







“How structural and behavioral factors influence performance in Moroccan public institutions: The mediating role of management control practices”

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HOW STRUCTURAL AND BEHAVIORAL FACTORS INFLUENCE PERFORMANCE IN MOROCCAN PUBLIC INSTITUTIONS: THE MEDIATING ROLE OF MANAGEMENT CONTROL PRACTICES

Abstract

This study explores the modernization of governance in Moroccan public sector institutions by analyzing the adoption of modern management control practices and their impact on organizational performance. Specifically, it examines how clearly defined structural factors (e.g., technological capabilities, organizational size, and age) and behavioral factors (e.g., leadership style and internal motivation) influence the implementation of these practices. The study also assesses how the effective use of such practices relates to performance outcomes. Data were collected through a structured survey administered to 100 Moroccan public establishments between 2023 and 2024, targeting key managerial profiles (such as finance directors and department heads). Structural equation modeling (SEM) was applied to test the hypothesized relationships. The findings reveal that behavioral factors, particularly leadership style, have a significant positive influence on the adoption of modern management control practices. Technological capabilities also play a facilitating role, whereas structural characteristics such as organizational age and size do not show statistically significant effects. Moreover, external control mechanisms exert a dual influence: they encourage compliance-oriented practices but may hinder more interactive and adaptive uses. The study confirms that the effective implementation of modern management control practices is positively associated with enhanced organizational performance. These results underscore the central role of behavioral and technological factors in promoting performance-driven reforms in the public sector.

Keywords

leadership, innovation, performance, control, structure, behavior, public sector, Morocco

JEL Classification

M41, H83, D23, L32

INTRODUCTION

In recent years, the Moroccan public sector has experienced profound transformations driven by wide-ranging institutional reforms aimed at modernizing public governance. These reforms align with a global shift toward greater resource optimization, performance accountability, and transparency in public action. A key milestone in this trajectory was the enactment of the Organic Law on Finance (LOF) in 2015, which formally introduced results-based management as a foundational principle of public financial governance in Morocco.

In this evolving institutional landscape, Moroccan public establishments ranging from public administrative bodies to industrial and commercial state-owned enterprises are increasingly required to rethink their managerial approaches. One major area of change is man-

agement control, which has evolved from a technical, budget-focused function to a more strategic tool for steering organizational performance. However, the adoption and effectiveness of modern management control practices vary significantly across public entities, depending on several structural factors (e.g., organizational age, size, and technological capabilities) and behavioral factors (e.g., leadership style, managerial competencies, and internal communication dynamics).

Recent empirical studies conducted in the Moroccan context support the relevance of this multidimensional perspective. For example, Hammouch et al. (2024) demonstrated that in industrial firms, variables such as size, technological infrastructure, and structural complexity significantly influence the use of advanced control systems. Similarly, Izenzal and Benazzi (2024) found that in local government institutions, leadership orientation, technical expertise, and external pressures, such as citizen demands, encourage the implementation of performance-oriented tools like the Balanced Scorecard.

Despite these insights, a significant research gap persists. Few studies have integrated both structural and behavioral determinants in explaining the adoption and interactive use of modern management control methods within public sector organizations. This is particularly problematic because the effectiveness of such tools, especially in their interactive form, depends on an organization's ability to foster strategic dialogue, learning capabilities, and adaptive decision-making (Simons, 1995; Henri, 2006).

This study addresses this gap by investigating how structural and behavioral factors influence the implementation of modern management control practices in Moroccan public establishments, and how their interactive use contributes to improved organizational performance. Grounded in contingency theory, this paper proposes a contextualized conceptual model that identifies the conditions under which management control practices effectively enhance performance in the public sector. By doing so, the study provides new insights into the modernization of public management in emerging economies.

1. LITERATURE REVIEW

Since the 1970s, the relevance of strictly financial performance indicators has been increasingly questioned in both academic literature and managerial practice. Several pioneering studies (Kaplan & Johnson, 1987) highlighted their tendency to promote short-termism, result manipulation, and risk-averse managerial behavior. Often overly aggregated and retrospective, these indicators appear ill-suited for strategic decision-making in increasingly complex, uncertain, and turbulent organizational environments. This criticism remains relevant today: recent research shows that traditional measurement systems, focused on financial performance, fail to reflect the underlying drivers of value creation in contemporary organizations (Gao, 2015; Bazarouj & Alaoui, 2019; Raucci & Tarquinio, 2020; Bazarouj et al., 2024).

Given these limitations, the shift toward more learning-oriented, agile, and innovation-driven organizations calls for the adoption of control systems that integrate qualitative, strategic, and be-

havioral dimensions. In this context, alternative methods such as the Balanced Scorecard (Kaplan & Norton, 1992, 2001) and Activity-Based Costing (ABC) have been developed to better align managerial decisions with the real drivers of performance (Abeysekera & Sharma, 2023; Stouthuysen et al., 2014). These approaches go beyond the limitations of traditional systems by enhancing the alignment between strategic objectives, resource mobilization, and stakeholder expectations, particularly in the public sector.

At the same time, management control research has emphasized the importance of contingency factors in explaining the diversity of control practices. Organizational performance does not stem from the uniform application of standardized tools but rather from their alignment with the contextual characteristics of each organization (Fernandes et al., 2023; Nassou & Bennani, 2024). Two major types of contingencies are traditionally distinguished (Chenhall, 2003). On the one hand, there are structural contingencies such as age, size, technological level, and degree of external con-

trol, as recently demonstrated in the Moroccan context by Hammouch et al. (2024). On the other hand, one observes behavioral contingencies such as leadership style and manager profile, whose influence on control system usage is now well established in the contemporary literature.

The management control literature has consistently emphasized the relevance of structural factors such as age, size, technology, and external control, which significantly shape the design and use of management control systems.

The relationship between organizational age and management control practices remains complex and nuanced. On the one hand, institutional maturity fosters increased formalization of management systems, reflecting the stabilization of decision-making routines and organizational learning effects (Davila & Foster, 2007). On the other hand, various studies challenge this perspective, noting that organizational longevity may also lead to structural inertia and hinder managerial innovation, especially in bureaucratic environments (Ngongang & Njojo, 2018; Chenhall & Moers, 2007). Therefore, age cannot be viewed as an autonomous determinant; its impact must be interpreted in interaction with other contextual variables such as strategic orientation, sectoral environment, or organizational adaptability.

Organizational size also plays a significant structural role in shaping control systems. Several studies have established a positive correlation between workforce growth and the sophistication of management tools, particularly in relation to the use of non-financial indicators and the formalization of processes (Germain & Gates, 2010; Ahsina et al., 2014). Larger organizations, faced with greater operational complexity, tend to articulate their strategic objectives more explicitly (Meyssonier, 2019). However, this relationship is neither universal nor linear. Research in the Moroccan context shows that size does not necessarily predict the adoption of advanced tools such as the Balanced Scorecard (Ibrahimi & Naym, 2019; Lhassan et al., 2024). Moderating variables such as organizational culture, strategic focus, or degree of institutional formalization influence this relationship (Chenhall, 2003; Davila & Foster, 2007). Thus, size should be understood within an interdependent

framework that includes internal dynamics and managerial orientations.

Technology, meanwhile, has become a pivotal driver in the transformation of management control practices, extending well beyond the mere automation of tasks. The integration of ERP systems, big data, and artificial intelligence has improved information flows, reinforced decision-making structures, and fostered more strategic control frameworks (Meyssonier, 2019). However, this integration also presents challenges, notably those concerning user adoption, data governance, and the interpretation of algorithmic outputs (Arnaboldi et al., 2017; Bhimani & Willcocks, 2014). The emergence of the “hybrid” management controller, both technician and strategist (Mawadia et al., 2016), illustrates this evolution, although such profiles remain relatively rare in the public sector, where budgetary constraints and organizational culture often limit technological innovation. Consequently, the impact of technology on control systems depends on the level of digital maturity, the availability and competence of human capital, and the overarching innovation strategy pursued.

Lastly, external control serves as a central normative factor, particularly in public institutions that face increasing demands for accountability. Through audits, regulatory reviews, and oversight by supreme audit institutions, external control contributes to reinforcing procedural formalization and strengthening managerial responsibility (Van Helden & Reichard, 2019). Yet, this influence can also be restrictive: imposed standardization may lead to passive compliance, discourage initiative-taking, and generate administrative overload (Modell, 2004; Julnes & Holzer, 2001; Ter Bogt, 2008). Furthermore, the dominance of diagnostic control logic (Simons, 1995) may constrain adaptability and the capacity for strategic learning, both of which are essential in dynamic environments (Henri, 2006). As highlighted by Ter Bogt and Scapens (2012), external control should thus be viewed not merely as an evaluative mechanism, but rather as a potential lever for dialogue, organizational adaptation, and professionalization.

In sum, the combined analysis of these structural factors underscores the importance of adopting a

contingency-based approach, one that takes into account the complex interplay of internal and external variables to better understand how management control systems are structured in contemporary organizations.

Beyond these structural variables, contemporary management control research highlights the critical role of behavioral factors, particularly leadership style and managerial profile, in the implementation and effectiveness of control systems. These behavioral variables do not operate in isolation; rather, they interact dynamically with organizational factors to influence how control tools are used, interpreted, and embedded.

To begin with, the literature acknowledges the influence of leadership on the selection and appropriation of control instruments, although this relationship should not be interpreted through a simplistic causal lens. Pioneering contributions, such as those by Otley and Pierce (1996), have underscored the limiting effects of authoritarian leadership, especially when grounded in a rigid budgetary logic. However, other research offers a more nuanced perspective, suggesting that such a style may prove effective in highly regulated contexts or crisis situations where reactivity and centralized decision-making are crucial.

In contrast, leadership styles oriented toward participation, collaboration, and collective engagement are often associated with a more interactive use of control tools. Such approaches foster management practices that promote organizational learning and enhance the ownership of control mechanisms by teams (Henri, 2006; Germain & Gates, 2010). Nevertheless, their implementation requires an organizational culture conducive to dialogue, a sufficient degree of decentralization, and real managerial autonomy conditions that are not always met, particularly in highly hierarchical public administrations.

In this regard, the leadership typology proposed by Yukl et al. (2002), which distinguishes between task-oriented, relationship-oriented, and change-oriented styles, offers a relevant analytical framework. Still, its application must remain cautious and context-sensitive. For example, transformational leadership, often praised in the literature

(Shao, 2019), may encounter institutional resistance or structural constraints that limit its practical reach.

Moreover, the manager's profile also constitutes a key behavioral variable. Their academic background, professional experience, and strategic vision significantly influence both the adoption and use of management control systems. Empirical studies have shown that leaders trained in management or economics are more likely to adopt sophisticated tools such as balanced scorecards or non-financial performance indicators (Chapellier, 1997; Bernard, 2010; Chapellier et al., 2013). This trend is explained by a stronger conceptual understanding of control instruments and a heightened awareness of multidimensional performance issues.

However, academic capital alone cannot fully explain managerial behavior. Professional experience is also a structuring factor, provided that its contextual nature is considered. Leaders with backgrounds in competitive, complex, or results-driven environments generally show greater openness to managerial innovation and formal systems (Martel et al., 1985; Nelson, 1987). In contrast, those from more bureaucratic settings may exhibit a form of conservatism that hinders the adoption of modern management practices (Nadeau et al., 1988).

Beyond these objective attributes, the way a leader perceives the role of management control is critical. Chenhall (2003) emphasizes that personal traits, strategic beliefs, and social representations of control tools act as cognitive filters, shaping their interpretation and practical application. Managers do not merely apply control systems; they construct, adapt, and legitimize them based on their vision and perceived challenges.

As a result, the effectiveness of management control does not stem from an ideal leadership style or profile, but rather from the leader's ability to align their behavior and competencies with the specific characteristics of their organization.

While structural and behavioral contingency factors strongly influence the use of interactive management control systems, their impact on

organizational performance is neither direct nor uniform. In practice, the effective contribution of this interactive use to performance improvement depends largely on the sector of activity and the nature of the missions carried out, which play a decisive moderating role in this relationship.

Interactive control, as a strategic lever, is widely recognized for its ability to foster organizational learning, innovation, and responsiveness in the face of uncertainty (Abernethy & Brownell, 1999; Henri, 2006). Nevertheless, its effectiveness varies significantly depending on the level of complexity and dynamism of the environment in which the public organization operates.

In sectors characterized by high external variability, such as healthcare or higher education, where decisions must be continuously adjusted in response to contextual changes, interactive control proves particularly relevant. It enables cross-functional dialogue, continuous sharing of critical knowledge, and collective revision of strategic assumptions. These features are essential for fostering double-loop learning and ensuring continuous adaptability in decision-making processes.

On the other hand, in more stable, highly regulated environments with limited managerial autonomy, such as central administrations or public entities with strictly administrative missions, management practices tend to favor more formal control systems oriented toward compliance, traceability, and procedural efficiency (Van der Stede, 2001; Chenhall & Moers, 2007). In such settings, diagnostic control tends to prevail, limiting opportunities for strategic interaction and relegating interactive control to a marginal or even symbolic role.

Moreover, the diversity of public sector structures further reinforces this heterogeneity. In service domains subject to performance-based logic or competitive pressures such as public industrial and commercial establishments (EPICs), autonomous utilities, or state-owned enterprises operating in sectors like water, electricity, or transportation, interactive control is perceived as a strategic adaptation tool, enabling the anticipation of user needs and enhancing organizational responsiveness (Porter, 1985). In contrast, in organizations

operating under monopoly conditions or rigid procedural frameworks, the implementation of interactive control is often hindered by institutional isomorphism and normative pressures (DiMaggio & Powell, 1983).

At the conclusion of this literature review, it becomes clear that the effectiveness of management control systems and particularly their interactive use depends on a complex interplay of structural factors (such as size, age, technology, or external oversight) and behavioral factors (notably leadership style and managerial profile). These variables influence not only the adoption of control tools but also their appropriation and strategic utility within public sector organizations.

However, the impact of this interactive use on organizational performance cannot be considered homogeneous. It is shaped by moderating factors such as the sector and the nature of activity, which define managerial logics and the degrees of strategic flexibility available.

Based on these observations, our research model aims to investigate the combined impact of structural and behavioral factors on organizational performance, incorporating the interactive use of management control systems as a mediating variable and the sector and nature of activity as a moderating variable. This framework enables a more nuanced exploration of the conditions under which control practices can effectively contribute to the performance of public establishments.

Within this framework of reflection, the following hypotheses can be formulated:

H1: Structural factors (such as size, technology, organizational age, and external control) are likely to influence management control practices.

H2: Behavioral factors (such as leadership style and managerial profile) are likely to influence management control practices.

H3: The interactive use of modern management control methods improves organizational performance through innovation, learning, and adaptability.

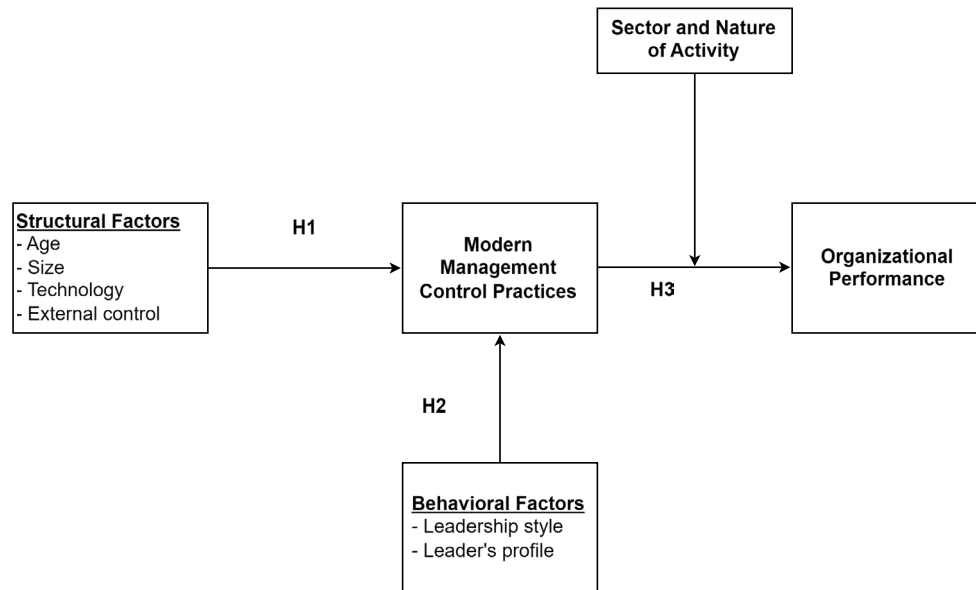


Figure 1. Conceptual research framework

H4: The effectiveness of interactive control in enhancing organizational performance in public establishments is moderated by the nature and sector of their activities.

2. METHOD

This study adopted a quantitative design based on a structured survey. To ensure representativeness, a stratified sampling approach was used to include various Moroccan public establishments across key sectors such as health, education, and infrastructure, and across different legal statuses (e.g., administrative bodies, state-owned enterprises). From an initial population of 227 public institutions, 100 valid responses were collected (44% response rate), primarily from financial directors, department heads, and internal controllers.

Regarding the measurement instruments, the questionnaire, built on prior validated scales, covered constructs such as leadership, technological capabilities, control practices, and perceived performance. Moreover, it was pre-tested with local experts to ensure clarity and relevance. In terms of ethics, all protocols were strictly followed, including obtaining informed consent and maintaining confidentiality. Finally, data analysis was conducted using SmartPLS 4, following a two-step process: first, verifying the reliability and validity of measurement constructs, and second, test-

ing the structural model to assess hypothesized relationships.

2.1. Sample characteristics

This empirical study focuses on Moroccan public establishments and their diversity across several key dimensions, as detailed in Table 1.

In terms of organizational age, the sample includes 10 relatively new institutions (less than 5 years old), 34 establishments aged between 5 and 20 years, and 56 institutions with over 20 years of operational history. This age distribution enables the study to explore how management control practices evolve across maturity levels.

Regarding organizational size (measured by the number of employees), 11 establishments employ fewer than 100 people, 23 have between 100 and 1,000 employees, and the majority, 66, have more than 1,000 employees. This range provides a useful context for examining the relationship between institutional capacity and the adoption of modern management control practices.

Sectoral distribution also reveals significant variation. The social sector, which includes health, education, and training institutions, accounts for 40% of the sample, reflecting the centrality of these domains in Moroccan public service delivery. This is followed by infrastructure and transportation

(18%), housing and urban planning (15%), agriculture and maritime fishing (12%), energy, mining, water, and environment (8%), and tourism and handicrafts (7%). This broad sectoral coverage enhances the relevance of the findings by capturing sector-specific constraints and enablers in management control implementation.

Furthermore, the study distinguishes between commercial and non-commercial public establishments. Specifically, 23% of the surveyed institutions engage in revenue-generating (commercial) activities, while the remaining 77% are non-commercial administrative bodies. This distinction is particularly relevant to the research objectives, as it allows the analysis to account for differences in performance expectations, financial autonomy, and accountability mechanisms.

In summary, the diversity of the surveyed institutions in terms of age, size, sector, and legal orientation ensures a comprehensive understanding of how contextual characteristics shape the adoption and use of modern management control practices within the Moroccan public sector.

The descriptive analysis of leader training among surveyed public establishment leaders in Morocco (Table 2) reveals a clear distinction between those with managerial and non-managerial backgrounds. Specifically, 52 leaders possess managerial training, equipping them with skills in areas such as strategic management, finance, human resource management, and marketing. This background suggests a solid understanding of management principles, enabling informed decision-making, effective resource management, and the achievement of organizational goals.

In contrast, 48 leaders lack formal managerial training, which may imply that their experience stems from other fields or specialized knowledge in particular sectors.

Regarding leadership experience, 21 leaders have less than 4 years of experience, indicating that they are relatively new to their roles and may still be in the process of learning and adapting. While these leaders may bring fresh perspectives, their limited experience could present challenges in managing an organization.

Table 1. Characteristics of the surveyed establishments

The characteristics of the surveyed establishment		Frequency	Percentage (%)
Age	Less than 5 years	10	10.0
	From 5 to 20 years	34	34.0
	More than 20 years	56	56.0
Size	Less than 100 employees	11	11.0
	From 100 to 1,000 employees	23	23.0
	More than 1,000 employees	66	66.0
Activity	Social, Health, Education, and Training	40	40.0
	Housing, Urban Planning, and Territorial Development	15	15.0
	Agriculture and Maritime Fishing	12	12.0
	Energy, Mining, Water, and Environment	8	8.0
	Infrastructure and Transportation	18	18.0
	Tourism and Handicrafts	7	7.0
Nature of Activity	Commercial Activity	23	23.0
	Non-commercial Activity	77	77.0

Note: n = 100.

Table 2. Respondent profile

Respondent profile		Frequency	Percentage (%)
Leader's Training	Management	52	52.0
	Non-management	48	48.0
Years of experience	Less than 4 years	21	21.0
	More than 4 years	79	79.0

Note: n = 100.

Conversely, 79 leaders have over 4 years of experience, reflecting substantial expertise and a deeper understanding of the operations of public establishments. These experienced leaders are likely to have a strong grasp of the specific challenges and opportunities faced by their organizations, along with proven management skills to address them effectively.

2.2. Data collection tools

To collect data, a structured questionnaire was developed based on measurement items adapted from prior research, ensuring both scientific validity and contextual relevance. The operationalization of the contingency variables draws primarily on the works of Meyssonier (2019), with adjustments made to account for the specific characteristics of Moroccan public establishments and their leaders. For structural contingency factors, the variables retained include age, size, technology, and external control. For behavioral contingency factors, the focus is on leadership characteristics, specifically leadership style and leader profile. The operationalization of modern management control practices is based on the framework developed by Simons (1995), while organizational performance is measured using indicators inspired by Kaplan and Norton's (1992) Balanced Scorecard. A five-point Likert scale was applied to most variables, particularly the latent constructs, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

3. RESULTS

The structural model was analyzed using SmartPLS 4, a software tool designed for structural equation modeling, to examine the hypothetical relationships among various factors. Specifically, the analysis focused on structural contingency factors such as age, size, technology, and external

control, as well as behavioral contingency factors, including leadership style and the leader's profile. Additionally, the study investigated the impact of modern management control practices on the dependent variable, which in this case is the performance of Moroccan public establishments.

As shown in the results of our structural equation analysis (Table 3), and more specifically during the model validation phase, the measurement model demonstrates strong internal consistency and convergent validity. Firstly, the Cronbach's Alpha (CA) values for all key constructs, namely behavioral factors, modern management control practices, organizational performance, and structural factors, are all above the recommended threshold of 0.7, indicating good internal reliability.

In addition, both the Composite Reliability (CR) and Rho_A coefficients also exceed 0.7 for all variables, further confirming the reliability of the constructs. Furthermore, the Average Variance Extracted (AVE) values are all above 0.5, which signals that a substantial proportion of variance in the indicators is captured by the latent constructs.

Taken together, these indicators provide robust evidence of convergent validity, consistent with the criteria established by Hair et al. (2006) and widely accepted in management research. The measurement model can thus be considered both reliable and valid for the structural analysis.

Furthermore, the results of the discriminant validity test, using the Fornell-Larcker criterion, show that the diagonal values are greater than all the off-diagonal values, confirming the discriminant validity of the scale. This indicates that the measured elements are highly correlated with their respective constructs and demonstrate weak correlations with other constructs. As a result, the data support the scale's capacity to effectively dif-

Table 3. Reliability and convergent and discriminant validity

Construct	CA	CR	rho_a	AVE	BF	MMCP	OP	SF
BF	0.806	0.883	0.871	0.566	0.852			
MMCP	0.947	0.949	0.954	0.656	0.828	0.810		
OP	0.853	0.871	0.894	0.590	0.628	0.722	0.768	
SF	0.834	0.821	0.868	0.838	0.158	0.112	-0.043	0.692

Note: SF = structural contingency factors; BF = behavioral contingency factors; MMCP = modern management control practices; OP = organizational performance.

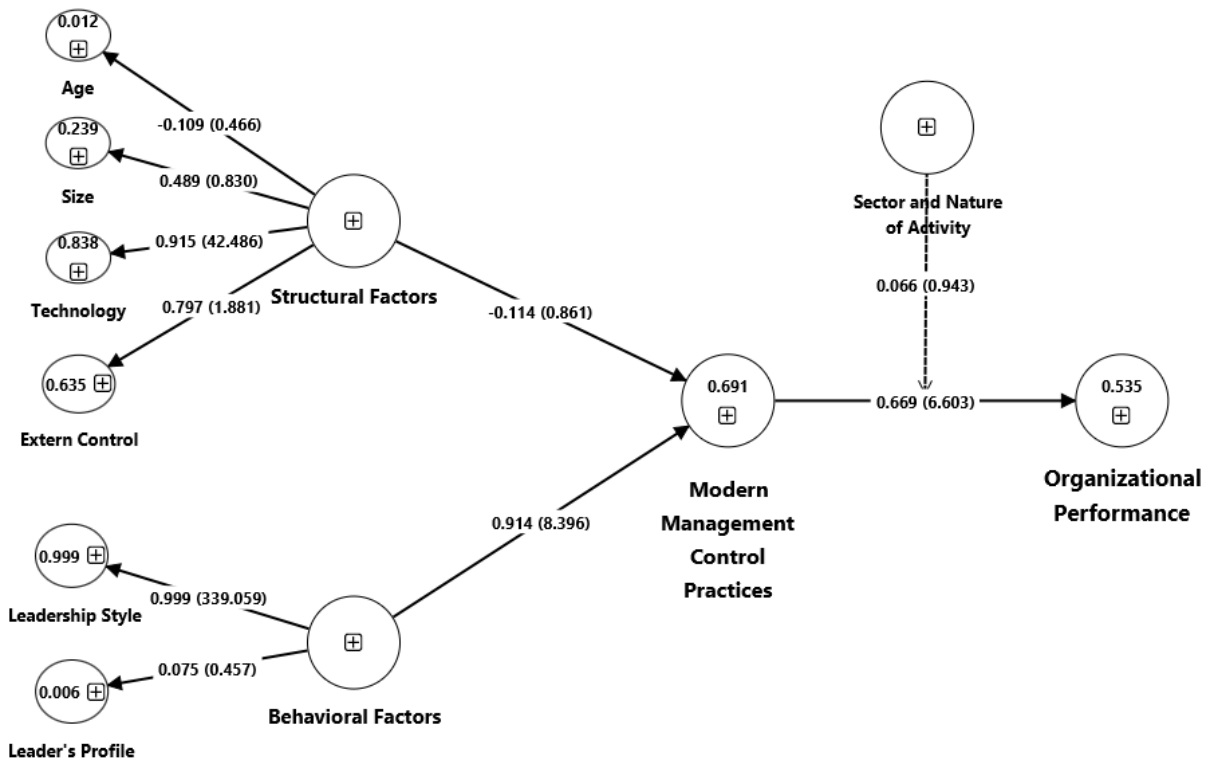


Figure 2. Adjusted structural model (Bootstrapping output)

Table 4. Results of R2 and Q2

Construct	R ²	Q ²	Interpretation
Modern management control practices	0.691	0.743	Significant
Organizational performance	0.535	0.612	Significant

ferentiate between variables, thus confirming the discriminant validity of the measurement model.

The results presented in Table 4 confirm the robustness of the structural model. To begin with, the R² values for the two endogenous constructs, modern management control practices and organizational performance, are 0.691 and 0.535, respectively. Since both values exceed the commonly accepted threshold of 0.500, they indicate a strong explanatory power of the model for these dependent variables. In addition to

explanatory strength, the model also demonstrates predictive relevance. Indeed, all Q² values are positive, which, in accordance with the guidelines of Hair et al. (2006), supports the predictive validity of the endogenous constructs within the PLS framework. Moreover, the model's global goodness-of-fit (GoF) index is computed at 0.677. According to the benchmark values suggested by Wetzels et al. (2009), where a GoF exceeding 0.36 is considered substantial, this result confirms a satisfactory model fit, reinforcing the overall quality and robustness of the structural model.

Table 5. Bootstrap results of the first hypothesis

Hypothesis	O	M	STDEV	T statistics	P values
H1 SF → MMCP	-0.114	-0.085	0.132	0.861	0.389
H1.1 A → MMCP	-0.055	-0.058	0.080	0.689	0.491
H1.2 S → MMCP	-0.043	-0.036	0.069	0.626	0.531
H1.3 T → MMCP	0.339	0.350	0.119	2.860	0.004
H1.4 EC → MMCP	0.404	0.405	0.112	3.592	0.000

Note: SF = structural contingency factors; A = age; S = size; T = technology; EC = external control; MMCP = modern management control practices.

The analysis results presented in Table 5 indicate that structural factors do not have a statistically significant impact on the use of modern management control practices in Moroccan public establishments. Indeed, the relationship is characterized by a negative path coefficient ($\beta = -0.114$), a t -value of 0.861, and a p -value of 0.389, which leads to the rejection of the main hypothesis H1. This suggests that, in this context, structural factors as a whole do not meaningfully influence the adoption of modern management control tools.

Furthermore, the sub-hypotheses H1.1 and H1.2, which examine the influence of age and size, respectively, are also rejected. Specifically, age presents a path coefficient of $\beta = -0.055$, $t = 0.689$, and $p = 0.491$, while size shows $\beta = -0.043$, $t = 0.627$, and $p = 0.531$. These values confirm the absence of a statistically significant relationship, indicating that neither the age nor the size of the organization has a discernible impact on the use of modern control practices.

However, not all structural dimensions yield insignificant results. On the contrary, the analysis reveals that technology (H1.3) and external control (H1.4) exert statistically significant and positive effects on modern management control practices. For technology, the path coefficient is $\beta = 0.339$, with a t -value of 2.860 and a p -value of 0.004, suggesting that technological advancements facilitate the implementation of modern control practices by enhancing integration, automation, and decision-support systems.

Similarly, external control shows a strong positive influence on modern management control practices, with a path coefficient of $\beta = 0.404$, $t = 3.592$, and $p < 0.001$. This highlights the crucial role of

regulatory frameworks, accountability mechanisms, and external oversight in driving the adoption of modern management control tools within public organizations.

The results for the second hypothesis (H2), presented in Table 6, reveal a statistically significant and positive relationship between behavioral factors and the use of modern management control practices, with a path coefficient of $\beta = 0.914$, $t = 8.395$, and $p < 0.001$. These findings provide strong empirical support for H2, indicating that behavioral factors have a significant influence on the adoption and implementation of modern control tools.

Regarding the sub-hypotheses, the first (H2.1), which examines the effect of leadership style on modern management control practices, is also supported. The results show a strong and significant impact ($\beta = 0.922$, $t = 8.862$, $p < 0.001$), indicating that leadership style plays a critical role in promoting the use of modern management practices within organizations.

Conversely, the second sub-hypothesis (H2.2), which explores the effect of the leader's profile on modern management control practices, is not supported. The path coefficient is $\beta = 0.071$, with a t -value of 0.852 and a p -value of 0.394, indicating a non-significant relationship. Therefore, the leader's profile does not appear to have a direct influence on the adoption of modern management control practices in this study.

The analysis of the direct effect of the use of modern management control practices on organizational performance (Table 7) yields a statistically

Table 6. Bootstrap results of the second hypothesis

	Hypothesis	O	M	STDEV	T statistics	P values
H2	BF → MMCP	0.914	0.908	0.109	8.395	0.000
H2.1	LS → MMCP	0.922	0.916	0.104	8.862	0.000
H2.2	LP → MMCP	0.071	0.037	0.084	0.852	0.394

Note: BF = behavioral contingency factors; LS = leadership style; LP = leader profile; MMCP = modern management control practices.

Table 7. Bootstrap results of the third hypothesis

	Hypothesis	O	M	STDEV	T statistics	P values
H3	MMCP → OP	0.669	0.677	0.101	6.603	0.000

Note: MMCP = modern management control practices; OP = organizational performance.

Table 8. Bootstrap results of the fourth hypothesis (Moderation)

	Hypothesis	O	M	STDEV	T statistics	P values
H4	SNA x MMCP → OP	0.066	0.068	0.070	0.943	0.346

Note: SNA = sector and nature of activity; MMCP = modern management control practices; OP = organizational performance.

significant result ($\beta = 0.669$, $p < 0.001$). This strong standardized coefficient indicates a positive and substantial relationship between the two variables. In other words, a higher level of adoption and use of modern management control practices is associated with improved organizational performance. These findings support the formulated hypothesis and align with previous research emphasizing the strategic role of modern control tools in enhancing decision-making, resource allocation, and performance monitoring. The empirical evidence thus confirms that the effective implementation of these practices constitutes a key performance lever within contemporary organizational contexts.

The results presented in Table 8 indicate that the moderation hypothesis is not supported. Indeed, the p -value obtained is 0.346, which clearly exceeds the conventional significance threshold ($p < 0.05$), thereby leading to the rejection of the hypothesis concerning the moderating role of the sector and nature of activity in the relationship between modern management control practices and organizational performance. Moreover, this result is further reinforced by the low and non-significant standardized Beta coefficient of $\beta = 0.066$, suggesting that the interaction effect between sector and nature of activity and modern management control practices on performance is weak and negligible.

4. DISCUSSION

The findings of this study reveal a differentiated influence of structural and behavioral factors on the adoption and use of modern management control practices in Moroccan public establishments.

Regarding structural factors, the results indicate that organizational age and size do not significantly affect the adoption of modern management control practices. This contrasts with prior research (e.g., Ahsina et al., 2014) that suggests older or larger organizations are more likely to

adopt advanced control systems. In the Moroccan public context, this may reflect a homogenization of practices due to top-down regulatory pressures, which reduce the structural variability traditionally observed in other settings.

In contrast, technological capabilities show a positive and significant influence on the adoption of modern management control practices. Public establishments with more advanced technological infrastructure are better equipped to process and analyze data, enabling a more dynamic and interactive approach to management control. These findings align with existing literature emphasizing the enabling role of digital transformation in enhancing control systems (e.g., Widener, 2007; Kaplan & Norton, 1992).

Conversely, external control mechanisms such as regulatory oversight, audits, and centralized reporting requirements exert a negative influence on the interactive use of modern management control practices. While these mechanisms are essential for ensuring compliance and accountability, they tend to reinforce formalization and rigidity, thereby limiting the adaptive potential of control practices. This confirms the tension identified in earlier works (e.g., Henri, 2006; Van der Stede, 2001) between external coercive pressures and the autonomy needed for strategic learning and innovation.

Turning to behavioral factors, the results show that leadership style plays a significant role in the adoption and use of modern management control practices. Transformational leadership, characterized by openness, innovation, and participative communication, positively correlates with the interactive use of control tools. This supports the findings of Henri (2006) and Simons (1995), who highlight the importance of leadership in fostering a learning-oriented control environment. On the other hand, task-focused or hierarchical leadership styles are more closely associated with diagnostic and compliance-driven control.

Interestingly, other behavioral variables such as leader training or seniority do not show statistically significant effects, suggesting that style and orientation may be more critical than experience or technical qualifications alone.

The results related to the third hypothesis confirm that differentiated use of modern management control practices, such as Balanced Scorecard and Activity-Based Costing, positively influences organizational performance. This is consistent with a broad body of literature (e.g., Kaplan & Johnson, 1987; Talbot, 1999; Bazarouj & Alaoui, 2019) which argues that performance improvements in public institutions are more likely when control systems are adapted to contextual realities and used as strategic rather than merely operational tools.

In contrast, the fourth hypothesis, which tested the moderating effect of sector and nature of activity on the relationship between the use of modern management control practices and performance, was not supported. Unlike previous studies con-

ducted in other institutional settings (e.g., Modell, 2004; Ter Bogt, 2008; DiMaggio & Powell, 1983), our data do not reveal any significant interaction effect in the Moroccan public context. This may reflect the relative uniformity of public management frameworks in Morocco, or institutional and cultural variables that reduce the impact of sector-specific dynamics. This finding suggests that the transferability of international models must be approached with caution, and that locally grounded factors may mediate the effectiveness of control practices in subtle ways.

Overall, this study enriches the literature by demonstrating that while certain structural variables may have limited explanatory power, behavioral factors and technological capabilities are central to the successful implementation of modern management control systems. Furthermore, it calls for a better understanding of how institutional contexts shape the interplay between management tools and performance outcomes in the public sector of emerging economies.

CONCLUSION

This study examined how structural and behavioral contingency factors influence the implementation of modern management control practices and their impact on organizational performance.

The results reveal that technological capabilities are key enablers, while size and age do not significantly influence adoption. In addition, leadership style emerged as a critical behavioral factor. Moreover, the analysis highlighted a key insight: external control mechanisms promote compliance but may hinder flexibility. This duality suggests a need for more adaptive governance structures that strike a balance between control and innovation. Most importantly, the research confirms that context-sensitive and interactive use of modern management control practices is positively associated with organizational performance. This finding underscores the practical value of tailoring control tools to the specific institutional environment of public organizations.

Based on these results, several implications can be drawn. First, public organizations must invest in digital infrastructure. Second, they should promote adaptive leadership. Finally, it is crucial to rethink overly rigid external control norms that may suppress strategic dialogue and learning. From a theoretical perspective, the study reinforces the relevance of contingency theory in explaining the effectiveness of public management control systems. It also highlights the importance of the interplay between technological, behavioral, and institutional variables. Nonetheless, certain limitations must be acknowledged. The reliance on self-reported data and the cross-sectional nature of the study may affect the generalizability and causal interpretation of the findings. In this regard, future research could adopt longitudinal approaches or mixed-methods designs to explore the dynamic evolution of modern management control practices and their long-term impact. Furthermore, comparative studies across countries and administrative cultures may enrich our understanding of how contextual factors mediate the use and success of control systems in the public sector.

AUTHOR CONTRIBUTIONS

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