

Bridging Internal Audit, ERM, and Management Control System in SMEs: A Meta-Analytic Review (1999–2025)

Intégration de l'audit interne, de l'Enterprise Risk Management (ERM) et des systèmes de contrôle de gestion dans les PME : une méta-analyse de la littérature (1999–2025)

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Abstract

This study synthesises 50 empirical and conceptual works published between 1999 and 2025 on the integration of internal audit, enterprise risk management (ERM) and management control systems (MCS) in small and medium-sized enterprises (SMEs) across Europe, Latin America, Africa and Asia. Adopting a systematic review enriched by meta-analytic mapping, the study combines thematic coding, Wilson confidence intervals for prevalence and structured vote-counting to assess five hypotheses, rather than pooling standardised effect sizes. Integrated audit-control systems are positively associated with governance quality, decision-making and resilience, digitalisation through ERP, business intelligence and artificial intelligence amplifies these effects, the ERM-PMS coupling is a promising yet under-tested mediating mechanism, managerial competence and leadership reinforce adoption, and over-reliance on external consultants weakens sustainability without capability transfer. The findings invite SMEs, particularly in emerging economies, to link audit follow-ups to budgeting and dashboards, to build minimal digital infrastructure before piloting artificial intelligence, and to contract for capability transfer. The study contributes an integrated reading of audit, risk and control tailored to resource-constrained firms.

Keywords : integrated audit, management control system, enterprise risk management (ERM), SMEs, digitalization.

Résumé

Cette étude synthétise 50 travaux empiriques et conceptuels publiés entre 1999 et 2025 et portant sur l'intégration de l'audit interne, du management des risques de l'entreprise (ERM) et des systèmes de contrôle de gestion au sein des petites et moyennes entreprises (PME) en Europe, en Amérique latine, en Afrique et en Asie. En adoptant une revue systématique enrichie d'une cartographie méta-analytique, l'étude combine un codage thématique, les intervalles de confiance de Wilson et un comptage structuré des votes afin d'évaluer cinq hypothèses, sans agréger des tailles d'effet standardisées. Les systèmes intégrés d'audit et de contrôle sont positivement associés à la gouvernance, à la décision et à la résilience, la digitalisation amplifie ces effets, le couplage ERM-PMS constitue un mécanisme médiateur prometteur mais encore peu exploré, les compétences managériales renforcent l'adoption, et la dépendance excessive aux consultants externes fragilise la durabilité des dispositifs. L'étude invite les PME, notamment des économies émergentes, à articuler audit, budgétisation et tableaux de bord et à privilégier le transfert de compétences avant toute expérimentation de l'intelligence artificielle.

Mots clés : audit intégré, contrôle de gestion, management des risques de l'entreprise (ERM), PME, digitalisation.

Introduction

Small and medium-sized enterprises (SMEs) are central to employment and innovation, yet they face disproportionate exposure to operational, financial and compliance risks because of resource constraints and informal governance structures. Integrating audit functions with management control systems (MCS) has therefore emerged as a strategic avenue to strengthen decision quality, safeguard assets and support resilience in volatile environments (Alotaibi, 2024 ; Weber et al., 2024 ; Roffia & Dabić, 2023). In parallel, the growing availability of digital tools, namely enterprise resource planning (ERP), business intelligence (BI) and artificial intelligence (AI), promises to transform audit and control practices, even as adoption remains uneven across sectors and regions (Tafuro et al., 2025 ; Fährndrich & Pedell, 2024 ; Broccardo et al., 2025).

Despite mounting interest, the field remains fragmented. First, the literature straddles conceptual traditions, with the francophone « contrôle de gestion » and the anglophone management control placing divergent emphases on structure, process and behaviour in SMEs (Villesèque-Dubus & Courrent, 2008). Second, empirical investigations differ widely in design and scope, ranging from qualitative case studies to surveys and nascent bibliometric analyses, which complicates cumulative inference about integration effects (Armitage et al., 2020 ; Famacion-Quinco, 2023 ; Tafuro et al., 2025). Third, digitalisation introduces new contingencies (data quality, cybersecurity and user trust) that both enable and constrain integrated practices (Lezhanina, 2025 ; Popel, 2025 ; Broccardo et al., 2025).

Although many studies claim that combining internal audit, risk management and management control enhances SME performance and resilience, the magnitude and boundary conditions of these effects remain contested. Variability in SME size, lifecycle, managerial competence and context appears to moderate both the adoption of integrated systems and the outcomes achieved, while the maturity of digital infrastructures shapes how audit practices influence the quality of internal control (Poneï et al., 2025 ; Shaiti & Al-Matari, 2020 ; Becker et al., 2011). This fragmentation gives rise to the central research question that structures the study:

To what extent, and under which conditions, does the integration of internal audit, enterprise risk management and management control systems strengthen the performance and resilience of SMEs, and how does digitalisation moderate this relationship?

This question is positioned within a positivist, confirmatory perspective: the study does not seek to explore an emerging phenomenon inductively, but rather to consolidate accumulated

empirical evidence in order to test a set of theoretically grounded hypotheses. Building on a broad corpus spanning Europe, Latin America, Africa and Asia, the meta-analytic synthesis (i) delineates the core constructs and integration mechanisms, (ii) examines the technological enablers and inhibitors of integration, and (iii) reviews the contingencies and organisational outcomes associated with integrated audit–control systems (Villesèque-Dubus & Courrent, 2008 ; Weber et al., 2024 ; Tafuro et al., 2025).

To answer this question, the study mobilises a systematic review enriched with a meta-analytic mapping of 50 studies published between 1999 and 2025. Because most SME studies report outcomes narratively rather than as standardised effect sizes, the synthesis relies on thematic coding, proportion-based prevalence with Wilson 95 % confidence intervals and a structured vote-counting procedure, rather than on the pooling of effect sizes characteristic of a classical meta-analysis. Five hypotheses (H1–H5) are assessed against this corpus and discussed through the lenses of contingency theory and enabling controls.

The remainder of the article is organised as follows. Section 1 reviews the literature on the foundations of integration, digital transformation and contingency conditions, and formulates the hypotheses. Section 2 details the methodology of the systematic review and its analytical procedures. Section 3 presents the results of the prevalence mapping and the hypothesis-level evidence. Section 4 discusses these findings hypothesis by hypothesis and explains the variation in outcomes, before the conclusion summarises the contributions, limitations and avenues for future research. Reflecting consistent yet incomplete patterns, five testable hypotheses guide the analysis:

H1. Integrated audit–control systems are positively associated with SME performance and resilience, because integration aligns strategic objectives, formalises risk identification and improves monitoring (Alotaibi, 2024 ; Weber et al., 2024 ; Roffia & Dabić, 2023).

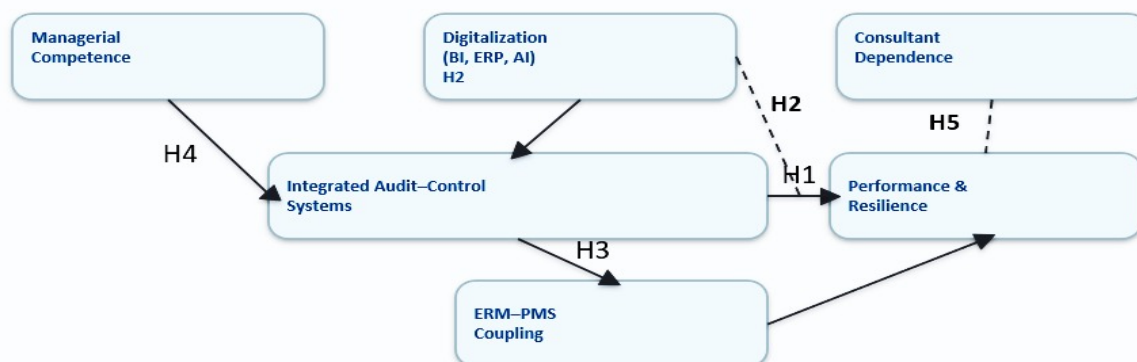
H2. Digitalisation (BI/AI/ERP maturity) strengthens the effect of integrated systems on outcomes by enhancing data quality, timeliness and automation (Tafuro et al., 2025 ; Shaiti & Al-Matari, 2020 ; Fähndrich & Pedell, 2024).

H3. Linking enterprise risk management (ERM) with performance measurement systems (PMS) mediates the relationship between integration and outcomes, improving the risk–return balance (Enhancing ERM–PMS, 2023 ; Appah, 2025).

H4. Managerial competence and leadership engagement positively moderate the adoption and effectiveness of integration (Ismail et al., 2019 ; Poneï et al., 2025 ; Bernard, 2019).

H5. Over-reliance on external consultants without owner appropriation weakens sustained integration and reduces its benefits (Baldo et al., 2019 ; Nobre & Zawadzki, 2013 ; Zawadzki, 2011).

Figure N°1 : Conceptual framework and hypotheses (H1–H5)



Source : Authors' synthesis.

1. Literature Review

1.1. Foundations and integration logics in SMEs

Historically, management control and internal audit evolved on parallel tracks: the former emphasised planning, budgeting and performance measurement, the latter assurance and compliance. In SMEs, however, resource scarcity and role overlap often require hybrids in which a single toolkit must both guide decisions and verify adherence to procedures. The notion of an integrated audit–control system has therefore gained traction as a way to couple strategic intent, operational monitoring and risk governance within a coherent architecture (Villesèque-Dubus & Courrent, 2008 ; León et al., 2025).

Whereas the anglophone tradition frequently stresses the design and use of budgets, KPIs and performance routines, francophone research foregrounds logics of structuration, actor strategies and the micro-politics of tool introduction, dimensions that are particularly salient in SMEs where owner-managers set the tone (Armitage et al., 2020 ; Nobre & Zawadzki, 2013). This dual lens underscores that integration is not merely technical but deeply organisational, as it involves negotiating meanings, responsibilities and learning cycles (Villesèque-Dubus & Courrent, 2008 ; Bernard, 2019).

Empirical work documents varied mechanisms of integration. Structurally, some SMEs formalise audit committees or steering groups to align audit plans with MCS priorities, procedurally, they embed audit follow-ups into budgeting and performance reviews, informationally, they synchronise risk registers and KPI dashboards, and behaviourally, they

cultivate enabling controls that support participation and problem-solving rather than mere compliance (Ismail et al., 2019 ; Alotaibi, 2024 ; León et al., 2025). Resilience-oriented frameworks further propose that integration should be adaptive and reconfigurable under stress, by building scanning routines, slack resources and feedback loops into control cycles (Weber et al., 2024).

Several studies nonetheless chronicle partial or late structuring. In growing family SMEs, control practices often lag behind complexity, producing patchy coverage and ad hoc remediation, and attempts to graft formal systems can falter without cognitive shifts among pivotal actors (Meyssonier & Zawadzki, 2009 ; Zawadzki, 2009). These accounts caution that integration is a path-dependent process, iterative and susceptible to setbacks, rather than a one-off design decision (Nobre & Zawadzki, 2013).

In terms of outcomes, integrated systems are associated with better governance quality, clearer decision rights and improved performance when appropriation is genuine, that is, when tools become part of everyday conversation rather than external impositions (Roffia & Dabić, 2023 ; Weber et al., 2024). The strength of these associations hinges on managerial competence and on aligning formal instruments with existing routines, an alignment that enabling controls can facilitate by granting autonomy and emphasising dialogue (Ismail et al., 2019 ; Bernard, 2019). Integration is thus multidimensional (structural, procedural, informational and behavioural), and the promise of superior outcomes depends on endogenous adoption and the fit between tools and organisational routines (Villesèque-Dubus & Courrent, 2008 ; Weber et al., 2024).

Table N°1 : Core constructs and working definitions

Construct	Working definition (SME context)	Canonical anchors
Integrated audit–control system	A coordinated configuration in which internal audit, risk management and management control instruments are jointly designed and used to align strategy, monitor processes and ensure compliance.	Villesèque-Dubus & Courrent (2008), León et al. (2025), Weber et al. (2024)
Management control system (MCS)	Formal and informal routines and instruments used by managers to steer behaviours toward organisational objectives (budgets, KPIs, scorecards, control culture).	Armitage et al. (2020), Ismail et al. (2019)
Internal audit (IA)	An independent, objective assurance and consulting activity designed to add value by improving risk management, control and governance.	Alotaibi (2024), Souza (2023)

ERM–PMS linkage	The systematic connection of risk assessment and mitigation with performance targets, indicators and learning cycles.	Enhancing ERM–PMS (2023), Appah (2025)
Digitalisation (ERP/BI/AI)	Deployment and routinisation of digital platforms to collect, integrate, analyse and act on data for audit and control purposes.	Shaiti & Al-Matari (2020), Tafuro et al. (2025), Broccardo et al. (2025)

Source : Authors' synthesis from the cited literature.

Table N°2 : Hypotheses and theoretical rationales

Hypothesis	Expected direction	Theoretical rationale	Illustrative anchors
H1: Integration → Performance / Resilience	Positive	Strategic alignment, formal risk cycles, monitoring → better decisions	Alotaibi (2024), Weber et al. (2024), Roffia & Dabić (2023)
H2: Digitalisation × Integration → Outcomes	Strengthening	Data timeliness and analytics intensify control utility	Shaiti & Al-Matari (2020), Tafuro et al. (2025), Fähndrich & Pedell (2024)
H3: Integration → ERM–PMS → Outcomes	Mediation	Risk–performance coupling balances trade-offs	Enhancing ERM–PMS (2023), Appah (2025)
H4: Managerial competence × Integration → Outcomes	Strengthening	Enabling controls and leadership engagement foster appropriation	Ismail et al. (2019), Poneï et al. (2025), Bernard (2019)
H5: Consultant dependence (high) → Integration sustainability	Weakening	Lack of endogenous change and user ownership impedes routinisation	Baldo et al. (2019), Nobre & Zawadzki (2013), Zawadzki (2011)

Source : Authors' synthesis from the cited literature.

1.2. Digital transformation and technology-enabled integration

With the diffusion of ERP, BI and AI, the audit–control nexus increasingly relies on data integration and analytics. ERP maturity has been shown to moderate the relationship between internal audit characteristics and the quality of internal controls: where ERP is mature, auditors can draw on reliable, timely data and automated traces, whereas where it is nascent, audit leverage is constrained by fragmentation and manual workarounds (Shaiti & Al-Matari, 2020). BI platforms, in turn, enhance visualisation and drill-down capabilities, supporting continuous monitoring, early warning and strategic dialogue, capabilities that naturally link audit recommendations to managerial action (Tafuro et al., 2025).

Several contributions argue that AI and autonomous platforms can automate anomaly detection, classify risks and even generate suggested controls, thereby expanding the scale and speed of oversight. Explainability (XAI) and human-in-the-loop designs are stressed as prerequisites for trust and adoption in SME settings, where expertise and tolerance for opaque models are limited (Popel, 2025 ; Broccardo et al., 2025). Similarly, digitalisation can reconfigure controller roles, from number keepers to analytical partners, while raising new competency demands that many SMEs struggle to meet (Fähndrich & Pedell, 2024).

However, the uneven digital terrain generates heterogeneity in realised benefits. Some SMEs rely on spreadsheets and semi-manual routines, others experiment with dashboards and low-code analytics, a few adopt AI pilots. Barriers include cybersecurity concerns, data governance deficits and a lack of digital roadmaps that specify milestones and responsibilities (Lezhanina, 2025 ; Fähndrich & Pedell, 2024). Moreover, the social usability of tools (interfaces, explainability and perceived fairness) conditions whether findings become actionable rather than merely available (Broccardo et al., 2025).

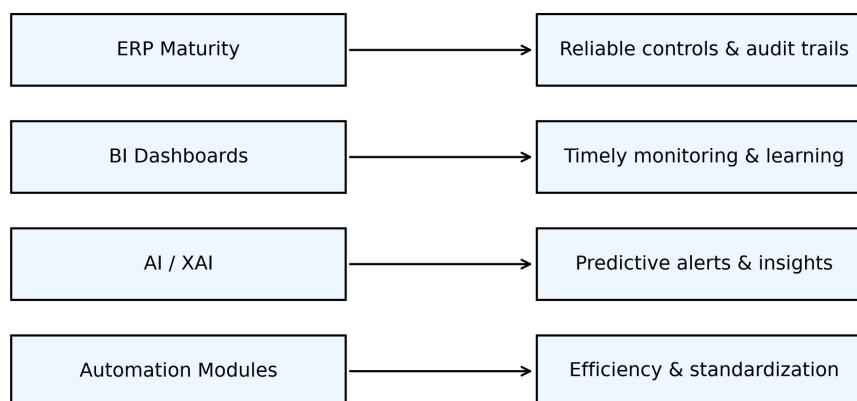
Finally, digitalisation can either stabilise or destabilise integration. On the one hand, shared platforms permit standardised processes and cross-functional visibility, on the other, implementation projects can absorb scarce managerial attention, trigger resistance and introduce new risks if not paired with training and governance disciplines (Shaiti & Al-Matari, 2020 ; Lezhanina, 2025). Technology is therefore best viewed as an amplifier of well-designed integration rather than as a substitute for it (Tafuro et al., 2025 ; Fähndrich & Pedell, 2024).

Table N°3 : Digital enablers of integration and expected effects

Digital enabler	Primary function	Expected effects	Salient risks / requirements	Anchors
ERP maturity	Unified transactional backbone	Reliable controls, audit trails	Implementation burden, change management	Shaiti & Al-Matari (2020), Roffia & Dabić (2023)
BI dashboards	Visualisation and drill-down	Timely monitoring, learning loops	Data governance, literacy	Tafuro et al. (2025)
AI / XAI tools	Anomaly detection, classification	Scale and speed, predictive alerts	Explainability, user trust	Popel (2025), Broccardo et al. (2025)
Automation modules	Routine control execution	Efficiency, standardisation	Cybersecurity, oversight	Lezhanina (2025), Fähndrich & Pedell (2024)

Source : Authors' synthesis from the cited literature.

Figure N°2 : Digital enablers of integration and their effects



Source : Authors' synthesis.

1.3. Contingency conditions, implementation barriers and organisational outcomes

A robust stream of work emphasises that context matters. Environmental uncertainty, competitive intensity, tax-administration pressures and cultural norms shape the selection and effectiveness of control tools in SMEs. In such settings, leadership experience and managerial competence become decisive, modulating whether integration is embraced as a strategic asset or resisted as an administrative burden (Poneř et al., 2025 ; Becker et al., 2011). Enabling control designs, which emphasise participation, clarity and repair, help SMEs turn constraints into learning and thereby improve performance (Ismail et al., 2019).

Actor-network dynamics also influence outcomes. Case studies document how owner-managers, controllers and external accountants negotiate the introduction of dashboards, budgets and audit routines. Success hinges on communication, legitimacy building and the capacity to translate abstract tools into local practices, whereas heavy reliance on external consultants can create discontinuities, especially when alignment with the owner's cognitive schemes is weak (Hamadi et al., 2022 ; Nobre & Zawadzki, 2013 ; Baldo et al., 2019).

In practice, barriers cluster into resource scarcity (time, skills, funding), cognitive resistance (lack of perceived relevance) and institutional constraints (regulatory complexity, certification demands). Late structuring and fragmented practices persist where SMEs attempt to bolt on controls without reworking processes or mindsets (Meyssonier & Zawadzki, 2009 ; Zawadzki, 2011). Conversely, where internal audit is positioned as a governance partner rather than a mere inspector, SMEs report improvements in control-environment quality, fraud prevention and ethical climate (Souza, 2023 ; Alotaibi, 2024 ; Peñarreta-Angamarca et al., 2024).

These contingencies translate into diverse organisational impacts. Integrated systems correlate with better resource allocation, planning discipline and crisis navigation, including during

exogenous shocks, provided that appropriation and competence thresholds are met (Roffia & Dabić, 2023 ; Weber et al., 2024). Several studies, however, highlight that risk-assessment components may exert weaker effects than control activities and monitoring, which suggests that communication quality and indicator design deserve more attention in SMEs (Long, 2025 ; Thanh, 2023). At the frontier, proposals to couple ERM and PMS, embedding key risk indicators alongside performance indicators, offer a practical bridge between vigilance and value creation, although implementation complexity remains salient and calls for incremental, context-sensitive roadmaps (Enhancing ERM–PMS, 2023 ; Appah, 2025).

Table N°4 : Contingency landscape for integrated audit–control in SMEs

Level	Key contingencies	Typical effects on integration	Illustrative anchors
Micro (actors / competence)	Owner engagement, controller skills, audit independence	Appropriation, routinisation, learning	Bernard (2019), Ismail et al. (2019), Alotaibi (2024)
Meso (organisational)	Family ownership, lifecycle, ERP maturity, culture	Tool choice, coupling strength, monitoring quality	Becker et al. (2011), Shaiti & Al-Matari (2020), Meyssonier & Zawadzki (2009)
Macro (context)	Regulation / taxation, uncertainty, norms	Motivation to formalise or defer controls	Poneï et al. (2025), Hamadi et al. (2022)

Source : Authors' synthesis from the cited literature.

2. Methodology

2.1. Review approach, scope and the systematic review / meta-analysis distinction

The study undertakes a structured evidence synthesis focused on the integration of internal audit, risk management and management control systems within SMEs. The corpus comprises 50 studies spanning 1999–2025 and covering Europe, Latin America, Africa and Asia (Cappelletti, 1999 ; Broccardo et al., 2025 ; León et al., 2025 ; Ilyasova et al., 2025).

A clarification of vocabulary is warranted here, in line with reviewers' expectations. A classical meta-analysis statistically pools standardised effect sizes (correlations, standardised mean differences) drawn from comparable quantitative designs in order to estimate a weighted average effect and its heterogeneity. A systematic review, by contrast, follows an explicit and reproducible protocol to identify, appraise and synthesise the evidence, without necessarily computing a pooled estimate. Because most SME studies in our corpus report outcomes narratively, or through heterogeneous indicators and managerial inferences rather than standardised effect sizes, a classical effect-size meta-analysis was not feasible for the full set.

The present work is therefore best characterised as a systematic review enriched by a meta-analytic mapping, or best-evidence synthesis: it applies proportion-based estimates of theme prevalence with Wilson confidence intervals and a structured vote-counting procedure to validate the hypotheses specified in Section 1. The term meta-analytic is thus used in this restricted, mapping-oriented sense, and the inferences are framed accordingly.

2.2. Eligibility criteria

The review included peer-reviewed journal articles, conference papers and doctoral or working papers that address SMEs or small enterprises and examine internal audit, management control, risk management or their integration. Studies had to report empirical findings, structured conceptual frameworks or validated measurement instruments and to be published between 1999 and 2025 in English, French, Spanish, Portuguese or Russian. Studies focusing exclusively on large enterprises, on the public sector, or on purely technical IT evaluations devoid of audit or control implications for SMEs were excluded.

Table N°5 : Inclusion and exclusion criteria used in the synthesis

Domain	Inclusion criteria	Exclusion criteria
Population	SMEs or small enterprises (private sector)	Large firms, public sector only
Phenomena	Internal audit, MCS, risk management or their integration	Pure IT evaluations without audit / control implications
Outcomes	Governance, performance / resilience, internal control, risk effectiveness, barriers	Outcomes unrelated to control / audit
Designs	Empirical (qualitative / quantitative / mixed) or structured conceptual	Opinion pieces without method or model
Period / languages	1999–2025, EN / FR / ES / PT / RU	Outside period, other languages if not translatable

Source : Authors' protocol anchored to the corpus defined in Section 1.

2.3. Outcomes, exposures and study designs

Primary outcomes included organisational performance and resilience attributable to integrated audit–control practices. Secondary outcomes covered risk-management effectiveness, internal-control quality, ethical climate and adoption barriers. Exposures comprised the integration level (partial versus moderate / advanced), digitalisation (ERP maturity, BI, AI / XAI), the ERM–PMS linkage, managerial competence and leadership engagement, and reliance on external consultants. Designs encompassed qualitative case studies, cross-sectional surveys and SEMs, bibliometric mappings and mixed methods.

2.4. Data extraction and coding

From each study the review extracted the setting (country and sector), design, sample, constructs and direction of effect (positive, mixed, null or negative) for each coded theme: integration level, digitalisation, risk-management effectiveness, organisational impact and adoption barriers. Thematic categories were also coded to enable consistent counts across the 50-study corpus.

2.5. Operationalisation of variables

Integration was coded as moderate or advanced when studies described coordinated or formal linkages between audit and MCS. Digitalisation was coded as significant when the study documented substantive use of ERP, BI or AI for audit and control. Organisational impact was coded as positive when studies reported improved governance, decision quality, efficiency or financial outcomes attributable to integrated audit–control. Risk-management effectiveness was coded as improved when studies documented better risk identification, mitigation or fraud prevention. Adoption barriers were coded as present when resource, cultural or institutional obstacles were prominent.

Table N°6 : Variable operationalisation and coding rules

Variable	Operational definition (SME context)	Coding
Integration level	Joint design / use of IA, ERM, MCS	0 = not explicit, 1 = partial, 2 = moderate / advanced
Digitalisation	ERP / BI / AI supports audit / control	0 = limited, 1 = significant adoption
Risk-management effectiveness	Improved risk identification / assessment / mitigation	-1 = worse, 0 = no change, +1 = improved
Organisational impact	Governance, decision quality, efficiency, performance, resilience	-1 = negative, 0 = null / mixed, +1 = positive
Adoption barriers	Resource constraints, actor resistance, institutional hurdles	0 = not salient, 1 = salient
ERM–PMS linkage	Explicit coupling of key risk indicators to performance measures	0 = no, 1 = yes
Managerial competence	Evidence that competence / leadership moderates integration	0 = no, 1 = yes
Consultant dependence	Reliance on external actors with evidence of benefit / harm	-1 = weakens, 0 = neutral, +1 = strengthens

Source : Authors' coding scheme.

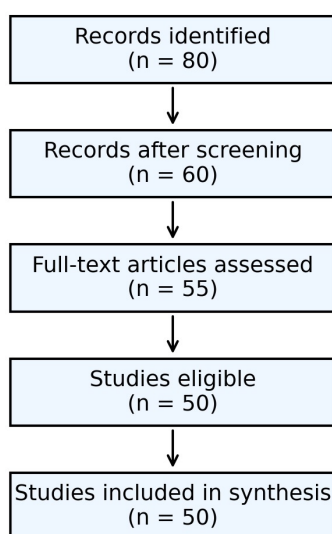
2.6. Study quality and risk-of-bias assessment

Given the design heterogeneity, a domain approach focusing on selection, measurement, confounding and reporting was used. Common risks included small samples, cross-sectional designs and reliance on self-reports, which may inflate self-assessed control maturity (Escalona & Zambrano, 2025 ; Famacion-Quinco, 2023). Qualitative case studies mitigated measurement bias by triangulating artefacts and process data but limited generalisability, while cross-sectional designs could not adjudicate causality (Armitage et al., 2020 ; Zawadzki, 2009). The synthesis emphasises patterns that are robust across designs and signals where claims rely mainly on a narrow subset.

2.7. Synthesis and statistical methods

Prevalence proportions and Wilson 95 % confidence intervals were computed for the key codes using the full-corpus denominator (N = 50). For the five hypotheses, a structured vote-counting procedure classified studies as supportive, mixed or contradictory according to the reported direction of effect and its mechanistic alignment. Where counts were small, cautious inferences were drawn in line with best-evidence synthesis. It should be acknowledged that vote-counting is a conservative and limited inferential device: it weights every study equally regardless of sample size or precision, it ignores the magnitude of effects, and it can understate genuine effects when statistical power is low across the primary studies. These limitations are revisited in the discussion and motivate the call for future effect-size meta-analyses.

Figure N°3 : Meta-analytic workflow (PRISMA-style)



Source : Authors' design

3. Results

3.1. Study set and characteristics

The final synthesis comprised 50 studies: qualitative case studies and longitudinal narratives (e.g. Zawadzki, 2009 ; Meyssonier & Zawadzki, 2009), surveys and SEMs (e.g. Ismail et al., 2019 ; Thanh, 2023), bibliometric and conceptual mappings (e.g. Tafuro et al., 2025 ; Weber et al., 2024) and mixed-methods investigations of AI / BI adoption (e.g. Broccardo et al., 2025 ; Popel, 2025). Geographically, the corpus spans Europe, Latin America, Africa and Asia, enabling cross-context comparison of integration pathways and obstacles (Alotaibi, 2024 ; León et al., 2025 ; Musikavanhu & Nqala, 2024).

3.2. Descriptive prevalence of key codes

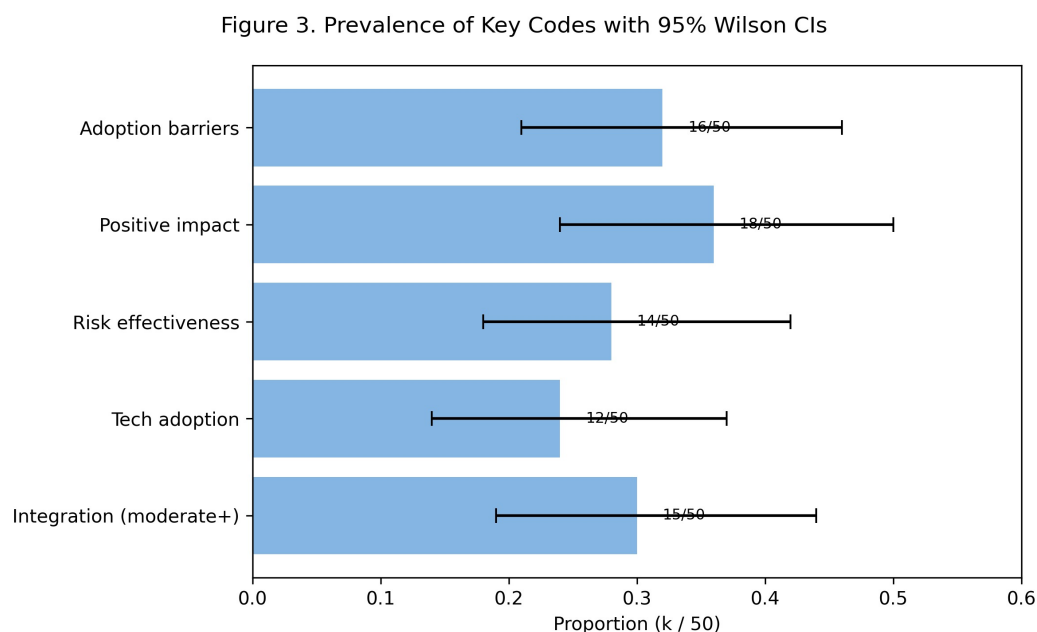
Using the full set (N = 50), the review mapped the prevalence of integration, digitalisation, effectiveness, organisational impact and barriers, as well as the thematic categories reported in Section 1. Because some papers are conceptual or do not measure every construct, these proportions are conservative lower bounds.

Table N°7 : Prevalence of key codes and themes across the 50-study corpus (Wilson 95 % CIs)

Code / theme	Count (k)	Proportion (k/50)	95 % CI
Integration level: moderate / advanced	15	0.30	[0.19, 0.44]
Significant tech adoption (AI / BI / ERP)	12	0.24	[0.14, 0.37]
Risk-management effectiveness improved	14	0.28	[0.18, 0.42]
Organisational impact positive	18	0.36	[0.24, 0.50]
Adoption barriers reported	16	0.32	[0.21, 0.46]
MCS adoption & effectiveness	20	0.40	[0.28, 0.54]
IA & integrated audit in governance / risk	18	0.36	[0.24, 0.50]
Digital transformation	14	0.28	[0.18, 0.42]
Contingency factors	12	0.24	[0.14, 0.37]
Resilience & financial performance	11	0.22	[0.13, 0.35]
Internal-control system design challenges	9	0.18	[0.10, 0.31]
Organisational / managerial characteristics	7	0.14	[0.07, 0.26]
External advisors & professional services	4	0.08	[0.03, 0.19]
Integrated models (taxation + controls + risk)	3	0.06	[0.02, 0.16]
Process auditing & continuous improvement	2	0.04	[0.01, 0.14]

Source : Authors' synthesis.

Figure N°4 : Prevalence of key codes with 95 % Wilson confidence intervals



Source : Authors' synthesis.

3.3. Hypothesis-level evidence mapping

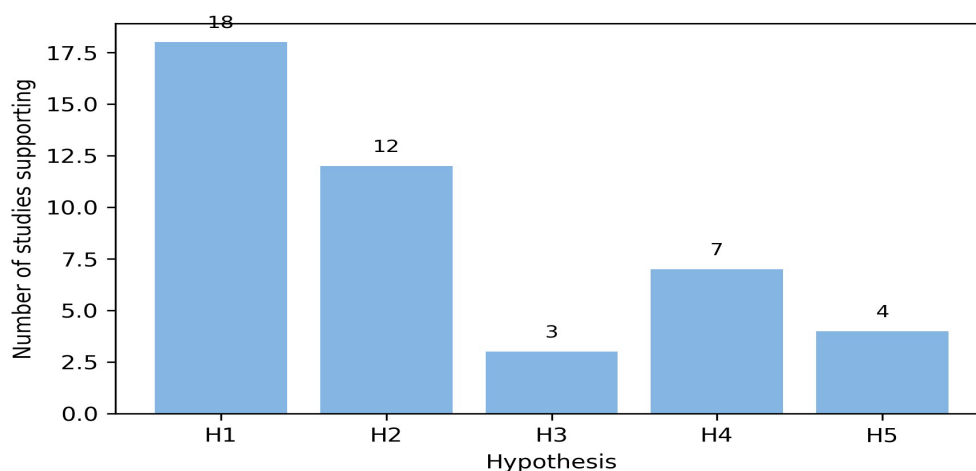
The five hypotheses proposed in Section 1 were validated through structured vote-counting. Studies were classified as supportive, mixed or contradictory according to the reported direction and mechanistic alignment. Where a study directly addressed a mechanism (e.g. ERM–PMS), it was classified under that hypothesis. Otherwise, related evidence was considered supportive but flagged as indirect.

Table N°8 : Validation of hypotheses via structured vote-counting

Hypothesis	Support (k)	Corpus denominator (N)	Direction
H1. Integration → Performance / Resilience	18	50	Supported
H2. Digitalisation × Integration → Outcomes	12	50	Supported
H3. Integration → ERM–PMS → Outcomes	3	50	Partially supported
H4. Managerial competence × Integration → Outcomes	7	50	Supported
H5. Over-reliance on external consultants → weaker sustainability	4	50	Supported with caution

Source : Authors' synthesis.

Figure N°5 : Hypotheses validation summary (vote-counting)



Source : Authors' synthesis.

3.4. Risk-of-bias profile

Common constraints include small samples and reliance on self-report surveys, which may inflate self-assessed control maturity. Qualitative case studies mitigate measurement bias by triangulating artefacts and process data but limit generalisability. Cross-sectional designs cannot adjudicate causality, particularly for digitalisation effects. Several contexts show geographic concentration, which constrains external validity.

Table N°9 : Threats to validity and expected direction of bias for each hypothesis

Threat	Impact on H1	H2	H3	H4	H5
Small samples & cross-sectional designs	Understate generalisability	Overstate short-term tool gains	Under-detect mediation	Blur moderation estimates	Anecdotal generalisation
Self-reports / social desirability	Overstate control maturity	Overstate digital payoffs	Under-document complexity	Overrate competence	Underreport dependence risks
Geographic concentration	Context-specific institutions drive effects	Digital infrastructure varies	Regulatory coupling varies	Leadership norms vary	Professional market varies

Source : Authors' synthesis.

4. Discussion

4.1. Consolidated interpretation of H1 (integration → organisational outcomes)

The corpus indicates that integrated audit-control configurations correlate with improved governance, decision quality and efficiency in SMEs, albeit with variation in depth and sustainability. Mechanistically, risk-management gains show how integration translates into

practice through structured identification, assessment and mitigation cycles, as well as routine feedback from audits to budgets and dashboards (Kupec & Písař, 2021 ; Roffia & Dabić, 2023). Qualitative accounts emphasise that when integration is endogenous, appropriated by owner-managers and embedded in routines, it fosters durable improvements in the control environment and strategic alignment (Bernard, 2019 ; Weber et al., 2024). Conversely, late structuring and fragmented adoption produce only episodic benefits (Meyssonier & Zawadzki, 2009 ; Zawadzki, 2009). H1 is therefore supported, with the proviso that benefits are contingent on appropriation and fit (Alotaibi, 2024 ; Weber et al., 2024).

4.2. Digitalisation as an amplifier (H2)

Evidence consistently frames ERP maturity, BI dashboards and AI / XAI tools as amplifiers of integrated control by improving traceability, timeliness and analytical depth (Shaiti & Al-Matari, 2020 ; Tafuro et al., 2025 ; Broccardo et al., 2025). Controllers evolve into analytical partners, while dashboards connect risk registers with performance dialogues (Fähndrich & Pedell, 2024). Adoption is nonetheless uneven. Cybersecurity, data governance and skills gaps remain prominent barriers, especially in resource-constrained SMEs (Lezhanina, 2025 ; Fähndrich & Pedell, 2024). Trust and explainability are prerequisites for AI-enabled control, so human-in-the-loop designs and XAI become critical to ensure tool uptake (Broccardo et al., 2025 ; Popel, 2025). H2 is thus supported: when integration exists, digitalisation strengthens its effects, when integration is embryonic, technology can catalyse but not substitute for organisational adoption.

4.3. ERM–PMS coupling (H3): theoretical implications

Direct evidence for an ERM–PMS mediation pathway is nascent but promising. Three studies explicitly embed risk indicators within performance measurement systems and report an improved balance between vigilance and value creation (Enhancing ERM–PMS, 2023 ; Appah, 2025 ; Akintobi et al., 2024). The organisational machinery needed to operationalise this linkage is, however, non-trivial for SMEs, and the limited prevalence likely reflects implementation complexity and reporting gaps rather than theoretical weakness. H3 is therefore judged partially supported.

Beyond the empirical count, the ERM–PMS coupling carries several theoretical implications that deserve emphasis. First, it reframes management control as a risk-aware activity: by embedding key risk indicators alongside performance indicators, the control package internalises uncertainty rather than treating risk as an external compliance domain, which extends the levers-of-control logic toward a genuinely integrative architecture. Second, the

coupling provides a concrete mechanism for the contingency argument, since the value of integration is realised only when risk and performance information are processed within the same cognitive and informational cycle, consistent with an enabling-controls reading. Third, by linking vigilance to value creation, the coupling repositions ERM from a defensive, loss-avoidance function to a strategic capability, which aligns risk governance with the resource-based and dynamic-capabilities view of resilience. These implications suggest that the ERM–PMS linkage is not merely an additional variable but a candidate integrative core for a theory of audit–control integration in SMEs, and they justify treating it as a priority for confirmatory research.

4.4. Managerial competence and leadership (H4)

Studies across methods converge on the importance of competence and leadership engagement as moderators of integration outcomes. Enabling-control philosophies and participative routines foster appropriation, creativity and performance (Ismail et al., 2019). Exploratory work in African and European contexts highlights leadership experience and cultural norms as determinants of tool selection and use (Poneï et al., 2025 ; Becker et al., 2011). Case evidence demonstrates that without owner buy-in, integrated tools remain symbolic (Bernard, 2019). H4 is accordingly supported: managerial competence is a genuine amplifier of integration effects.

4.5. Role and risks of external consultants (H5)

External accountants and consultants can enable adoption by importing templates and skills, yet dependence can also impede appropriation, causing tool detachment once the consultant exits (Baldo et al., 2019 ; Nobre & Zawadzki, 2013). Longitudinal failures highlight the need for endogenous change, iterative learning and alignment with the owner's cognitive schemes (Zawadzki, 2011). H5 is thus supported with caution: external advisors are helpful when they coach and co-create, not when they displace internal ownership.

4.6. Why do results vary? Context, mechanisms and emerging economies

Integration succeeds where three conditions co-occur: structural coupling of audit and MCS, so that audit findings feed planning cycles, digital plumbing (ERP / BI) that renders processes observable, and behavioural enablement through participative controls. Absent these, SMEs experience partial integration in which audits remain siloed, KPIs proliferate without discipline and digital tools are underused. Environmental uncertainty and institutional pressures catalyse formalisation in some settings, but resource constraints and cultural norms shape both willingness and capacity to integrate (Poneï et al., 2025 ; Hamadi et al., 2022).

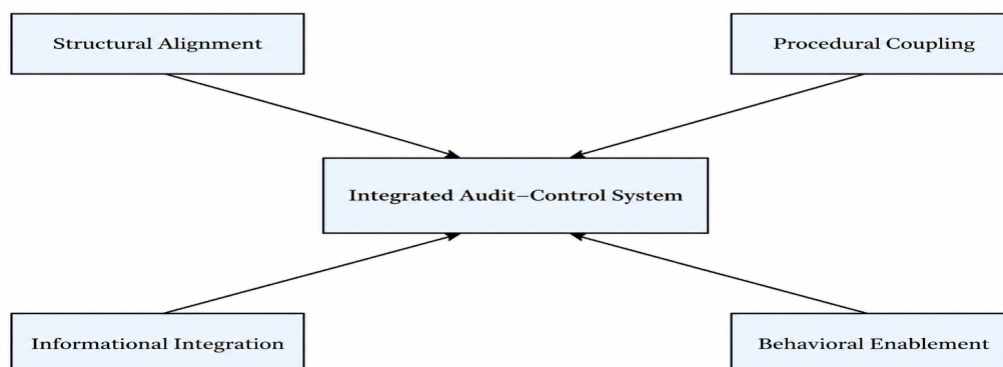
These contingencies are especially consequential for SMEs in emerging economies, which are strongly represented in the corpus through Latin American, African and Asian studies. In such contexts, informality of governance, thin markets for qualified controllers, fragile digital infrastructures and volatile regulatory and tax environments simultaneously raise the expected benefits of integration and the barriers to achieving it. Three practical implications follow. First, because qualified internal expertise is scarce, capability transfer from consultants and from public support programmes is decisive, which sharpens the relevance of H5 for these settings. Second, given uneven ERP and connectivity, emerging-economy SMEs are likely to benefit more from frugal, low-cost digital plumbing (shared dashboards, low-code analytics) than from premature AI pilots, which reframes H2 as a staged trajectory rather than a binary choice. Third, where formalisation is partly driven by tax administration and certification pressures, integrated audit–control can serve as a lever for institutional legitimacy and access to finance, which connects the contingency reading to development-oriented outcomes. Future work should therefore test the proposed mechanisms with samples drawn explicitly from emerging economies and with measures sensitive to informality and resource scarcity.

Table N°10 : Mechanism–context matrix explaining variation in outcomes

Mechanism	Enabling context	Likely outcome	Illustrative studies
Structural coupling (IA ↔ MCS)	Clear roles, audit follow-ups in planning cycles	Faster remediation, alignment	Alotaibi (2024), León et al. (2025)
Digital plumbing (ERP / BI / AI)	ERP maturity, data governance	Timely monitoring, predictive alerts	Shaiti & Al-Matari (2020), Tafuro et al. (2025), Broccardo et al. (2025)
Behavioural enablement	Leadership engagement, enabling controls	Appropriation, sustained use	Ismail et al. (2019), Bernard (2019)
ERM–PMS coupling	Risk competencies, indicator design	Balanced vigilance–value	Enhancing ERM–PMS (2023), Appah (2025)
Consultant coaching (vs substitution)	Co-creation, capability transfer	Endogenous change, resilience	Nobre & Zawadzki (2013), Baldo et al. (2019)

Source : Authors' synthesis.

Figure N°6 : Mechanisms of audit–control integration



Source : Authors' synthesis.

Conclusion

This systematic review with meta-analytic mapping shows that integrated audit–control systems, when appropriated and supported by digital infrastructures, are associated with better governance, decision quality and resilience in SMEs (H1), and that digitalisation acts as an amplifier rather than a substitute (H2). The ERM–PMS pathway is conceptually strong but empirically emergent (H3), managerial competence and leadership are consistent moderators (H4), and over-reliance on external consultants risks undermining sustainability unless capability transfer occurs (H5).

For practice, SME leaders should treat integration as a programme: couple audits to budgeting cycles, design enabling controls and invest in minimum viable digital plumbing (ERP / BI) before piloting AI tools (Armitage et al., 2020 ; Tafuro et al., 2025). Controllers and auditors should use shared risk registers and KPI dashboards and prioritise explainability and user training to convert analytics into action (Shaiti & Al-Matari, 2020 ; Broccardo et al., 2025). Policymakers and support agencies, particularly in emerging economies, should promote ERM–PMS templates and capability-building programmes, recognising competence as a performance multiplier for SMEs (Appah, 2025 ; Enhancing ERM–PMS, 2023).

Several limitations qualify these conclusions. Many primary studies lack standardised effect sizes or rely on self-reports, which curtails quantitative pooling and invites desirability bias (Famacion-Quinco, 2023 ; Escalona & Zambrano, 2025). Cross-sectional surveys and single-site cases dominate, which limits causal inference and external validity (Armitage et al., 2020 ; Zawadzki, 2009). Several studies are regionally concentrated, so institutional effects may not generalise (Roffia & Dabić, 2023 ; León et al., 2025). The reliance on vote-counting is itself a limitation, because the procedure weights studies equally, disregards effect magnitude and can

understate effects under low statistical power, using the full 50-study denominator further produces a conservative reading that underestimates the share of supportive evidence for hypotheses that only a subset of studies set out to test.

Five directions appear especially fruitful:

- Effect-size studies at scale: prioritise multi-country, longitudinal designs that measure the impact of integrated audit–control on financial and resilience outcomes with standardised metrics, enabling a genuine effect-size meta-analysis.
- Digital maturity models for SMEs: develop and validate staged roadmaps linking ERP / BI / AI capabilities to concrete control outcomes, with attention to explainability and cybersecurity.
- ERM–PMS toolkits: co-design pragmatic templates for risk–performance coupling and test their uptake and effects across diverse SME contexts.
- Competence building and enabling controls: evaluate training interventions and leadership coaching, mapping their impact on appropriation and sustained use.
- Consultant engagement models: identify the conditions under which external professionals effectively facilitate adoption, and derive guidelines that favour capability transfer over dependence.

In aggregate, the evidence indicates that integration works, and that it works better with digital support, provided SMEs invest in the human and organisational complements that make tools meaningful: competence, participation and ownership. The road ahead lies in turning promising mechanisms, especially the ERM–PMS coupling and AI-supported analytics, into repeatable, explainable and affordable practices tailored to SME realities, including those of emerging economies.

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