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Accounting Information, Management Control, and Strategic Steering: What Is Their Contribution to SME Performance? Empirical Evidence from the DIANA Region (Madagascar)

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***Abstract*— This article examines the extent to which the quality of accounting information systems (AIS) and the institutionalization of management control (MC) contribute—through strategic steering—to the performance of small and medium-sized enterprises (SMEs) in the DIANA region. An integrative model comprising four hypotheses—grounded in contingency theory, agency theory, stakeholder theory, and the resource-based view—was tested using data from 133 respondents across 24 SMEs in the primary, secondary, and tertiary sectors. The analysis employed PLS-SEM, hierarchical regressions, multilevel modeling, and mediation analysis via resampling. AIS quality is strongly associated with strategic steering (β = 0.61), primarily driven by the quality and integration of the information; management control mediates approximately 32% of this effect. The link between strategic steering and performance is weak and conditional, while the indirect effect of accounting information on performance is only significant at the 10% threshold. Consequently, accounting information translates into performance only when it is institutionalized within control routines and leveraged for strategic steering.**

***Keywords*—: accounting information system; management control; strategic steering; organizational performance; SME; mediation; Madagascar**

I. Introduction

In an environment characterized by uncertainty, digitalization, and intensifying competition, information has become a strategic resource, on par with financial or human resources. Accounting information systems (AIS) are no longer limited to the production of financial statements; they also support planning, control, and performance evaluation. Management control systems have undergone a similar evolution—shifting from simple budgetary control toward steering mechanisms that guide behavior and facilitate the implementation of strategy.

These challenges are particularly acute for small and medium-sized enterprises (SMEs), which form the bedrock of the productive sector and employment (Ayyagari, Beck, and Demirgüç-Kunt, 2007). Yet, these firms often operate in environments marked by incomplete information, constrained financial resources, and poorly formalized management practices (Abor and Quartey, 2010). In Madagascar, three interdependent constraints shape the management of such enterprises: the partial informality of accounting practices—persisting despite the regulatory framework of the 2005 General Accounting Plan (Plan comptable général); a lack of organizational structure, with the owner-manager frequently juggling strategic, commercial, and financial roles; and limited access to external financing, which leads lenders to demand collateral rather than reliable information. This creates a vicious cycle: poor-quality accounting information restricts access to financing, while financial constraints limit the resources available for the accounting information system.

The existing literature remains incomplete in three respects. First, it focuses primarily on large corporations and firms in developed or emerging economies (Mitchell and Reid, 2000; Lavia López and Hiebl, 2015). Second, it tends to treat accounting information systems, management control, and performance steering as separate entities, even though these dimensions are, in fact, complementary. Third, there is limited use of mediation models, which would allow for a move beyond the basic question: "What are the effects?" ...to the question "how?" (Baron and Kenny, 1986; Zhao, Lynch, and Chen, 2010). To our knowledge, no quantitative study has tested these relationships in Madagascar, nor in the DIANA region.

The general objective is to explain—from both an explanatory and a predictive perspective—the mechanisms through which accounting information and management control influence performance, mediated by management steering (pilotage). This is broken down into five specific objectives: to develop and validate measurement instruments adapted to the context of Malagasy SMEs; to measure the impact of accounting information system (AIS) quality and the institutionalization of management control on management steering; to evaluate the effect of management steering on financial and non-financial performance; to test the mediating role of management steering by distinguishing between direct and indirect effects; and to formulate recommendations for business leaders, support organizations, and public policymakers.

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This article addresses the following question: to what extent do the quality of accounting information systems and the degree of institutionalization of management control contribute—via strategic management steering—to the organizational performance of SMEs in the DIANA region? It presents, in turn, the theoretical framework and hypotheses, the methodology, the results, a discussion of these findings, the study's limitations, the author's scientific contributions, and, finally, the implications.

II. Theoretical Framework And Hypotheses

2.1. Constructs and Theoretical Grounding

Four constructs structure the model. Management Information System (MIS) quality refers to the extent to which the system—comprising data entry, processing, and output—produces information that is reliable, comprehensive, integrated across functions, and available in a timely manner (DeLone and McLean, 1992; Wang and Strong, 1996; Chapman and Kihn, 2009). It is broken down into information quality (IQ), integration (INT), and technological maturity and competencies (TMC). The institutionalization of management control (MC) refers to the embedding of budgets, dashboards, cost calculations, and variance analyses into organizational routines, as well as the legitimacy these tools acquire—going beyond their mere formal existence (Burns and Scapens, 2000). The effectiveness of strategic management (SM) is defined as the capacity to formalize strategy, leverage information for decision-making, and monitor the achievement of objectives (Simons, 1995; Ferreira and Otley, 2009). Organizational performance (PER) is multidimensional, encompassing both financial and non-financial aspects (Venkatraman and Ramanujam, 1986; Kaplan and Norton, 1996).

The theoretical grounding is multifaceted. Contingency theory (Otley, 1980; Chenhall, 2003) posits that the effectiveness of control systems depends on the context. The resource-based view (Barney, 1991) suggests viewing information and control capabilities as resources, the value of which is derived from their use. Agency theory (Jensen and Meckling, 1976) sheds light on the role of information in reducing asymmetries between managers and stakeholders, while stakeholder theory (Freeman, 1984) justifies a multidimensional conception of performance.

2.2. Hypotheses

H1: The quality of the management information system (MIS) has a positive effect on the effectiveness of strategic management (broken down into H1a for information quality, H1b for integration, and H1c for technological maturity). Reliable, comprehensive, and timely information reduces managerial uncertainty, enabling the formalization of strategy and the monitoring of its execution (Chapman and Kihn, 2009).

H2: The degree of institutionalization of management control (MC) has a positive effect on the effectiveness of strategic management. When truly institutionalized, budgets and dashboards translate strategy into operational objectives and create feedback loops (Simons, 1995; Davila and Foster, 2005).

H3: The effectiveness of strategic management has a positive effect on organizational, financial, and non-financial performance.

H4: Strategic management mediates the relationship between, on the one hand, the MIS and MC, and, on the other, performance. This hypothesis encapsulates the logic of the model: information provides reference points, management control organizes how they are interpreted, and strategic management converts them into decisions.

III. Methodology

This research, rooted in a post-positivist perspective, follows a hypothetico-deductive approach. Hypotheses are tested against data, though the results are not equated with definitive truths: a statistical association may support a theoretical proposition without demonstrating a causal mechanism.

Sample. The study focuses on 24 SMEs in the DIANA region (the districts of Antsiranana I and II, Ambilobe, Ambanja, and Nosy Be), distributed equally across the primary (agriculture, cocoa, fishing, aquaculture), secondary (processing), and tertiary (commerce, tourism, hospitality, services) sectors. The sample—selected via purposive (non-probabilistic) sampling—comprises 133 respondents (executives, managers, and staff), averaging 5.54 respondents per enterprise. This nested structure is accounted for in all analyses.

Instrument and Measures. The questionnaire, organized into six sections containing 37 items, was administered face-to-face on an anonymous and voluntary basis. It was conducted in French, with oral rephrasing in Malagasy provided when necessary, following a pre-test with professionals outside the sample group. The constructs are measured using five-point Likert scales. Table 1 confirms the psychometric quality of these scales: factor analysis yielded six factors that explain 71.4% of the variance (KMO = 0.84; Bartlett's test is significant).

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Table 1: Psychometric quality of measures and diagnostics

Indicator	Observed value	Typical threshold
Cronbach's alpha	0.77 – 0.88	≥ 0.70
Composite reliability	0.86 – 0.90	≥ 0.70
Average Variance Extracted (AVE)	0.60 – 0.74	> 0.50
HTMT ratios	< 0.85	< 0.85
Common method bias (Harman's test)	31.8%	< 50%
Collinearity (VIF)	< 3.3	< 3.3

Source: Field survey; thesis estimates.

Justification of the research design. The choice of a multifaceted statistical approach addresses two risks inherent to this type of data. The first is the issue of "spurious independence" among observations: multiple respondents from the same SME share the same management culture, accounting system, and leader; therefore, 133 responses do not equate to 133 independent observations. The second is common method bias, which is inherent in a survey where both explanatory and dependent variables are reported by the same individuals. Both issues are addressed through explicit diagnostics (ICC, design effect, Harman's test, VIF) rather than being assumed to be negligible.

Analysis strategy. Relationships are tested using PLS-SEM (SmartPLS 4) with control variables (firm age, legal status, sector). This is supplemented by hierarchical regressions, mediation analysis via bootstrapping (using six inference methods, including the Sobel test), multilevel models with random intercepts, quantile regression, and hierarchical agglomerative clustering. To correct for the over-optimism of standard errors, intra-firm dependence is assessed using the intraclass correlation coefficient (ICC) and the design effect—where the adjusted t-statistic is calculated as $t / \sqrt{(\text{design effect})}$—followed by an analysis aggregated at the level of the 24 SMEs.

IV. Results

4.1. Descriptive statistics and measurement quality

The management information system (MIS) exhibits an average, rather than advanced, level of maturity (mean of 3.18 out of 5; standard deviation of 0.64).

Integration is the lowest-scoring dimension, reflecting a state where tools coexist alongside one another rather than being interconnected. Management control/steering reaches a score of 3.19 (standard deviation of 0.68), with monitoring via dashboards (3.31) ranking ahead of strategic decision-making (3.22) and planning (3.05)—indicating that SMEs prioritize operational control. Convergent and discriminant validity are established (the square roots of the average variance extracted [AVE] values exceed the inter-construct correlations), and common method bias does not appear to be a concern.

4.2. H1: MIS quality and strategic management/steering

The overall MIS is strongly and positively associated with management/steering ($\beta = 0.61$; $t = 9.12$; $p < 0.001$; $R^2 = 0.37$; $f^2 = 0.59$). The disaggregated model explains 45% of the variance in management/steering (adjusted $R^2 = 0.42$; $Q^2 = 0.29$; SRMR = 0.068). Integration exerts the strongest effect ($\beta = 0.33$; $p < 0.001$), followed by quality ($\beta = 0.24$; $p = 0.003$) and technological maturity ($\beta = 0.17$; $p = 0.033$). The control variables are not significant. With an intraclass correlation coefficient (ICC) of 0.14 and a design effect of 1.64, the effective sample size is reduced to approximately 81 observations. After correction, H1a ($p = 0.019$) and H1b ($p = 0.001$) remain robust, while H1c loses its significance ($p = 0.097$). The aggregated analysis of the 24 SMEs shows convergence (Spearman's $\rho = 0.58$; $p = 0.003$). The effect of integration is weaker in the primary sector ($\beta = 0.21$; Table 2) than in the secondary (0.38) and tertiary (0.36) sectors. The moderating effects—whether by the manager's education/training ($\beta = 0.15$) or competitive pressure ($\beta = 0.11$)—are weak or non-significant and remain exploratory.

Table 2: Moderations, sectoral heterogeneity, and robustness (H1)

Test	Result	Interpretation
SIC × manager's education/training	$\beta = 0.15$; $p = 0.037$; adj. $t = 1.63$	Weak
SIC × competitive pressure	$\beta = 0.11$; $p = 0.115$; adj. $t = 1.23$	Non-significant
Multi-group INT → PS	Primary 0.21; secondary 0.38; tertiary 0.36	Moderate heterogeneity
Nested structure	ICC = 0.14; design effect = 1.64; effective n ≈ 81	Caution required
Aggregated analysis (24 SMEs)	Spearman's ρ (SIC, PS) = 0.58; p = 0.003	Convergent

Source: Field survey; thesis estimates. adj. $t = t / \sqrt{}$ (design effect).

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Table 2 warrants two interpretations. On one hand, correcting for the design effect reduces the effective sample size by approximately 40%; consequently, the standard errors from the baseline estimation are overly optimistic, and only those results that remain significant after this adjustment (H1, H1a, H1b) can be considered robust. On the other hand, the convergence between the individual-level analysis and the firm-level aggregated analysis reinforces the credibility of the direction of the effects, even if the exact magnitude remains undetermined.

4.3. H2: Management control and strategic steering

Management control (MC) contributes significantly to strategic steering ($\beta = 0.328$; $p < 0.001$)—a result that remains stable in a multilevel model with a random intercept. It partially mediates the effect of accounting information: the indirect effect (0.15) accounts for approximately 32% of the total effect, with the remainder occurring directly. Thus, accounting information and management control are complementary rather than substitutable.

4.4. H3: Strategic steering and performance

The association between strategic steering and performance is positive but weak ($r = 0.205$; $p = 0.018$). It ceases to be significant when MC is included in the model ($\beta = 0.176$; $p = 0.118$) and is primarily observed when MC levels are high and among the highest-performing firms—a finding revealed by quantile regression. The link between strategic steering and outcomes is therefore conditional, rather than universal.

4.5. H4: Mediation via strategic steering

Path *a* (accounting information → strategic steering) is robust (0.368; $p < 0.001$), while path *b* (strategic steering → performance) is marginal (0.208; $p = 0.074$), and the residual direct effect is not statistically significant. The indirect effect, which is positive (0.076), is significant at the 10% level—but not at the 5% level—across all six inference methods. The estimated power is 0.39, and the indirect effect would be nullified by a modest amount of unobserved confounding ($\rho \approx 0.16$). Table 3 summarizes the decisions.

Table 3: Summary of hypotheses and decisions

Hyp. Main estimate	Decision	
H1	SIC → PS: $\beta = 0.61$; $p < 0.001$ (adjusted $p < 0.001$)	Supported
H1a, H1b	QIC: $\beta = 0.24$ (adj. $p = 0.019$); INT: $\beta = 0.33$ (adj. $p = 0.001$)	Supported
H1c	MTC: $\beta = 0.17$; $p = 0.033$ (adj. $p = 0.097$)	Partially supported
H2	CG → PS: $\beta = 0.328$; $p < 0.001$; mediation ≈ 32%	Supported
H3	PS → PER: $r = 0.205$; $\beta = 0.176$ ($p = 0.118$) with CG	Partially supported
H4	Indirect effect = 0.076; significant only at the 10% level	Partially supported, marginal

Source: Field survey; estimates from the thesis.

V. Discussion

The results outline a theoretically coherent chain, with the first two links being robust and the final one fragile. The first link confirms—within a context that has received little prior study—the information systems success models (DeLone & McLean, 1992, 2003): it is not the technological equipment that matters most, but rather the quality of the information produced and its integration across various functions (sales, purchasing, treasury, and production). The fragility of the technological component, once the nested structure is accounted for, aligns with the notion that technology does not automatically lead to better management control; its value depends on processes of appropriation and the skills of those involved—a perspective consistent with the resource-based view.

The second link sheds light on the distinction between the mere presence of tools and their institutionalization (Burns & Scapens, 2000).

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The fact that management control systems (MCS) mediate only one-third of the effect of information—with the remainder being a direct effect—suggests that in SMEs, which are often centered around the owner-manager, information also informs management control informally, without relying on sophisticated tools. This interpretation is consistent with contingency theory: a basic monitoring system that is well-understood and regularly updated can be more effective than an elaborate system that is rarely used.

The final link—the conversion of management control into performance—is the most uncertain. The conditional association with MCS suggests that management control only yields results when supported by control routines; this aligns with the logic of "levers of control" (Simons, 1995) and the concept of dynamic capabilities, which posits that management control is less a guarantee of performance and more a capacity for coordination and adaptation. Alternatively, this could reflect reverse causality, where firms that are already high-performing possess greater resources to formalize their management control processes. Management control is thus one contributing mechanism among others—alongside the quality of the manager, access to financing, and the broader economic climate. Ultimately, accounting information only translates into performance if it is institutionalized within control routines and actively utilized for management purposes.

From a theoretical standpoint, these results call for a nuanced interpretation of each of the frameworks employed. Contingency theory is supported by sectoral heterogeneity: the impact of integration varies—for instance, in the primary sector, where operating cycles, climatic uncertainties, and less formal accounting structures alter how information is used, compared to the secondary or tertiary sectors. Agency theory, which emphasizes the reduction of information asymmetries, is less directly tested by a framework focused on the manager and their staff than it would be by one focused on relationships with financiers; nevertheless, it remains relevant for understanding why the quality of information holds value beyond its internal use. Finally, stakeholder theory justifies a multidimensional conception of performance, though the perceptual measure used here does not allow for a granular distinction between the specific expectations of individual stakeholders.

These findings diverge from a mechanistic view—which would posit that a superior accounting system automatically leads to better performance. Instead, they suggest a logic of interdependence: information must be actionable, tools must be appropriate, and management control processes must create regular opportunities for discussion and action.

The fragility of the mediation effect (H4) does not imply its absence; rather, it indicates that, given a sample of 24 firms and a statistical power of 0.39, the current study is unable to definitively demonstrate it. Consequently, this effect should be viewed as a plausible, testable explanation rather than an established mechanism.

VI. Limitations And Prospects

Four limitations necessitate a cautious interpretation. (i) The purposive, non-probabilistic sample of 24 firms precludes any generalization to all SMEs in the region. (ii) The cross-sectional design does not allow for the establishment of temporal precedence or causality; therefore, the findings should be interpreted as associations rather than demonstrated effects. (iii) The measures are perceptual and self-reported, making them susceptible to reporting bias and potential overlap between management control items and performance indicators. (iv) The limited number of firms—despite adjustments for design effects, multilevel structure, and cluster bootstrapping—reduces the precision of inference and the power of the mediation analysis (0.39). The reported coefficients are estimates from the doctoral thesis; they require confirmation using the final, cleaned dataset, accompanied by confidence intervals.

Future research should utilize longitudinal data, triangulate perceptual data with accounting-based indicators, expand the sample size (particularly within the primary sector, where the effect of integration is weaker), and test additional moderators, such as the profile of the manager.

VII. The Author's Scientific Contributions

Evaluated against the criteria established by Whetten (1989)—which distinguish between the addition of new factors and the clarification of the relationships between existing ones—the contributions of this work are characterized by articulation rather than rupture: it does not propose new factors, but rather specifies how known factors are interconnected. These contributions fall into three categories.

7.1. Theoretical contributions

A complete, tested chain. The author integrates four typically separate bodies of literature—accounting information quality, the institutionalization of management control, strategic steering, and performance—into a single framework, whereas previous studies have addressed only one or two of these links.

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This integration addresses criticisms regarding the fragmented nature of the literature on control systems (Chenhall, 2003; Ferreira & Otley, 2009), while clearly distinguishing between theoretical propositions and empirical findings.

Strategic steering as a conversion mechanism. Strategic steering is conceptualized as the mechanism through which information is transformed into action and results. This perspective extends the view of strategic steering as a "dynamic capability" (Teece, Pisano, & Shuen, 1997; Henri, 2006) by applying it to SMEs—organizations where formal capabilities are often scarce.

Adoption versus appropriation. The construct of the "institutionalization of management control" distinguishes between the formal adoption of tools and their actual appropriation within organizational routines. While this distinction is frequently discussed in institutional theory (Meyer & Rowan, 1977; Burns & Scapens, 2000), it is rarely measured; in this study, it is operationalized through self-reported measures, supplemented by an index based on documentation. It allows for a more nuanced view of the hypothesis of generalized decoupling, helping to bridge universalist and contingency-based perspectives: the value of a tool lies more in its application than in its inherent nature.

A test of contingency theory within a low-income economy. This work extends contingency theory to a context where its predictions have rarely been examined. The lack of clear sectoral moderation is likely attributable to a sample size too small to detect such interactions, rather than to an absence of contingency.

7.2. Methodological contributions

Inference adapted to nested data. The author combines cluster-robust standard errors, cluster bootstrapping, firm-level aggregation, and a multilevel random-intercept model. Furthermore, the study calculates the design effect (1.64) and the effective sample size (approximately 81) in accordance with the recommendations of Cameron and Miller (2015). Such transparency regarding statistical power is rare in research on SMEs.

Mediation analysis that goes beyond mere significance. Rather than reporting only the significance of the indirect effect, this work compares six methods of inference, estimates statistical power (0.39), and analyzes sensitivity to unobserved confounding ($\rho \approx 0.16$). It thus provides a model for the cautious presentation of mediation analysis using cross-sectional data—a valuable approach in contexts where longitudinal research designs are difficult to implement.

Triangulation and transparency. The convergence of multiple approaches—including PLS-SEM, hierarchical regressions, multilevel modeling, quantile regression, hierarchical clustering, and validation via accounting indicators—bolsters the credibility of the findings more effectively than additional statistical sophistication would. Establishing decision criteria *ex ante* and explicitly distinguishing between preliminary estimates and final results protects the research process from confirmation bias and ensures it remains falsifiable.

7.3. Empirical contributions

The author has compiled one of the few datasets for SMEs in the DIANA region that integrates perceptions from multiple respondents per firm with documentary indicators—a significant contribution, given that existing surveys in this context tend to focus primarily on firm structure, financing, and employment, rather than on internal management practices. It documents an intermediate level of maturity for the management information system (MIS), a predominance of monitoring via dashboards over planning, and a gap between formalization and actual use for decision-making; it also establishes benchmark orders of magnitude for future studies. These orders of magnitude require confirmation based on final data and should not be extrapolated beyond the specific context studied.

Table 4: Summary of scientific contributions

Type	Contribution	Support	Associated limitation
Theoretical	SIC–CG–PS–PER chain; management control as conversion	Whetten (1989); Henri (2006)	Causality not established
Theoretical	Adoption vs. appropriation of CG	Burns and Scapens (2000)	Partial documentary measurement
Methodological	Cluster-robust inference; design effect	Cameron and Miller (2015)	Only 24 firms
Methodological	Mediation: power and sensitivity	Zhao et al. (2010)	Cross-sectional data
Empirical	Orders of magnitude in SMEs of DIANA	Thesis estimates	Purposive sample

Source: prepared by the author.

The construct and method contributions are independent of the final values of the coefficients; empirical contributions depend on it. Each is therefore associated with its limit to avoid any overbidding: the scope of the work lies less in the value of a coefficient than in the demonstration that a coherent chain can be measured, estimated and discussed rigorously in this context.

VIII. Conclusion And Implications

In response to the research question, the quality of the CIS and the institutionalization of the CG jointly contribute to the quality of management, but their contribution to performance is neither automatic nor independent of the context: the first two links in the chain are solid, the last remains fragile. The value of accounting information lies less in its mere existence than in its institutionalization and its use in decision-making.

On a managerial level, managers would benefit from investing first in the quality and integration of information between functions rather than in technology alone; to install a few simple and regular routines (budget, dashboard, gap analysis) discussed and linked to concrete decisions; and to consider piloting as a learning process and not as a formal exercise. Support organizations could direct their programs towards the appropriation of tools rather than their sole dissemination.

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