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Businesses

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Suggested Citation: Hammouch, Hind; Manta, Otilia; Palazzo, Maria (2024) : Adapting management control systems to organizational contingency factors: A study of Moroccan industrial companies, *Businesses*, ISSN 2673-7116, MDPI, Basel, Vol. 4, Iss. 4, pp. 883-898, <https://doi.org/10.3390/businesses4040048>

This Version is available at:

<https://hdl.handle.net/10419/338763>

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Article

Adapting Management Control Systems to Organizational Contingency Factors: A Study of Moroccan Industrial Companies

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Abstract: This study investigates how organizational contingency factors, namely company size, environmental uncertainty, technological capacity, and organizational structure, affect the design and effectiveness of management control systems (MCS) in Moroccan industrial companies. Drawing on contingency theory, which emphasizes the alignment of organizational systems with contextual factors, this research applies quantitative methods to a sample of 190 industrial firms in Morocco, achieving a 76% response rate to the distributed surveys. The data are analyzed using correlation and linear regression techniques to explore these relationships. The findings reveal that larger firms, those operating in dynamic and uncertain environments, and those with advanced technological systems tend to implement more sophisticated, integrated, and participative MCS. Furthermore, flexible and decentralized organizational structures significantly enhance the adoption of adaptive control systems. These results underscore the importance of tailoring MCS to organizational characteristics and environmental conditions, particularly in emerging market contexts. This study’s novel contribution lies in its application of contingency theory to a non-Western industrial context, addressing a gap in the literature by demonstrating how specific regional factors influence MCS practices. This research offers practical insights for Moroccan industrial firms seeking to improve their operational efficiency, adaptability, and strategic decision making in volatile markets.

Keywords: organizational contingency factors; MCS; size; environment; organizational structure; technology



Citation: Hammouch, H.; Manta, O.; Palazzo, M. Adapting Management Control Systems to Organizational Contingency Factors: A Study of Moroccan Industrial Companies.

Businesses **2024**, *4*, 883–898.

<https://doi.org/10.3390/businesses4040048>

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Received: 16 September 2024

Revised: 3 December 2024

Accepted: 5 December 2024

Published: 16 December 2024



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1. Introduction

In the current industrial landscape, where rapid technological advancements, globalization, and environmental unpredictability increasingly shape organizational dynamics, effective MCS are essential for monitoring performance, coordinating activities, and facilitating strategic decision making. The need for adaptive and responsive MCS is particularly acute for companies in emerging economies, which often face unique operational challenges, such as volatile markets, resource constraints, and diverse regulatory landscapes. These challenges require organizations to design MCS that are not only efficient, but also flexible enough to respond to fluctuating external and internal conditions [1].

The contingency theory of management, which originated in the mid-20th century, suggests that organizational practices, including MCS, must be aligned with specific contextual factors to enhance effectiveness. Key among these factors are company size, environmental uncertainty, technological sophistication, and organizational structure, each of which has been shown to influence MCS design and implementation [2]. For instance, larger companies with complex hierarchies and operations often require more sophisticated MCS, while firms operating in highly dynamic environments benefit from control systems that support agility and rapid decision making [3].

Recent studies have extended contingency theory by exploring the implications of MCS within different regional and cultural contexts. However, most empirical research in this area has focused on developed economies, leaving a significant gap in understanding how these systems operate in emerging markets like Morocco [4]. Moroccan industrial companies encounter distinct pressures, including varying levels of technological adoption, fluctuating market conditions, and regulatory environments shaped by regional factors. These characteristics underscore the need for localized studies to uncover how specific contingency factors influence MCS effectiveness in non-Western contexts, thereby contributing to a more global understanding of MCS adaptability [5].

Addressing this gap, our study aims to examine the following question: to what extent can organizational contingency factors influence the implementation of MCS in Moroccan industrial companies?

Using quantitative methods, such as correlation and linear regression analyses, this research seeks to provide empirical insights into how variables, such as company size, technological capability, environmental conditions, and organizational structure impact MCS sophistication and effectiveness. By tailoring MCS to align with these organizational characteristics, Moroccan companies could potentially improve operational efficiency, adaptability, and strategic decision making, a crucial advantage in the volatile conditions of emerging economies [6].

Ultimately, this study contributes to both the academic literature and practical applications by offering insights into how Moroccan industrial firms could optimize their MCS to align with their unique organizational characteristics, thereby enhancing their overall performance and competitiveness.

2. Theoretical Background: Management Control Systems—Contingency Factors

2.1. Management Control Concepts

Management control was born with the industrial revolution. Its introduction into companies came with the division of tasks, to control the activities of each entity in order to monitor the achievement of set objectives. According to R. N. Anthony [7], “management control is the process by which managers obtain assurance that resources are obtained and used effectively and efficiently to achieve the organization’s objectives”. Selmer [8] stated that the foundations of management control are as follows:

- Forecasting means quantifying the objectives, resources and action plans, and translating them into financial terms.
- Measuring means ensuring that operations are carried out.
- Taking action means identifying, understanding, and analyzing any discrepancies between the targets and forecasts, which may indicate malfunctions. It means anticipating the company’s future in order to take corrective action.

The main tools of management control are described below.

2.1.1. The Dashboard

A dashboard is a management tool made up of a set of performance indicators, the aim of which is to compare forecasts with the actuals to analyze discrepancies and implement corrective actions. Ragain and Caroline [9] defined the dashboard as “A management tool comprising synthetic and comparative information through a structuring of indicators tracing the evolution of key success factors relating to the same responsibility center”.

2.1.2. Reporting

Reporting plays a crucial role in relaying critical information to senior management, where its primary function is to support accurate, timely communication and facilitate decision-making processes. According to recent studies, effective reporting provides management with a structured and periodic overview of the activities and performance outcomes within specific units [10]. As an a posteriori control tool, reporting is especially vital for organizations with decentralized structures, as it enables senior management

to monitor dispersed operations and ensure their alignment with the overall strategic goals [11].

2.1.3. Budgetary Control

Budgetary control is one of the tools of management control. Bouquin stated that the budget is “The accounting and financial expression of the action plans adopted to ensure that the objectives pursued and the resources available in the short term converge towards the achievement of operational objectives”. Indeed, the budget is defined as a set of quantified forecasts. Clerc argued that budgetary control consists in comparing the actual results with the forecasts, to reveal and verify any discrepancies.

2.2. Contingency Theory in Management Control

From the 1970s onwards, the initiators of this contingent contribution to control systems have proposed that the controls could adapt to a wide range of complex situations by considering contextual factors. As Gilles pointed out, “the theory of structural contingency recognizes a human dimension around control, considering that actors and the nature of their relationships (...) produce forms of management control and influence the content of the information processed”.

Thus, all control research with a contingent approach has sought to update these particular types of controls, by analyzing the impact of external and/or internal variables on an organization. In particular, most of these studies have examined the impact of the relationship between structural adaptation and contingency factors on organizational performance [12].

Indeed, Hayes [13] was one of the first to study MCS using a contingent approach. His efforts concerned the level of performance achieved by divisions according to three contingency factors: the factors internal to the divisions, the factors external to the company, and the factors relating to the nature of the relationship between the divisions. Otley [14] continued this research and suggested a model that considers technology, organizational structure, and the environment as factors. Subsequent work has introduced several innovations to these models. Fisher [15], for example, recognized five categories of contextual factors: the environment, strategy, technology, product and sector change, and knowledge and observability factors.

In addition, fit is a central concept in contingency theory. It characterizes the nature of the intersection between a company’s characteristics and its contingency factors, and is conceptualized as having an influence on an organization’s outputs. In the same sense, structural contingency theory states that companies adapt their structure from misfit, which leads to poor performance, to adaptation, which leads to good company performance. Secondly, “variation in a contingent variable moves the organization from adaptation to maladaptation, and thus from equilibrium to disequilibrium. Structural changes are the consequence of variations in the environment” [16].

2.3. Variables of Organizational Contingency Theory

The contingent research on MCS qualifies as very strong work. These studies have asserted that the majority of MCS depend on contingent external factors. This extensive research has led to the formalization of a number of contingent variables: size, technology, and environment. The variables relating to size, age, culture, and other factors can be elaborated upon.

2.3.1. Size

Company size is a contingency factor that correlates with its ability to learn about and adopt management control tools. According to Diana et al. [17], the size factor is significant in explaining the implementation of management control. It exerts an influence on the content of the management control tools. In fact, the size of an organization is a contingency factor for explaining the organizational management practices. The use of

formal, non-financial representations of performance is generally more widespread in large organizations than in small and medium-sized ones.

2.3.2. The Environment

This variable was one of the first to be analyzed in contingent studies. The premise of this research is that the environment strongly influences the organizational structure of MCS. This work has focused on the notion of perceived environmental uncertainty. This notion has a strong explanatory power for control systems.

Desreumaux defined this concept as the inability to assign reliable probabilities about the effect of environmental factors on a decision, the lack of knowledge about the possible outcomes of a decision, or the lack of information about the factors associated with a given decision [18]. Uncertainty is linked to the complexity and stability of the environment, and is produced when there is a change in the environmental conditions that affects the controlled processes [19].

Several control studies have suggested that environmental uncertainty drives the use of differentiated additional information, measures, and data. Indeed, in the event of uncertainty, traditional accounting measures are no longer sufficient to steer and measure performance in a prescriptive way, especially when the sources of competitive advantage are more complex.

2.3.3. Technology

Technology has become a pivotal factor in understanding and shaping corporate structures and managerial practices. Contemporary research has emphasized that technology influences not only the efficiency of operations, but also the flexibility and responsiveness of MCS to environmental changes [20]. According to recent studies, technology functions as an essential internal organizational contingency factor, directly affecting information flow, decision-making speed, and the integration of data-driven processes within firms. This builds on earlier work, updating the idea that technology is fundamental to the technical production processes employed by organizations, with recent evidence linking technological advancements to the improved adaptability of and strategic alignment with MCS.

2.3.4. Organizational Structure

The original aim of this theory was to study the influence of certain variables on the structure of a company; however, this approach gradually changed to analyze managerial practices (from a variable to be explained to an explanatory variable). Thus, Brignall and Ballantine [21,22] stated that the efficiency and effectiveness of a control system is linked to the ability of an organization's structure to communicate information within the company. As a result, structure is a key control variable, even if it has to be admitted that the research into the impact of structure on MCS is neither numerous nor well developed. Nevertheless, Sponem [19] has taken two aspects of the structure as explanations for control practices: the level of decentralization and interdependence.

3. Methodological Approach to Research

3.1. Finalization of Theoretical Model and Operationalization of Variables

In this research, we have a single dependent variable—management control, “MCS”—and four independent variables—size, “SIZE”; environment, “ENV”; technology, “TECH”; and organizational structure, “STR”. A model is a representation of a set of hypotheses used to explain a phenomenon. Given the objectives of our study, we will present a model of the relationship between the organizational contingency factors and MCS. Thus, we have as follows (see Figure 1):

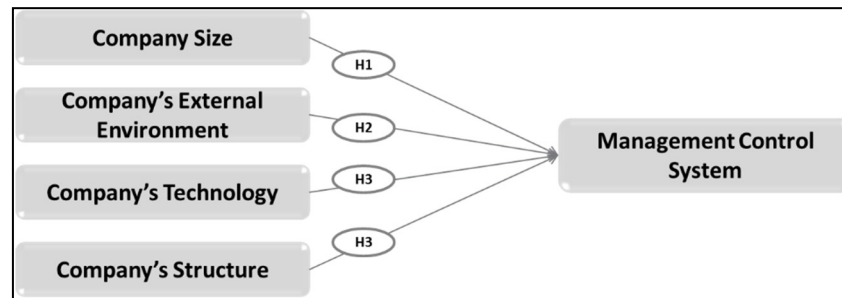


Figure 1. This study’s conceptual model. Source: elaborated by the authors.

➤ Operationalization of the variables

In this study, we use four independent variables relating to the organizational contingency factors: size, environment, technology, and organizational structure.

➤ Operationalization of the “Environment” construct

The following three items, as indicated in Table 1, measure the environment.

Table 1. Operationalization of the “Environment” construct.

Variable	Items
Environment	The dynamism of the external environment is very stable (slow evolution).
	The dynamism of the external environment is average (average trends).
	The external environment is very dynamic (rapid change).

Source: based on work by Komarev [23].

We therefore make the following assumptions:

H1. *The company size affects the MCS design.*

H2. *The company’s environment affects the MCS design.*

• Operationalization of the “Technology” construct

The following two items, as indicated in Table 2, measure the technology.

Table 2. Operationalization of the “Technology” construct.

Variable	Items
Technology	The existence of an information system.
	The degree of technology within a company.

Source: based on work by Chapellier [24] and Kalika [25].

We therefore make the following assumption:

H3. *The company’s technology affects the MCS design.*

• Operationalization of the “Organizational structure” construct

The following seven items, as indicated in Table 3, measure a company’s structure.

Table 3. Operationalization of the “Organizational structure” construct.

Variable	Items
Organizational structure	Advising managers (management, operations, etc.).
	Forecasting (budget, operational and strategic plans, etc.).
	Taking action (implementing and monitoring action plans, budgetary control).
	Closing and reporting (reporting, dashboard, etc.).
	Analyze costs (cost accounting).
	Develop tools (information systems, procedures, processes, etc.).
	Advising managers (management, operations, etc.).

Source: based on work by Zian [26].

We therefore make the following assumption:

H4. *A company’s organizational structure affects the MCS design.*

3.2. Sample and Data Collection

This study investigates the impact of organizational contingency factors, specifically, the size, environment, technology, and organizational structure on the adoption and effectiveness of MCS in Moroccan industrial firms. To achieve this objective, a diverse sample of 190 Moroccan industrial companies was selected based on several criteria designed to capture a representative cross section of the sector.

While the ideal sample size for a population of 10,891 firms, calculated using a 95% confidence level and 5% margin of error, is approximately 370 companies, practical constraints limited the sample to 190 firms. Despite this limitation, this sample’s diversity of sub-sectors, firm sizes, and regions ensures that it will provide meaningful and reliable insights into the Moroccan industrial sector. Additionally, this sample size aligns with similar studies of emerging markets, balancing feasibility with statistical power for a robust analysis. The choice of Moroccan industrial companies was strategic. Industrial firms in Morocco face unique operational challenges due to technological shifts, regulatory pressures, and market fluctuations that are characteristic of emerging economies. This sector was chosen as it includes organizations with complex operational requirements that necessitate sophisticated MCS to ensure effective management. Additionally, the industrial sector provides a rich context for studying contingency theory due to the varied levels of technology adoption, organizational structures, and external pressures these companies encounter.

This sample includes companies of varying sizes, from small enterprises to large industrial firms, allowing this study to explore how company size, a well-established contingency factor in MCS literature, influences the sophistication and design of MCS. To ensure that the findings reflect the diversity of the industrial sector, companies from various sub-sectors were selected. This approach not only increases this study’s generalizability across different industrial contexts, but also enables meaningful comparisons across sub-sectors.

We chose Moroccan industrial companies covering the period from March 2022 to June 2023. We adopted a positivist perspective, following a hypothetical–deductive technique. In this respect, we opted for a quantitative approach to compile the data and obtain the information required to address our issue.

We administered questionnaires in the field to 250 Moroccan industrial companies. In the final phase, we collected 190 questionnaires. The construction of our questionnaire required a pre-test. This enabled us to anticipate the future of our survey [27]. Pre-testing is evaluating a questionnaire on a limited, diverse sample of people to enhance its quality [28]. This method’s objectives are to identify any mistakes that have been made, guarantee that the questions are understandable, and determine the typical answer time [28,29].

Our questionnaire was administered to CEOs, CFOs, and accountants, i.e., people who are very familiar with their company's governance system, direction, and strategy.

The first section of the questionnaire concerned general information about the respondent and the company, the second section focused on information on the MCS within the said company, and the third section enabled information to be obtained concerning the environment, technology, and organizational structure of the company in question that have an impact on the MCS. The data on size were collected from the Chamber of Commerce database.

The number of questionnaires mailed and returned is presented in Table 4 below.

Table 4. Results of survey of Moroccan companies.

Target	Surveys Distributed	Surveys Retrieved		Surveys Unretrieved	
	Number of Surveys Distributed	Number of Surveys Retrieved	Percentage %	Number of Unrecoverable Surveys	Percentage %
Moroccan industrial companies	250	190	76%	60	24%

Source: elaborated by the authors.

Following the collection of data from 190 industrial companies in Morocco, SPSS software (version 1, IBM SPSS Statistics) was used to conduct an exploratory study of the data. Following this, a multivariate linear regression analysis, a correlation analysis, and an exploratory factorial analysis were performed on the gathered data.

These statistical analyses consisted of validating our measurement scales and subsequently testing the hypotheses of our research model, namely the effect of the (independent variable) organizational contingency factors on the MCS (dependent variable).

In designing questionnaires, the choice of answer options plays a critical role in the type of data collected. According to recent studies by Saunders, Lewis, and Thornhill [30], four primary types of measurement scales are commonly used: nominal, ordinal, interval, and ratio. Each scale serves a distinct purpose in categorizing and analyzing responses. For instance, nominal scales are used for labeling without a quantitative value, while ordinal scales establish an order among the options. Interval and ratio scales provide more precise measurements, with ratio scales offering a true zero point, allowing for a broader range of statistical analyses.

For the purposes of this research, the interval scale was chosen to measure the variables in our model. To this end, all the items were presented on the most commonly used 5-point Likert scale. This attitudinal scale has the advantage of being richer in terms of information, making it possible to operationalize the various statistical analysis tools (descriptive statistics, principal component analysis (PCA), regression matrices, etc.).

According to this, the Likert scale's acceptance was influenced, in part, by how simple it was to administer for our intended audience. Second, management research frequently uses this assessment scale.

We now present the results of the descriptive analysis of our sample in Table 5.

Table 5. Sample characteristics.

Sample Characteristics	Workforce	Percentage	Percentage Cumulative
Firm legal status			
SA	25	13.2	13.2
SARL	165	86.8	100
Total	190	100	
Employees			
Between 10 and 99 employees	15	7.9	7.9
Between 100 and 200 employees	115	60.5	68.4
Over 200	60	31.6	100
Total	190	100	
Years of existence			
Less than 5 years	15	7.9	7.9
Between 5 and 10 years	50	26.3	34.2
Between 10 and 25 years	109	57.4	91.6
Over 25 years	16	8.4	100
Total	190	100	

Source: elaborated by the authors.

4. Presentation and Discussion of Results

4.1. Exploratory Factor Analysis (EFA)

4.1.1. Results of the Validation Tests of the “Environment” Measurement Scales

The analyses carried out show a KMO value of 0.753 (greater than 0.5) and a Bartlett’s test of 0.000 (the error is less than 0.05), as indicated in Table 6. This justifies the use of an exploratory factorial analysis of the “Environment” variable.

Table 6. Presentation of the KMO index and Bartlett’s test.

Precision measurement of Kaiser–Meyer–Olkin sampling.	0.753
Approximate chi-square	625,430
Bartlett’s sphericity test	ddl
	1
Meaning of Bartlett	0.000

Source: elaborated by the authors.

Table 7 shows that the Cronbach’s Alphas index for the “Environment” variable is above the acceptability threshold (>0.06). These findings show that the measuring scales for the “Environment” component have acceptable internal consistency. We decided to keep all the elements that presented on the scale during this phase.

Table 7. Total variance explained.

Component Matrix	Representation Quality		
	Axis1 component	Initial	Extraction
ENV1	0.981	1	0.961
ENV2	0.993	1	0.984
ENV3	0.994	1	0.987
Eigenvalues	2.933		
Total variance explained	97.77		
Cronbach’s Alpha	98.9		

Source: elaborated by the authors.

4.1.2. Results of the Validation Tests of the “Technology” Measurement Scales

To ensure the factorial verification of the two statements, we opted for the KMO and Bartlett’s tests. The analyses carried out show a KMO value of 0.56 (greater than 0.5) and a Bartlett’s test of 0.000 (the error is less than 0.05), as indicated in Table 8. This justifies the use of an exploratory factorial analysis of the “Technology” variable.

Table 8. Presentation of the KMO index and Bartlett’s test.

Precision measurement of Kaiser–Meyer–Olkin sampling.	0.560	
Bartlett’s sphericity test	Approximate chi-square	629,500
	ddl	1
	Meaning of Bartlett	0.000

Source: elaborated by the authors.

The results of the factorial analysis of the “Technology” variable in Table 9 show satisfactory indicators: Cronbach’s alpha and the total variance explained have values of 58.5% and 94.98%, respectively. We also note that the two items have a representation quality above the required threshold (0.4), and a very good correlation with the first factorial axis.

Table 9. Total variance explained.

Component Matrix	Representation Quality		
	Component Axis 1	Initial	Extraction
TECH	0.975	1	0.590
DEG.TECH	0.975	1	0.590
Eigenvalues	1.90		
Total variance explained	94.98		
Cronbach’s Alpha	58.5		

Source: elaborated by the authors.

In short, for the rest of the analysis, we will retain the two items from the “Technology” scale, i.e., the existence of an information system and the degree of technology within a company.

4.1.3. Results of the Validation Tests of the “Organizational Structure” Measurement Scales

To ensure the factorial verification of the six statements, we opted for the KMO and Bartlett’s tests. The analyses carried out show a KMO value of 0.746 (well above 0.5) and a Bartlett’s test of 0.000 (the error is less than 0.05), as indicated in Table 10. This justifies the use of an exploratory factorial analysis of the “Organizational structure” variable.

Table 10. Presentation of the KMO index and Bartlett’s test.

Precision measurement of Kaiser–Meyer–Olkin sampling.	0.746	
Bartlett’s sphericity test	Approximate chi-square	629,500
	ddl	1
	Meaning of Bartlett	0.000

Source: elaborated by the authors.

The results of the factorial analysis of the “Organizational structure” variable in Table 11 show satisfactory indicators: Cronbach’s alpha and the total variance explained

have values of 98.4% and 84.473%, respectively. We also note that the six items have a representation quality above the required threshold (0.4), and a very good correlation with the first factorial axis.

Table 11. Total variance explained.

Component Matrix	Representation Quality		
	Component Axis 1	Initial	Extraction
CG.OBJ1	0.990	1	0.980
CG.OBJ2	0.964	1	0.929
CG.OBJ3	0.979	1	0.958
CG.OBJ4	0.979	1	0.958
CG.OBJ5	0.974	1	0.948
CG.OBJ6	0.990	1	0.980
Eigenvalues	11.826		
Total variance explained	84.473		
Cronbach's Alpha	97.4		

Source: elaborated by the authors.

In total, the four measurement scales that comprise the “Organizational contingency” variable’s reliability analysis produced very good Cronbach’s alpha values and an explanatory power of more than 50%, as indicated in Table 12.

Table 12. Measurement of the “Organizational contingency” variable.

Variable	Number of Items	Variance Recovered Following Factorization	Cronbach's Alpha
Environment	3	97.77	98.9
Technology	2	94.98	58.5
Organizational structure	6	84.473	98.4

Source: elaborated by the authors.

4.2. Correlation and Regression Analysis

4.2.1. Correlation Analysis

In the present research, we used Pearson’s correlation test to test the linear relationship between the independent variables and the dependent variable (Table 13).

Table 13. Correlation test.

Variables	SIZE	ENV	TECH	STR	SCM
SIZE	1				
ENV	−0.004	1			
TECH	0.009	0.040	1		
STR	−0.085	−0.009	0.041	1	
SCM	0.090	0.223	0.158	−0.012	1

Source: elaborated by the authors.

The relationship is considerable, at 1% (Sig. = 0.000 < 0.001) between the two types of variable, as the table demonstrates.

4.2.2. Regression Analysis

To test the research hypotheses and the relationship between the independent and dependent variables, we used a multivariate linear regression.

The test results show that the adjusted R Square = 54.7%, i.e., the independent variables explain 54.7% of the variation in the dependent variable; the Durbin–Watson value = 1.746, which is between 1.5 and 2.5, so the results do not violate the first-order series autocorrelation hypothesis (Table 14).

Table 14. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin–Watson
1	0.744	0.554	0.547	0.39275	1.746

Source: elaborated by the authors.

In addition, the F-test has Sig. = 0.000 < 0.001 (Table 15), so the regression model is appropriate (1% level of statistical significance), i.e., there is at least one independent variable affecting the dependent variable.

Table 15. Anova test.

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	67.986	5	12.400	80.386	0.000
	Residual	54.123	185	0.154		
	Total	122.109	190			

Source: elaborated by the authors.

The results of the regression analysis in Table 16 show that the variables SIZE, ENV, TECH, and STR all have Sig. = 0.000 < 0.001, so the regression model is statistically significant at 1%, and fits the data set, i.e., these independent variables (SIZE, ENV, TECH, and STR) exert a significant effect on the dependent variable (MCS).

Table 16. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	−1.680	0.315	−6.553	0.000			
	SIZE	0.335	0.048	0.338	6.962	0.000	0.980	1.014
	ENV	0.423	0.045	0.468	8.320	0.000	0.975	1.022
	TECH	0.418	0.046	0.464	9.120	0.000	0.968	1.019
	STR	0.202	0.035	0.237	4.213	0.000	0.900	1.020

Source: elaborated by the authors.

While the variables in this study are measured using a Likert scale, which lacks inherent units, standardized coefficients are employed to facilitate the direct comparison of the relative importance of the independent variables. Standardization enables the evaluation of the strength of each variable's impact on the dependent variable (MCS) on a consistent scale, particularly in multivariate regression models. This approach is commonly used to interpret regression results when variables are measured on similar or comparable scales.

4.3. Discussion of Results

4.3.1. Size

The empirical analysis of the relationship between the size of the Moroccan industrial companies and their MCS is grounded in contingency theory, which emphasizes that organizational structures and management practices must be aligned with both environmental and internal factors [31]. Recent studies, including those by Henri [32] and Bedford et al. [33], have affirmed that larger companies tend to adopt more sophisticated MCS due to the increasing complexity of operations, which demands advanced control mechanisms for effective oversight and coordination. In our study, the linear regression results ($\beta = 0.338$) reveal a significant positive relationship between company size and MCS sophistication, indicating that as Moroccan firms grow, they develop more comprehensive management controls to address diverse activities and higher levels of operational complexity. These findings support the theoretical expectations of contingency theory, which propose that larger organizations require complex control systems to manage the greater variety of processes and hierarchical structures efficiently.

As a result, these findings highlight the important influence that the “Size” factor has on MCS implementation.

Hypothesis H1 is therefore validated.

4.3.2. Environment

The empirical analysis of the relationship between the environment, as an organizational contingency factor, and MCS in Moroccan industrial companies reveals significant correlations, supported by the linear regression analysis ($\beta = 0.468$). These findings align with contemporary contingency theory perspectives, as highlighted by recent authors such as Chenhall [34,35] and Bedford et al. [33], who have argued that the effectiveness of MCS is contingent upon their alignment with external environmental factors. Recent studies by Gosh and Willinger [36] have also demonstrated that organizations in dynamic and unpredictable environments require flexible and adaptive control systems to respond effectively to external changes. Similarly, this study confirms that Moroccan companies operating in unstable or rapidly changing environments adopt more participative and adaptable MCS, whereas companies in more stable environments rely on formalized and structured systems. These results emphasize the importance of customizing MCS to the environmental conditions, to enhance the organizational performance of the Moroccan industrial sector.

As a result, these findings highlight the important influence that the “Environment” factor has on MCS implementation.

Hypothesis H2 is therefore validated.

4.3.3. Technology

The empirical analysis of the relationship between technology, considered a key organizational contingency factor, and MCS in Moroccan industrial companies demonstrates a significant positive correlation between these variables. Using linear regression techniques, the findings indicate that technology significantly enhances both the effectiveness and sophistication of MCS ($\beta = 0.464$). This aligns with recent research by Barros et al. [5], who highlighted that advanced technological capabilities allow for more dynamic and responsive control systems tailored to organizational needs. Additionally, Curtis and Sweeney [34] emphasized that technology integration into management structures supports better information flow and decision-making processes, especially in environments with high operational complexity. A contemporary study by Korsen et al. [35] also underscored the importance of aligning organizational structures and management systems with digital technologies to achieve improved performance outcomes. This study confirms that Moroccan industrial firms can leverage IT technologies to manage information more effectively, enhance decision making, and optimize management control processes, thereby increasing competitiveness and operational efficiency.

As a result, these findings highlight the important influence that the “Technology” factor has on MCS implementation.

Hypothesis H3 is therefore validated.

4.3.4. Organizational Structure

Recent empirical research has underscored the significant relationship between organizational structure and MCS within Moroccan industrial companies. Using correlation and linear regression analyses, our findings indicate that more formalized and decentralized organizational structures are associated with the adoption of sophisticated and participative MCS ($\beta = 0.237$). This result aligns with the principles of contingency theory, as explored by contemporary scholars like Bedford [4], who have emphasized that the effectiveness of MCS is contingent on its alignment with an organization’s structural characteristics.

A recent study by Lewinson et al. [6] also suggested that companies operating in dynamic and uncertain environments achieve higher performance levels when employing flexible structures and adaptive MCS, facilitating agile decision making and responsiveness. This strategic fit between the organizational structure and MCS, supported by the results of our study, highlights the critical role of aligning these elements to optimize the performance of Moroccan industrial firms. By adopting an MCS tailored to their structural and environmental contexts, Moroccan companies can enhance both their operational efficiency and adaptability.

As a result, these findings highlight the important influence that the “Organizational structure” factor has on MCS implementation.

Hypothesis H4 is therefore validated (see Figure 2).

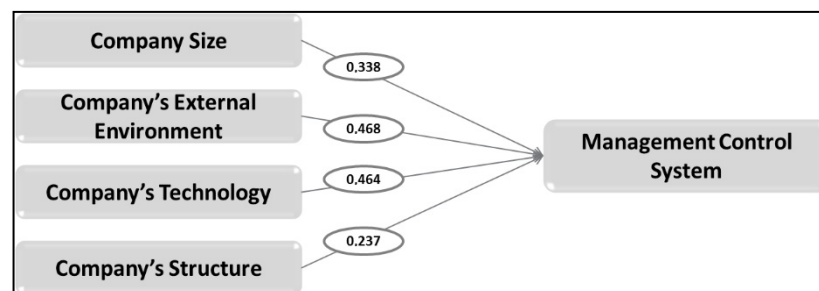


Figure 2. Final validated research model. Source: elaborated by the authors.

5. Conclusions

MCS have long been a focal point of academic inquiry, prompting ongoing discussions about their effectiveness and the development of supporting theories. Our research on the interplay between organizational contingency factors and MCS within Moroccan industrial firms emphasizes the vital role of strategic adaptation for enhancing organizational performance. The findings indicate that variables, such as firm size, technological capability, operating environment, and organizational structure, significantly influence the sophistication and effectiveness of the implemented MCS. This aligns with contingency theories, particularly the works of recent scholars like Bedford et al. [33], who explored the nuanced impact of contextual factors on management practices, and highlighted the importance of adaptability in dynamic environments.

This study explores the influence of organizational contingency factors, namely, company size, environmental uncertainty, technological capability, and organizational structure, on the design and effectiveness of MCS in Moroccan industrial companies. Grounded in contingency theory, our findings underscore the necessity for MCS to be tailored to the specific organizational characteristics and environmental contexts. The results reveal that Moroccan firms operating in dynamic, uncertain environments, and with advanced technological systems are more inclined to implement sophisticated, adaptive MCS. This aligns with the recent literature, which has suggested that flexible and participative control systems are critical for maintaining competitiveness in volatile markets.

5.1. Theoretical Implications

This study contributes to contingency theory by applying it to a non-Western, emerging market context, an area previously underrepresented in the literature. Our findings provide empirical evidence supporting the premise that MCS must be contextually adapted to fit the specific organizational and environmental factors, particularly within emerging markets. This research advances contingency theory by emphasizing the unique characteristics of Moroccan industrial firms, including their regulatory environment, technological adoption levels, and market dynamics. These findings highlight that the structural and contextual variations present in Moroccan industrial companies shape MCS practices differently from those in Western economies, suggesting the need for a broader and more adaptable contingency framework that considers regional distinctions.

5.2. Practical Implications

For practitioners, particularly managers and policymakers within Moroccan industrial firms, this study provides actionable insights into optimizing MCS for enhanced performance and responsiveness. By aligning MCS with specific contingency factors, such as adopting participative systems in uncertain environments or leveraging technology to streamline control processes, firms could improve their decision-making agility and operational efficiency. Our results also suggest that larger companies may benefit from more formalized MCS to manage their complex structures, while smaller firms in stable environments could effectively use simpler control mechanisms. These insights are especially valuable for firms in emerging economies seeking to adapt to shifting market demands and leverage MCS as a strategic tool to maintain competitiveness.

5.3. Research Limitations

Despite these contributions, this study has several limitations that future research could address. First, our focus on Moroccan industrial firms may limit the generalizability of the findings to other sectors or regions. Cross-industry or cross-country comparisons could reveal whether similar contingency effects are present in other emerging economies or sectors. Additionally, this research employs cross-sectional data, capturing a single point in time, which restricts our understanding of how MCS evolve in response to dynamic changes. Longitudinal studies could provide insights into the temporal effects of contingency factors on MCS adaptation.

Another limitation is the reliance on quantitative methods, which, while effective for identifying relationships, may overlook the nuanced ways in which contingency factors influence MCS design and implementation. A mixed-methods approach that incorporates qualitative data, such as case studies or interviews, could offer a richer understanding of how firms interpret and respond to contingency factors. Lastly, other influential factors, such as organizational culture and leadership style, were not included in our model but could significantly impact MCS design and effectiveness.

However, when interpreting the correlation results, it is essential to bear in mind the influence of the low-amplitude scales (five-point Likert) used to measure our variables. Restricted scales can inflate correlation coefficients due to limited response variability, which may exaggerate the strength of the observed relationships. Future studies could benefit from the use of broader or alternative scales to verify these results.

5.4. Research Prospects

Building on these limitations, several avenues for future research emerge. First, comparative studies across different emerging markets would be valuable for identifying whether specific regional or cultural factors consistently shape MCS adaptation. Such research could extend the contingency framework by examining how the national context influences MCS practices in countries with similar developmental stages or industrial profiles. Further, as digital transformation reshapes management practices, future studies could investigate how Industry 4.0 technologies, such as automation, AI, and data analytics, impact MCS

design and functionality. Research into the role of digital tools in fostering agile MCS would be particularly relevant for companies navigating fast-paced environments. Additionally, examining sector-specific MCS practices, especially within industries facing unique external pressures, would help managers tailor MCS strategies to their operational realities.

Finally, as markets become more volatile, there is a growing need to explore agile MCS that would allow firms to respond swiftly to external changes. Future research could assess the effectiveness of agile MCS models within various organizational contexts, offering insights into the best practices for designing adaptable MCS in increasingly unpredictable environments.

In conclusion, this study makes significant theoretical and practical contributions by shedding light on how organizational contingency factors shape MCS design and effectiveness within Moroccan industrial firms. While limitations exist, this study provides a foundation for future research on MCS adaptation in emerging economies and opens avenues for exploring the integration of digital tools, sector-specific approaches, and agile practices in MCS design. Through these continued efforts, research could further enhance our understanding of how MCS can be optimized to improve responsiveness, competitiveness, and adaptability in dynamic and diverse industrial contexts.

Author Contributions: Conceptualization, H.H. and O.M.; methodology, H.H.; software, H.H.; validation, H.H., O.M. and M.P.; formal analysis, H.H.; investigation, H.H. resources, H.H.; data curation, H.H.; writing—original draft preparation, H.H.; writing—review and editing, H.H., O.M. and M.P.; visualization, H.H., O.M. and M.P.; supervision, H.H., O.M. and M.P.; project administration O.M.; funding acquisition, O.M. and M.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval are not required for this study as per Moroccan national legislation [Law No. 09-08 on the Protection of Individuals], because data collected through questionnaires does not involve sensitive personal data or private individual information.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data will be made available on reasonable request by contacting the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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