Median	Max	Std. dev
Number of MCSs	N_MCS	0-41	0	7.16	5	27	6.83
# of employees	SIZE	10-249	10	34.39	21	164	31.56
PEU dynamism	PEUdyn	1-7	1	4.25	4.08	7	1.31
PEU uncertainty	PEUunc	1-7	1	3.5	3.51	6.5	1.48
PEU hostility 1	PEUhost1	1-7	1	3.51	3	7	1.69
PEU hostility 2	PEUhost2	1-7	1	5.21	5.5	7	1.59
Life cycle	LIFE_CYCLE	1-5	1	3.62	3	5	1.1
Age	AGE	n.a	23	40.25	39	84	11.01
Experience	EXPERIENCE	n.a	1	17.83	17	50	10.63
Tenure	TENURE	n.a	1	12.82	10	50	10.56
College	COLLEGE	0-1	0	.55	1	1	.5
Training in economics/management	ECON_TRAINING	0-1	0	.38	0	1	.48

Table 2 presents this factor analysis. While these factors are slightly different from previous literature that extracted one factor (Gordon and Narayanan, 1984) and two factors (King et al., 2010), we retained these factors since they fit our data better. We labeled these factors as PEUdyn, PEUunc, PEUhost1 and PEUhost2. We averaged the questions' items for each of these four constructs in order to obtain a single score for each construct.

Table 2: PEU – Factor analysis: principal component analysis, with orthogonal rotation

	<i>Factor Loadings</i>				<i>Uniqueness</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
1. PEU dynamism					
Economic environment	0.805	0.172	0.159	-1.155	0.273
Technology environment	0.507	0.343	0.128	0.470	0.388
Legal environment	0.663	0.062	0.261	0.316	0.389
Political environment	0.609	0.055	-0.171	0.505	0.342
2. PEU uncertainty					
Predictability of competitors' actions	0.051	0.889	0.176	-0.039	0.174
Predictability of consumers' preferences	0.181	0.831	-0.018	0.196	0.238
3. PEU hostility1					
Price competition	-0.026	0.267	0.836	0.007	0.229

Product and service diversity competition	0.219	-0.050	0.860	0.107	0.198
4. PEU hostility2					
HR access competition	0.053	0.071	0.070	0.888	0.199
Suppliers access competition	0.041	0.035	0.081	0.777	0.387
Cronbach alpha	0.738	0.738	0.724	0.695	
Eigenvalues	1.804	1.716	1.622	2.044	
% of variance	18.04%	17.16%	16.22%	20.44%	

Table 3 presents the distribution of the life cycle variable summarized on table 1. Due to the low number of firms in some of the categories – Birth, Growth and Revival we collapsed them in one group.

Table 3: Distribution of firms by life cycle category

Life Cycle	Code	% of total	Maturity	3	50.00
Birth	1	1.72	Revival	4	5.17
Growth	2	8.62	Decline	5	34.48

From these tables, we conclude that Azorean firms on average adopt 7 MCSs, have 35 employees, are on the maturity stage, and the PEU is about the midpoint of the scale, except for PEU dynamism and PEU hostility related with human resources and suppliers, that rate higher. As for the participants, they have on average 40 years, 18 years of experience, and 13 years in the company. 55% of the participants has a college degree and 38% has some type of economics and management training. Table 4 presents the pairwise correlations between the variables and is first evidence on the relationship between the independent and the dependent variable. The table shows that the use of MCSs is positively associated with the firm's size, PEU uncertainty and PEU hostility related with price and products/services. At the participant's level, the use of MCSs is positively associated with the education at the college level and training in economics and management. From this table, we also identify a high correlation between AGE and EXPERIENCE. Hence, in our analysis we only use one of these variables to avoid multicollinearity problems. We chose to use the variable AGE since it has a stronger correlation with the number of MCSs used, even though not statistically significant.

Table 4: Pairwise correlations: Pearson correlations *

N	Abbreviated Name	1	2	3	4	5	6	7	8	9	10	11	12
1	N_MCS	1											
2	SIZE	0.28***	1										
3	PEUdyn	0.18	0.12	1									
4	PEUunc	0.25**	0.23*	0.32***	1								
5	PEUhost1	0.26**	0.3**	0.45***	0.11	1							
6	PEUhost2	0.18	-0.08	0.34***	0.26**	0.15	1						
7	LIFE_CYCLE	0.14	-0.05	0.06	0.21	-0.10	-0.04	1					
8	AGE	0.03	0.08	0.02	0.06	-0.08	0.04	-0.03	1				
9	EXPERIENCE	0.02	0.06	0.04	0.1	-0.03	0.05	-0.06	0.93***	1			
10	TENURE	-0.16	0.02	0.21	0.01	0.06	0.17	-0.10	0.68***	0.68***	1		
11	COLLEGE	0.32***	0.2*	0.17	0.18	0.12	-0.07	0.31**	-0.03	-0.12	-0.24**	1	
12	ECON_TRAINING	0.3***	0.23**	0.15	0.13	0.11	-0.01	0.24*	-0.08	-0.1	-0.24**	0.63***	1

* Variables are described on Table 1. Significant levels are the following: *** 1%, ** 5% and * 10%.

Empirical tests and results

To test our hypotheses we used a regression model for count data. Our estimation specifications consider in a first stage only firm variables. In a second stage we consider both firm and individual variables. Finally we add control variables that aim to reduce the heterogeneity of the sample in terms of industry, region and participants' position in the company. The specifications are the following:

$$N_MCS_i = \alpha_0 + \beta_1 SIZE_i + \beta_2 PEUdyn_i + \beta_3 PEUunc_i + \beta_4 PEUhost1_i + \beta_5 PEUhost2_i + \beta_6 MATURITY_i + \beta_7 DECLINE_i + \varepsilon_i$$

(Equation 1)

where i represents the firm/participant and the variables are defined on Table 1.

In our second specification, we add the participants' information:

$$N_MCS_i = \alpha_0 + \beta_1 SIZE_i + \beta_2 PEUdyn_i + \beta_3 PEUunc_i + \beta_4 PEUhost1_i + \beta_5 PEUhost2_i + \beta_6 MATURITY_i + \beta_7 DECLINE_i + \beta_8 AGE_i + \beta_9 TENURE_i + \beta_{10} COLLEGE_i + \beta_{11} ECON_TRAINING_i + \varepsilon_i$$

(Equation 2)

Based on the previous specification, we add control variables to mitigate the heterogeneity of the sample in terms of industry, region and respondents' job in the company.

$$N_MCS_i = \alpha_0 + \beta_1 SIZE_i + \beta_2 PEUdyn_i + \beta_3 PEUunc_i + \beta_4 PEUhost1_i + \beta_5 PEUhost2_i + \beta_6 MATURITY_i + \beta_7 DECLINE_i + \beta_8 AGE_i + \beta_9 TENURE_i + \beta_{10} COLLEGE_i + \beta_{11} ECON_TRAINING_i + \sum \mu_i Controls_i + \varepsilon_i$$

(Equation 3)

Table 5 presents the estimation of equations 1 to 3. From the table we conclude that, before we introduce participants' variables and other controls (specification 1), the use of MCSs is positively associated with the size of the company and the maturity and decline stages. All these effects are statistically significant. Hence, we find support for H1 and H4a. We find evidence against H4b and no evidence to support H2.

When we add, participants' information the effect of size is no longer statistically significant which may be due to the fact that larger firms have respondents with higher education and training in economics and management as shown on Table 4. The results for life cycle stage hold in this specification and we also find that PEU hostility related competition for access to HR and suppliers to be statistically significant. Hence, we find partial support for H2. This specification also shows that participants' characteristics – age, tenure, college, and training in economics and management – are not related with the use of MCSs. Hence, we find no evidence to support hypothesis 3. Finally, when we introduce control variables on specification 3, we find that the only variables that are statistically associated with the use of MCSs are PEU hostility related with HR and suppliers (positive sign) and tenure in the company (negative sign). Even though, the control variables help to mitigate the sample heterogeneity in terms of industry, region, and participants' job in the company, they reduce the degrees of freedom to estimate the coefficients and hence it is not surprising the decline in the statistical significance. Moreover we only have 60 observations with complete information in all these variables.

Table 5: Estimation of the effects on the use of MCSs*

Specification	1			2			3		
	Negative Binomial			Negative Binomial			Negative Binomial		
Estimation Method	Coef	Std Error	IRR	Coef	Std Error	IRR	Coef	Std Error	IRR
SIZE	.50**	.22	1.65	.34	.24	1.41	.22	.24	1.24
PEUdyn	.08	.15	1.09	.12	0.15	1.13	.07	.14	1.08
PEUunc	.04	.10	1.04	.02	.10	1.02	-.01	.10	.98
PEUhost1	.04	.09	1.04	.04	.09	1.04	.06	.08	1.06
PEUhost2	.14	.10	1.15	.16*	.09	1.18	.20**	.01	1.23
MATURITY	.78**	.35	2.20	.72**	.33	2.05	.54	.40	1.71
DECLINE	.85**	.37	2.34	.81**	.38	2.24	.35	.45	1.43
AGE	n.a.	n.a.	n.a.	.75	.70	2.12	.94*	.73	2.56
TENURE	n.a.	n.a.	n.a.	-.34	.25	.71	-.38	.23	.68
COLLEGE	n.a.	n.a.	n.a.	.47	.37	1.60	.40	.35	1.49
ECON_TRAIN	n.a.	n.a.	n.a.	-.01	2.50	0.99	-.01	.22	.98
Z stats for industry ¹⁾	n.a.			n.a.			0.288		
Chi2 stats for region ²⁾	n.a.			n.a.			3.18		
F stats participants' position ²⁾	n.a.			n.a.			3.11**		
N	61			60			60		
Pseudo R2	0.0442			0.0623			0.0876		

* Variables are described on Table 1. Constant included but not reported. Significant levels are the following: *** 1%, ** 5% and * 10%.

Discussion and Conclusion

This study provides first evidence on the use of MCSs in an outermost region, the Azores islands. Previous studies have analyzed the adoption of management control systems (MCS) and the use of HR practices in early/startup companies (Helmann and Puri, 2002; Davila and Foster, 2007), which are in general SMEs, but no evidence has been collected on the use of MCS in outermost regions. These regions are an interesting setting due to their physical and economic isolation as well as their limitations to access human capital. Using primary data collected through a questionnaire, we apply both a contingency and an institutional lens to identify the determinants of MCSs in these locations. We find that size and PEU are positively associated with the use of MCS, when only firm variables are used. We find no evidence that participants' characteristics are related with the use of MCS, except for age that is negatively associated with the MCS use. Hence, we find support for both contingency and institutional theories in this particular setting of outermost regions. There are two main contributions that this paper provides. On one hand, there has been limited research on the antecedents of the use of MCS in SMEs located in the outermost regions. The existing studies analyze the adoption and implications for specific MCS performance, particularly the more innovative MCSs, such as the ABC and the BSC. This paper addresses the use of MCSs in general. On the other, previous studies have not analyzed jointly contingency theory and institutional theory. This is a relevant contribution to the study of the antecedents of using MCS, in particular, given prior research on the antecedents of MCSs related both with contextual variables, such as the perceived environmental uncertainty (Chenhall, 2005), and the importance of the CFO action as a relevant change agent in the organizations (Byrne and Pierce, 2007; Naranjo-Gil et al., 2009).

This paper is not without caveats. These caveats are related with the method used and the sample. The limitations of questionnaires are well known (Van der Stede et al., 2007) and we mitigate these by using pre-tested questions, running a pilot test on the questionnaire and encouraging participation by sharing the findings with the participants

and offering vouchers. Additionally, by using a questionnaire we cannot infer cause-effect relationships due to the cross-sectional nature of the data.

There are several avenues for future research. For example, by following overtime some of these companies, we can collect longitudinal data to test cause-effect relationships. Additionally, by collecting hard data on the performance of these companies we can test the relationship between the use of MCSs and performance.

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