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Cultural contingency on the antecedents of the complexity of management accounting systems: Evidence from a meta-analysis of individual data

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Abstract
The purpose of this study is to test the hypothesis that there is a cultural contingency on the antecedents of the complexity of management accounting systems. After briefly reviewing the theoretical debate on this hypothesis, we present our results which provide support for cultural contingency on these antecedents. However, the data studied could be criticized. Thus, further research will be needed to explore this cultural contingency.

1. Introduction

Hofstede (1999) asserts that management in this century will not fundamentally differ from management in the last century. But he expects a breakthrough in the development of theories of management. These theories will become more adapted to the systems of national culture values. This article thus aims at showing that the antecedents of management accounting system complexity (hereafter MASC) differ among countries.

Following Drury and Tayles (2005), the complexity of management accounting systems can be intuitively defined as a point on a continuum. In this study, low complexity, the left extremity of this continuum, is characterized by the absence of accounting data. High complexity, the other end of the continuum, is defined by the presence of all accounting data: cost, financial, and budgetary accounting data; legal and optional ones; historical and "forecasted" ones.

To the best of our knowledge, most studies on the antecedents of management accounting system complexity have analyzed these antecedents by observing small and medium sized enterprises (Chapellier, 1996; Lavigne, 1999; Ben Hamadi and Chapellier, 2010; Chapellier and Mohammed, 2010). Thus, this observation legitimates our interest for small and medium sized enterprises (hereafter SME).

From a country to another and from a study to another, the definition of SME differs. For example, Chapellier (1996) defines SME as a firm of 10 to 100 employees. But Chapellier and Mohammed (2010) define SME as being a firm with less than 250 employees. Moreover, these studies on the antecedents of MASC differ in their results.

For instance, the size of the enterprise is positively linked with the MASC (Haldma and Lääts, 2002; Chenhall, 2003; Abdel Kader and Luther, 2008; Chapellier and Mohammed, 2010). However, Ben Hamadi and Chapellier (2010) find that these variables are not significantly linked. This result could come from a cultural contingency. Despite the overwhelming theoretical attention, it nevertheless lacks empirical evidence of cultural contingency on the antecedents of MASC.

Thus, the aim of this study is to address the following research question: Is there a cultural contingency on the antecedents of MASC? In order to address this issue, the remainder of this

article is organized as follows: Section 2 describes data and methods used in this study. Section 3 reports the results. Section 4 discusses the results and concludes.

2. Data and methods
2.1. Samples
The data used are from Chapellier's (1996), Ben Hamadi and Chapellier's (2010), and Chapellier and Mohammed's (2010) studies. The first study bears on French SMEs; the others respectively concern Tunisian and Syrian SMEs. We used these data because they are more homogeneous, despite some differences (Table 1).

Table 1 – Comparison between Studies

Article	Chapellier (1996)	Chapellier and Mohammed (2010)	Ben Hamadi and Chapellier (2010)
Sample Size	113	92	71
Average Number of Employees by Firm (standard deviation)	41,14 (24,03)	80,47 (72,48)	104,35 (85,42)
Average Age of Firms (standard deviation)	28.13 (16.48)	17.36 (16.01)	21.41 (19.88)
Level of Educational Attainment*			
- Self-Educated		12	4
- under Leaving Certificate	48		14
- Leaving Certificate		22	5
- Certificate + two Years	29 (and Certificate + three Years)	8	8
- Certificate + four Years	36	43	
- Master's Degree / PhD		7	40
Management Studies**	32	17	29
Other Studies**	81	75	42

* Because of differences from a study to another, the meta-analyst (the second author) made a choice: he created a dummy variable "level of attainment" taking either the value zero, for SME top managers with a bachelor's degree or less, or one otherwise. ** Educational background of the firm's top manager.

2.2. Statistical analyses
The difference in statistical treatment among these studies justifies the use of a meta-analysis of individual data: "a specific type of systematic review. Instead of extracting data from study publications, the original research data for each participant in an included study are sought directly from the researchers responsible for that study." (Steward *et al.*, 2008) Because of these differences in statistical treatment, the results of these studies could not be aggregated by using a traditional meta-analysis.

The meta-analysis of individual data allows to reveal differences among studies and thus, cultural contingency on the antecedents of MASC. In order to test the existence of a cultural contingency, we used the following model:

MASC = Intercept + α . Study + β . Antecedents + γ . Antecedents x Study

Intercept is the intercept in the French context: the value of MASC when the value of all antecedents is zero. *Study* is a matrix built by concatenating two dummy variables taking the value one to indicate that the answer is from a specific study (zero otherwise). When the first dummy variable equals one, the answer is from the Tunisian study. When the second dummy variable equals one, the answer is from the Syrian study. When the two dummy variables equal zero, the answer is from the French study. Thus, *α* (a vector of two slope coefficients for the dummy variables) represents changes in the intercept due to cultural contexts. If these coefficients significantly differed from zero, there would be evidence of a cultural contingency.

Antecedents is a matrix built by concatenating the observations for each antecedents: age of the firm, size of the firm, educational background of the top manager, his or her level of educational attainment, and his or her experience leading the small business. These antecedents were retained because they are the common antecedents for these three studies. Thus, β is a vector of five slope coefficients for these antecedents.

Antecedents x study represents the interaction between the studied cultural contexts (*Study*) and *antecedents*. Thus, γ is a vector of ten slope coefficients for these interactions. If these slopes significantly differed from zero, there would be evidence of a cultural contingency.

3. Results

Table 2 provides descriptive statistics for the variables measured in the three studies: the complexity of management accounting systems and its antecedents. The correlation between measures appears in table 3. As indicated in this table, MASC and level of attainment are significantly correlated with the other measured variables except Firm Age.

Table 2 – Descriptive Statistics for the Measured Variables (n = 276)

Variable	Hypothetical Range	Actual Range	Mean	Standard Deviation
MASC	0 – 80	0 – 79	41.09	17.04
Firm Age	0 – 300	0 – 105	22.81	17.84
Firm Size	0 – 300	10 – 300	70.51	67.19
Educational Background	0 – 1	0 – 1	0.28	0.45
Experience	0 – 3	0 – 3	1.88	0.79
Level of Attainment	0 – 1	0 – 1	0.46	0.50

Table 3 – Correlation Matrix for the Measured Variables (n=276)

	1	2	3	4	5	6
1 - MASC	1	-0.0027	0.192***	0.3204***	-0.1345**	0.3035***
2 - Firm Age		1	-0.0141	0.0414	0.4163***	-0.0557
3 - Firm Size			1	0.0966	-0.0693	0.2448***
4 - Educational Background				1	-0.2092***	0.3617***
5 - Experience					1	-.2734***
6 – Level of Attainment						1

*, **, *** respectively denote that the correlation is significant at the 10%, 5%, 1% level (two-tailed test).

To test the presence of a cultural contingency, we used the backward elimination procedure in Gretl. This procedure identifies the main effects of cultural contexts and of antecedents and their interaction effects.

Table 4 shows the main effects and interaction effects of MASC antecedents – Firm Age (A), Firm Size (S), Educational Background (B), Experience (E) and Level of Attainment (L) –, and cultural contexts – the Tunisian (TC) and Syrian (SC) contexts – on Management Accounting System Complexity (MASC). As table 4 shows, the main effects of the Tunisian and Syrian contexts are significant (coefficient = -13.12, $p < 0.01$, and coefficient = -15.05, $p < 0.01$). Thus, these contexts significantly decrease the value of the intercept.

Table 4 – Main Effects and Interaction Effects of Antecedents of Management Accounting System Complexity (MASC) and of Cultural Context on MASC

Variable	Coefficient	Standard Error	T-value	P-value
Intercept	39.31	2.99	13.13	<0.00001
Syrian Context SC	-15.05	3.28	-4.60	<0.00001
Tunisian Context TC	-13.12	4.27	-3.07	0.00234
Firm Age A	-0.16	0.06	-2.82	0.00513
Firm Size S	0.21	0.05	3.99	0.00008
Educational Background B	6.97	1.99	3.50	0.00054
Level of Attainment L	6.32	2.03	3.11	0.00209
A x TC	0.23	0.10	2.19	0.02943
S x SC	-0.11	0.06	-1.99	0.04731
S x TC	-0.20	0.06	-3.61	0.00037
L x TC	10.07	3.82	2.64	0.00885

Moreover, in the Tunisian context, the effect of Firm Age (A) on MASC is higher than in the French and Syrian Contexts (coefficient = 0.23, $p<0.05$). Indeed, the effect of the age of Tunisian firms on MASC is about 0.06 (-0.1634+0.2276) versus -0.1634 in other studied contexts.

Furthermore, as table 4 indicates, in the Tunisian and Syrian contexts, the effect of Firm Size is significantly lower than in the French context, since the interaction effects between the Tunisian and Syrian contexts and Firm Size is significant (respectively: coefficient = -0,20, $p < 0.01$, and coefficient = -0.11, $p < 0.05$). In the Tunisian context, the effect of Firm Size on MASC is almost zero (0.0067=0.2091-0.2024).

Finally, the significant coefficient on L x TC (10.07, $p<0.01$) confirms the presence of a cultural contingency on the link between MASC and its antecedents (in this case, level of attainment).

4. Discussion, limitations and direction for future research

Haldma and Lääts (2002), Chenhall (2003), and Abdel Kader and Luther (2008) show that the relationship between Firm Size and complexity of management accounting system is positive. In contrast, our results confirm that the non-significant link between Firm Size and MASC in Tunisian firms (Ben Hamadi and Chapellier, 2010) is due to cultural contingency. Whereas this link is significantly positive in the French and Syrian contexts, there is no significant effect of Firm Size on MASC in the Tunisian context. Thus, following Hofstede (1999), the relationship between Firm Size and MASC has to be adapted to national culture value systems.

However, this main result should be interpreted in light of three limitations. *First*, the sample of each study was not randomly selected. During future researches, samples should be randomly selected: all individuals will have an equal probability of being selected and thus, samples will be representative. *Second*, we only used common antecedents: size and age of the firm, educational background and level, and experience of the top manager. Thus, we excluded other antecedents of MASC: ownership structure, level of indebtedness of the firm, and strategy and objectives of its top manager. *Finally*, Chapellier (1996) studied French

SMEs in the early 90's, whereas Ben Hamadi and Chapellier (2010), and Chapellier and Mohammed (2010) respectively studied Tunisian and Syrian SMEs in the late 2000s. Thus, our evidence of cultural contingency could be polluted by time contingencies. To better show cultural contingency, future researchers in this field should empirically examine the cultural contingency of the antecedents of MASC by using Hofstede's questionnaire (Hofstede, 2001).

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