

Artificial Intelligence and the Long-Term Viability of Belgian SMEs: Toward an Integrative Conceptual Framework Based on the Digital Sustainability Paradox

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Abstract

Small and medium-sized enterprises (SMEs) are central to the Belgian economy, yet their long-term viability remains constrained by limited resources, skills, financing capacity, and dependence on external actors. At the same time, artificial intelligence (AI) adoption is accelerating: in 2025, 34.5% of Belgian enterprises with ten or more employees used at least one AI technology, compared with 20.0% across the European Union. Rapid diffusion, however, does not imply an automatically positive effect on long-term viability. This article conducts an integrative literature review and develops a conceptual framework linking AI use to four dimensions of SME long-term viability: organizational survival, financial stability, strategic and entrepreneurial continuity, and adaptive capacity. The central contribution is the concept of the digital sustainability paradox: the same AI use can simultaneously create organizational capability and introduce a new vulnerability. The framework distinguishes automation, analytics and prediction, human judgment augmentation, and knowledge codification mechanisms, and derives eight testable propositions. It further shows that the effects of AI are conditioned by data quality, internal capabilities, augmentation-versus-substitution orientation, digital maturity, firm size, ownership structure, and technological dependence. The article concludes with an empirical research agenda focused on Belgian SMEs and implications for managers and policymakers.

Keywords: SMEs; artificial intelligence; long-term viability; resilience; dynamic capabilities; digital transformation; Belgium; data governance.

1. Introduction

SMEs form the backbone of the Belgian economy. According to the OECD (2024), they account for approximately 99% of firms, 65% of total employment, and 56% of value added. The Federal Public Service (FPS) Economy also recorded 1,186,099 VAT-registered SMEs as of 31 December 2024. This quantitative importance should not obscure their heterogeneity: one-person microenterprises, family businesses, industrial SMEs, service firms, and high-growth companies do not have the same resources, trajectories, or capacity to absorb digital technologies.

The issue of long-term viability is especially important because the mere existence of a firm does not guarantee its continuity over the medium term. Statbel (2025) reports that 89.3% of firms created in 2023 were still active one year later, whereas only 63.5% of firms created in 2019 remained active at the end of 2024. Long-term viability therefore involves more than administrative survival: it requires continuity of operations, financial sustainability, continuity of strategic choices, and the organization's ability to learn and reconfigure itself.

At the same time, AI is rapidly entering business practice. Eurostat (2026a) estimates that 34.5% of Belgian enterprises with ten or more employees used at least one AI technology in 2025, compared with 20.0% across the European Union. Belgium is therefore among the European countries with the highest levels of adoption. The gap between large firms and SMEs

nevertheless remains substantial at EU level: in 2025, approximately 55% of large enterprises used AI, compared with 19% of SMEs (Eurostat, 2026b). This difference suggests that access to resources, skills, and infrastructure remains decisive.

A large share of the recent literature focuses on the determinants of AI adoption in SMEs: digital skills, managerial support, IT infrastructure, competitive pressure, data quality, and organizational readiness (Jöhnk et al., 2021; Almashawreh et al., 2024; Mammadov Huseyn et al., 2024; Apostoae et al., 2025). This literature primarily addresses the question: why does an SME adopt AI? It provides less direct insight into a second, equally important question: what happens to an SME's long-term viability once AI is effectively embedded in its processes?

This shift from adoption to organizational consequences is the starting point of the present article. The digital transformation literature shows that technology does not directly generate performance; its effects are mediated by changes in processes, capabilities, and business models (Vial, 2019; Verhoef et al., 2021). Likewise, research on AI highlights the automation-augmentation paradox: AI can substitute for human tasks, but it can also enhance the quality of human judgment and action (Raisch & Krakowski, 2021). For SMEs, this ambivalence is particularly pronounced because the owner-manager, proximity-based relationships, and tacit knowledge often play a structurally important role (Julien & Marchesnay, 1988; Marchesnay, 1991; Torrès, 1998).

The article therefore addresses the following question: how do different uses of artificial intelligence affect the dimensions of long-term viability of Belgian SMEs, and under what conditions do these effects become beneficial or destabilizing? The article makes three contributions. First, it proposes a multidimensional conceptualization of long-term viability tailored to SMEs. Second, it introduces the digital sustainability paradox, whereby capability creation through AI may be accompanied by a new vulnerability. Third, it translates this reasoning into a testable model comprising eight propositions and a set of moderators reflecting SME heterogeneity.

2. Methodology: an integrative review oriented toward theory building

The research question lies at the intersection of several bodies of literature - SME management, digital transformation, AI adoption, dynamic capabilities, resilience, finance, and governance. A strictly exhaustive systematic review would be appropriate for a narrow question concerning a homogeneous effect; it is less suitable when the objective is to connect heterogeneous theoretical streams in order to build a new model. This article therefore adopts an integrative literature review, following the recommendations of Torraco (2005) and Snyder (2019). The approach combines different conceptual and empirical perspectives to generate new theoretical linkages while maintaining an explicit search and selection procedure.

The corpus was constructed in two strata. The first brings together foundational works required to define SMEs and long-term viability: SME-specific management, proximity, resource dependence, credit rationing, dynamic capabilities, resilience, and family-business succession. The second focuses primarily on the period 2018-August 2026 and covers research on digital transformation, AI in organizations, organizational readiness for AI, and AI adoption in SMEs. Institutional and regulatory data were considered separately in order to document the Belgian and European context.

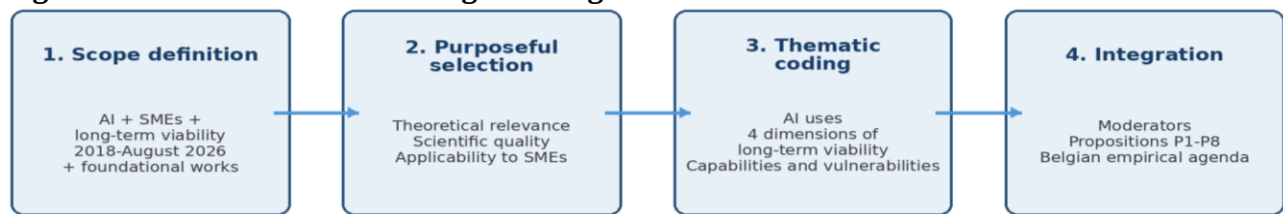
The literature search drew on academic search engines and indexes as well as publishers' platforms (ScienceDirect, SpringerLink, SAGE Journals, AIS eLibrary, and journal websites), complemented by backward and forward citation searching around key studies. Search strings combined the terms "artificial intelligence", "AI adoption", "SME", "small and medium

enterprise", "digital transformation", "organizational resilience", "dynamic capabilities", "sustainability", "financial stability", "family business", and "Belgium". Institutional sources were drawn primarily from Eurostat, FPS Economy, Statbel, the OECD, and the European Commission.

The review included: (a) peer-reviewed studies directly relevant to at least one relationship in the model; (b) foundational books whose concepts continue to be mobilized in recent literature; (c) empirical studies explicitly focused on SMEs or on mechanisms transferable to SMEs; and (d) official institutional sources for statistics and the regulatory framework. Purely promotional texts, untraceable sources, studies describing only a technical solution without an organizational mechanism, and references that could not be verified were excluded. This last rule led to the removal of Revolton (1999), which appeared in an earlier version of the manuscript but could not be verified with sufficient confidence in its primary bibliographic form.

Coding was organized around four categories: type of AI use, organizational capability created, vulnerability introduced, and dimension of long-term viability affected. A second reading identified recurring moderating conditions: data quality, skills, governance, firm size, digital maturity, family ownership, augmentation-versus-substitution orientation, and vendor dependence. The purpose of the corpus is therefore not to calculate an aggregate effect size, but to build a coherent and falsifiable theoretical architecture, consistent with integrative and conceptual review approaches (Webster & Watson, 2002; Snyder, 2019).

Figure 1. Protocol for constructing the integrative review



Source: author's own elaboration, based on Torraco (2005), Webster and Watson (2002), and Snyder (2019).

The figure above makes the methodological logic explicit. It shows that the article is not a narrative summary assembled ad hoc, but an integrative review built in two strata: foundational works used to define the construct of SME long-term viability, and contemporary studies used to theorize AI uses, moderators, and outcomes. This figure strengthens the article by demonstrating transparency and by clarifying why the corpus supports theory building rather than a purely descriptive review.

Table 1. Criteria used to construct and analyze the corpus

Element	Methodological choice	Purpose
Type of review	Integrative and conceptual review	Connect heterogeneous bodies of literature and produce a theoretical model
Main time window	2018-August 2026, supplemented by foundational works	Capture the recent diffusion of AI without losing the theoretical foundations
Units analyzed	Peer-reviewed articles, foundational books, official public data	Separate academic evidence from the statistical and regulatory context

Element	Methodological choice	Purpose
Coding dimensions	AI use; capability created; vulnerability; long-term viability dimension; moderator	Move from descriptive synthesis to testable causal relationships
Rigor criterion	Verifiable and directly relevant references	Reduce the risk associated with uncertain secondary citations

Source: author's own elaboration.

The table above improves the credibility of the review by specifying the inclusion logic, the analytical categories, and the role of each source type. Rather than leaving the corpus implicit, the table makes the selection strategy auditable and helps readers understand how the theoretical framework was assembled.

3. The Belgian context: a particularly relevant empirical setting

3.1. Definition and economic importance of SMEs

European Commission Recommendation 2003/361/EC defines an SME as an enterprise with fewer than 250 employees and either annual turnover not exceeding EUR 50 million or an annual balance-sheet total not exceeding EUR 43 million. Within this category, microenterprises employ fewer than 10 people, small enterprises fewer than 50, and medium-sized enterprises fewer than 250. This distinction is essential because the organizational effects of a technology cannot be assumed to be identical in a one-person business and a firm with 200 employees.

In Belgium, the sector is both extensive and fragmented. The OECD (2024) estimates that SMEs account for approximately 99% of firms, 65% of employment, and 56% of value added. FPS Economy (2025) records 1,186,099 VAT-registered SMEs at the end of 2024, of which 62.9% were located in Flanders, 25.3% in Wallonia, and 10.3% in the Brussels-Capital Region. This structure amplifies the importance of technological diffusion: productivity gains spread across SMEs can have a substantial macroeconomic effect, while poorly absorbed technological shocks can also multiply vulnerabilities at small scale.

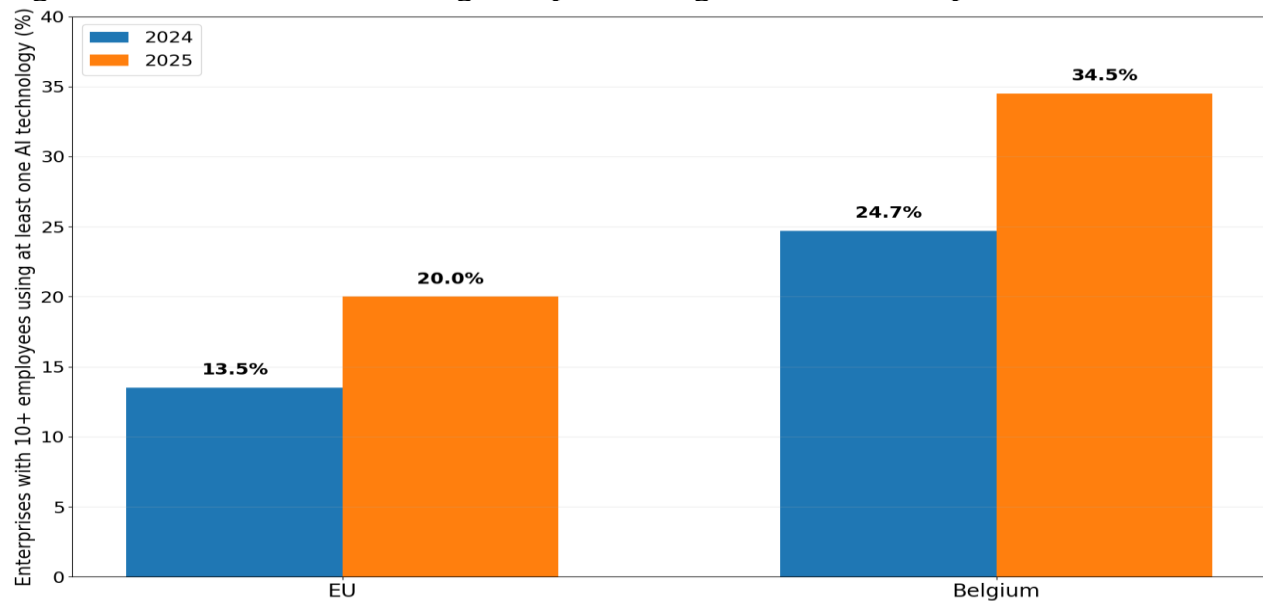
The OECD also points to a Belgian paradox: rapid adoption of digital technologies and high R&D intensity do not automatically translate into equivalent productivity gains. This observation provides a strong rationale for distinguishing adoption, assimilation, and capability creation. A firm may purchase or activate an AI tool without changing its routines, skills, or governance sufficiently to generate lasting improvement.

3.2. AI adoption among the highest in Europe

Eurostat data show a very rapid acceleration. In 2024, 24.7% of Belgian enterprises with ten or more employees used at least one AI technology, compared with 13.5% across the European Union. In 2025, the corresponding share reached 34.5% in Belgium and 20.0% in the EU. Belgium's increase of almost ten percentage points in one year confirms that AI is no longer a marginal issue for the country's enterprises.

The statistic nevertheless requires cautious interpretation: Eurostat's scope mainly covers enterprises with ten or more employees, whereas a large share of the Belgian business population consists of microenterprises. The absence of equally detailed measurement for the smallest firms creates an empirical blind spot. This blind spot is especially important for research on long-term viability because microenterprises are precisely the firms for which fixed costs, vendor dependence, and limited internal capabilities may alter the benefit-risk balance of AI.

Figure 2. Growth in AI use among enterprises: Belgium and the European Union



Source: author's own elaboration based on Eurostat (2025, 2026a). **Scope:** enterprises with 10 or more employees.

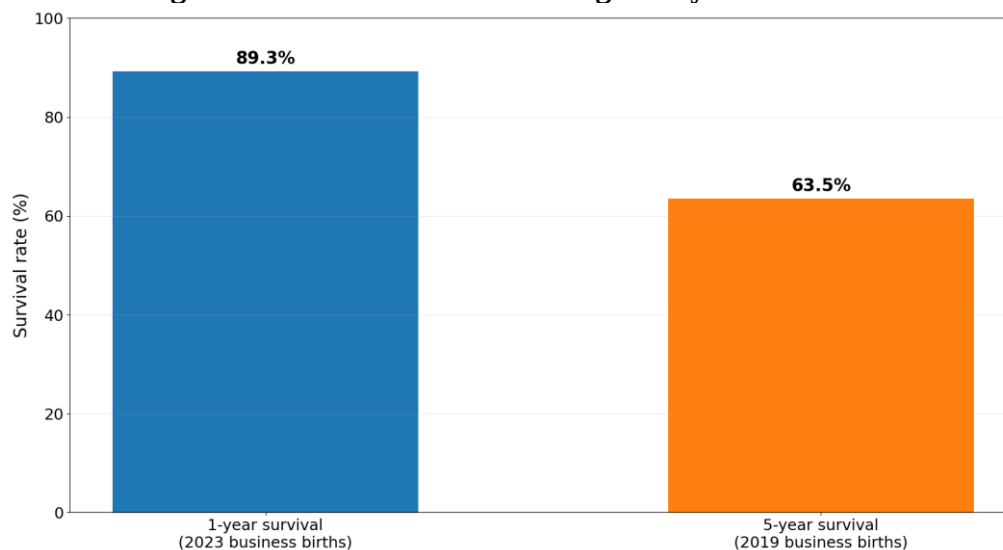
The figure shows that Belgium is not a marginal digital context. The rapid increase in AI use and Belgium's position above the European average justify the relevance of the empirical setting. The figure therefore supports the article's central argument that the key issue is no longer whether AI exists in Belgian firms, but how its concrete uses affect long-term viability.

3.3. Long-term viability, survival, and the regulatory framework

Survival data further support a dynamic perspective. Statbel (2025) reports that 89.3% of firms created in 2023 were still active at the end of 2024, whereas the five-year survival rate of firms created in 2019 was 63.5%. The decline across these horizons is a reminder that a one-off performance improvement or short-term operational gain is not sufficient to establish long-term viability. The scientific challenge is therefore to identify the mechanisms through which AI shapes trajectories over several years.

The institutional context also reinforces the need for governance. As of 2 August 2026, most provisions of the European Union's Artificial Intelligence Act are applicable or entering into enforcement, including transparency obligations for certain systems. The timeline has been modified for some high-risk categories, whose deadlines have been postponed to 2027 or 2028. For SMEs, the regulatory framework represents both a potential compliance cost and a risk-reduction mechanism: documentation, transparency, control over AI uses, and accountability can strengthen trust and reduce some of the vulnerabilities associated with AI.

Figure 3. Business survival in Belgium by time horizon



Source: author's own elaboration based on Statbel (2025).

This figure complements the adoption narrative with a viability perspective. It reminds the reader that firm continuity erodes over time and that long-term viability cannot be inferred from short-term survival alone. This visual reinforces the need to examine AI effects against a dynamic horizon rather than through one-off performance snapshots.

4. SME long-term viability: a multidimensional construct

Long-term viability cannot be reduced to maintaining a positive accounting result. In SMEs, financial, strategic, and operational decisions are often tightly intertwined around the owner-manager (Julien & Marchesnay, 1988; Marchesnay, 1991). Torrès (1998) also emphasizes the logic of proximity that characterizes part of SME management: hierarchical, temporal, cognitive, and relational proximity. These characteristics make certain intangible assets - trust, tacit knowledge, customer relationships, and owner-manager intuition - particularly important.

The framework retains four complementary dimensions. They are not conceived as four independent states, but as interdependent dimensions in which fragility can propagate from one to another. A cash shortfall can reduce investment capacity; the loss of skills can weaken adaptive capacity; and technological dependence can simultaneously affect organizational survival, financial stability, and strategic continuity.

4.1. Organizational survival

Organizational survival refers to the SME's minimum capacity to maintain operations, retain essential human and technical resources, serve customers, and access the resources on which it depends. Resource dependence theory (Pfeffer & Salancik, 1978) reminds us that organizations never fully control all critical resources required for their operation. In SMEs, concentration among customers, suppliers, banks, or technology providers can make this dependence particularly visible.

4.2. Financial stability

Financial stability refers to the capacity to finance operations, absorb cash-flow shocks, preserve access to credit, and support the investments required for continuity. Information asymmetry can restrict small firms' access to finance and lead to credit rationing (Stiglitz & Weiss, 1981). AI may therefore be valuable when it improves forecasting, reporting quality, or working-capital

management; conversely, it may weaken an SME when fixed costs, maintenance requirements, or uncertainty surrounding return on investment exceed the financial resources available.

4.3. Strategic and entrepreneurial continuity

Strategic and entrepreneurial continuity refers to the firm's ability to preserve coherence among its trajectory, market positioning, owner-manager choices, and the transfer of key knowledge. This dimension does not imply immobility: a strategy can evolve while remaining consistent with the SME's distinctive capabilities and value-creation logic. In family firms, succession adds a specific dimension. Bughin and Colot (2008) show that family ownership does not mechanically produce superior performance; Colot (2009), however, highlights the importance of succession planning. AI can help codify routines and knowledge, but it can also shift decision making toward quantifiable indicators at the expense of judgment, experience, or trust-based relationships.

4.4. Adaptive capacity

The fourth dimension concerns the ability to detect change, seize opportunities, and reconfigure resources. This perspective draws on Teece's (2007) dynamic capabilities theory and Duchek's (2020) process view of resilience, which combines anticipation, response, and learning. AI can increase the speed of information detection and processing, but excessive dependence on historical data can make the organization less attentive to unprecedented disruptions and qualitative signals.

Table 2. The four dimensions of SME long-term viability

Dimension	Core question	Critical resources	Examples of empirical indicators
Organizational survival	Can the SME continue operating?	Key personnel, suppliers, customers, tools, access to resources	Operational continuity, disruptions, supplier/customer concentration, turnover of key skills
Financial stability	Can it finance its activities over time?	Cash, credit, margins, working capital requirements, investment capacity	Cash flow, cash-flow volatility, customer payment delays, financing cost, margin
Strategic continuity	Does it remain coherent with its value-creation logic?	Vision, tacit knowledge, customer relationships, governance, succession	Positioning stability, algorithmic dependence, knowledge codification, succession preparedness
Adaptive capacity	Can it detect and absorb change?	Information, learning, flexibility, skills	Decision speed, innovation, process reconfiguration, response to shocks

Source: author's synthesis based on Marchesnay (1991, 2004), Stiglitz and Weiss (1981), Teece (2007), Duchek (2020), Bughin and Colot (2008), and Colot (2009).

The table above is the conceptual backbone of the article. It clarifies that long-term viability is multidimensional and that the review does not reduce SME durability to accounting performance. By distinguishing organizational survival, financial stability, strategic and

entrepreneurial continuity, and adaptive capacity, the table structures the entire theoretical argument and prepares the logic of the propositions.

5. From adoption to assimilation: AI as an organizational capability with dual effects

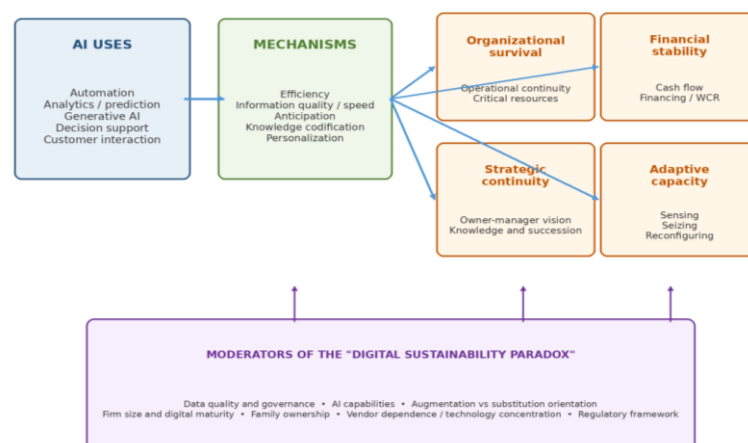
The SME digitalization literature shows that the presence of a technology is not equivalent to value creation. Eller et al. (2020) link digitalization to financial performance but also show that available resources determine the quality of this transformation. Vial (2019) and Verhoef et al. (2021) conceptualize digital transformation as a process in which technology triggers strategic and organizational responses. This logic leads to three distinct levels: adoption (the tool is available), assimilation (the tool is embedded in routines), and capability (the organization can repeatedly use the tool to achieve a strategic outcome).

For AI, this distinction is reinforced by the automation-augmentation paradox. Raisch and Krakowski (2021) show that automation and augmentation are interdependent: replacing a human task often changes the tasks that remain, while augmenting human judgment entails a redistribution of responsibilities between the user and the system. For an SME, the choice between substitution and augmentation is not neutral. Substitution can reduce costs while increasing dependence and loss of know-how; augmentation can preserve owner-manager judgment but requires more skills and supervision.

Research on organizational readiness for AI confirms the importance of these conditions. Jöhnk et al. (2021) identify strategic alignment, resources, knowledge, culture, and data as readiness factors. Studies specifically focused on SMEs identify similar mechanisms: skills, availability of IT experts, training, infrastructure, management support, and the Technology-Organization-Environment framework (Mammadov Huseyn et al., 2024; Almashawreh et al., 2024; Apostoaie et al., 2025). These studies explain the likelihood of adoption well. The present article extends this logic by treating these factors as conditions that determine whether adoption is converted into long-term viability.

We therefore propose the concept of the digital sustainability paradox: an AI use improves an SME's long-term viability only when the organizational capability created exceeds and durably compensates for the new vulnerability introduced by that use. The paradox does not imply that AI is inherently negative; rather, it implies that value creation cannot be assessed independently of the associated dependence, cost, opacity, loss of skills, or regulatory risk.

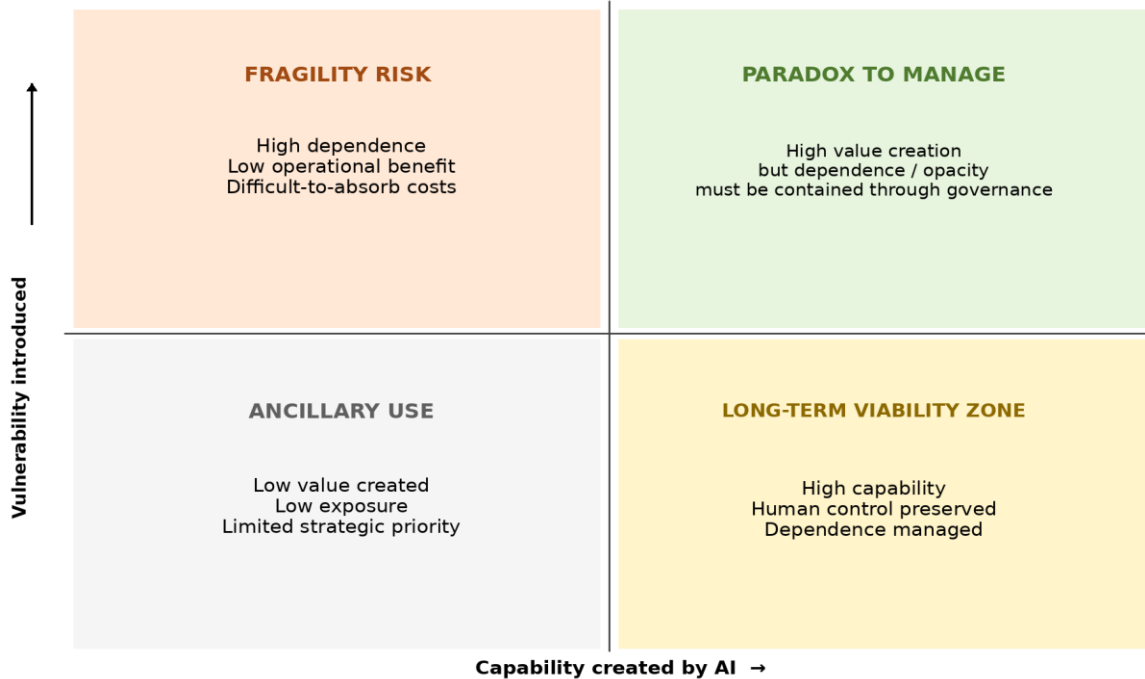
Figure 4. Integrative conceptual framework: AI, capabilities, long-term viability, and moderators



Source: author's own elaboration

This figure is the core model of the manuscript. It synthesizes the article's causal logic by linking AI uses to organizational capabilities, then to the four dimensions of long-term viability, while making moderators explicit. The figure helps readers see that the effect of AI is indirect and conditional rather than automatic.

Figure 5. The digital sustainability paradox



Source: author's own elaboration.

The figure above condenses the article's original theoretical contribution into a simple mechanism. It emphasizes that AI should not be evaluated only through immediate efficiency gains: every capability created may be accompanied by a new source of vulnerability, such as opacity, dependence, or skills erosion. This figure is useful because it gives the review a memorable conceptual signature.

6. Effects of AI on the dimensions of long-term viability: theoretical propositions

6.1. Automation and organizational survival

In SMEs with small teams, automating administrative, accounting, commercial, or document-processing tasks can free up time and reduce delays. Davenport and Ronanki (2018) emphasize that the most realistic AI applications are often targeted and tied to clearly identified processes. This logic is particularly relevant when the time of the owner-manager or multi-skilled employees is a scarce resource.

The operational gain can, however, be reversed when automation makes a critical task incomprehensible to employees, when the provider becomes irreplaceable, or when the firm stops maintaining the skills needed for a fallback procedure. The readiness factors identified by Jöhnk et al. (2021) therefore imply that automation improves survival only if the firm retains a minimum capacity for supervision and manual recovery. We therefore rely on this idea to frame our first research proposal: *“The intensity of AI use for process automation is positively associated with SME organizational survival”*.

6.2. Predictive analytics and financial stability

Analytical uses can improve cash-flow forecasting, anomaly detection, customer credit-risk monitoring, margin management, and resource allocation. In a context where SMEs may face financing constraints and information asymmetry (Stiglitz & Weiss, 1981), improvements in reporting quality and anticipation can strengthen the firm's ability to avoid a liquidity crisis.

However, prediction quality depends on the volume, relevance, and stability of the data. A small firm may have histories that are too short or irregular to generate actionable accuracy. Integration costs, licenses, dependence on a provider, and data-preparation time must therefore be included in the return-on-investment calculation. The relevant mechanism is not "AI -> finance", but "AI + data + interpretive capability -> better financial decisions". Hence our second research proposal: ***“The use of predictive AI is positively associated with SME financial stability”***.

6.3. AI, owner-manager judgment, and strategic continuity

Strategic continuity is the dimension for which the opposition between augmentation and substitution is most consequential. SMEs frequently rely on tacit knowledge of customers, markets, and partners, as well as rapid trade-offs made by the owner-manager. AI can make this information more accessible, identify trends, and structure scenarios. It can also codify part of organizational knowledge and reduce the risk of information loss during succession.

Conversely, substituting opaque recommendations for judgment can lead a firm to prioritize easily quantifiable factors at the expense of relational or strategic signals. The issues of explainability, fairness, and accountability identified by Floridi et al. (2018) and Jobin et al. (2019) then become directly organizational: a statistically efficient decision can still damage trust with a customer, employee, or partner. We therefore rely on this to frame the following third research proposal: ***“The effect of AI on entrepreneurial continuity is more favorable when AI is used to augment owner-manager judgment than when it substitutes for that judgment in decisions”***.

6.4. AI and adaptive capacity

AI can strengthen sensing by rapidly processing market, customer, or production data; it can support seizing by comparing scenarios and setting priorities; and it can contribute to reconfiguring by identifying processes or resources to be reallocated. This articulation links analytical capabilities to the dynamic capabilities described by Teece (2007) and the resilience mechanisms studied by Duchek (2020). In the broader context of advanced analytics, Mikalef et al. (2020) show that the value of analytical capabilities is mediated precisely by their contribution to dynamic and operational capabilities.

The risk stems from the retrospective nature of most training and management data. A genuinely novel disruption may make past regularities weakly informative. A SME that confuses model accuracy with strategic certainty may then pay less attention to uncoded weak signals. AI therefore strengthens adaptation when it diversifies available information and accelerates learning, not when it rigidifies decision making around a single recommendation. Hence the following fourth research proposal: ***“the use of AI for analytics and decision support is positively associated with SME adaptive capacity”***.

6.5. Moderators of the digital sustainability paradox

6.5.1. Data quality and governance

AI does not automatically correct flaws in the information system on which it relies. Missing data, inconsistent definitions, limited historical depth, or collection bias can accelerate a poor decision. Data governance encompasses quality, traceability, access rights, confidentiality, retention, and auditability. It becomes increasingly important as the EU AI Act and data-

protection rules strengthen requirements for control and transparency. We rely on this to frame the following research proposal: ***“Data quality and governance strengthen the positive effect of AI uses on all four dimensions of long-term viability”***.

6.5.2. Internal capabilities and absorptive capacity

Empirical research on adoption converges on the role of skills. Mammadov Huseyn et al. (2024) show that the presence of IT expertise, training, and certain management capabilities increases the likelihood of adoption; Almashawreh et al. (2024) likewise highlight infrastructure, IT knowledge, and management support. After adoption, these same variables become absorptive capacity: the ability to understand outputs, detect an error, redesign a process, and engage effectively with a provider. This leads us to frame the following sixth research proposal: ***“The level of internal digital and AI capabilities positively moderates the relationship between AI use and long-term viability”***.

6.5.3. Augmentation-versus-substitution orientation and human control

Human control does not mean that every decision must remain manual. It means that the firm retains the ability to identify decisions requiring contextualized judgment, understand the limitations of an output, and intervene when the consequences are significant. This orientation is consistent with the automation-augmentation paradox of Raisch and Krakowski (2021) and with the principles of accountability and transparency in the AI ethics literature. Hence the following research proposal: ***“An orientation favoring augmentation of human work positively moderates AI's effect on strategic continuity, stakeholder trust, and adaptation”***.

6.5.4. Firm size, maturity, ownership, and technological dependence

SME heterogeneity should be treated as a variable rather than a peripheral limitation. A microenterprise may benefit substantially from a generative assistant or automated tool precisely because it has few employees; yet the same tool may represent a larger share of its budget and concentrate dependence on a provider. Medium-sized enterprises generally possess more data, specialized functions, and bargaining capacity, but their integration challenges are also more complex.

Family ownership may also alter the effects. During succession, codifying knowledge in digital systems can reduce the loss of organizational memory; at the same time, excessive formalization may overlook relational dimensions of knowledge. Finally, dependence on a single vendor, API, or proprietary model represents a contemporary form of resource dependence. Such dependence can affect costs, availability, data portability, and exit capacity. We therefore frame the following research proposal: ***“Concentrated technological dependence on a single provider or ecosystem negatively moderates the relationship between AI use and long-term viability”***.

7. Model synthesis and operationalization for empirical validation

The proposed framework leads to a more precise causal chain than the direct relationship "AI adoption -> performance". AI should be measured through its uses and degree of assimilation; these uses generate intermediate mechanisms; the mechanisms affect several dimensions of long-term viability; and moderators ultimately determine whether the capability created outweighs the vulnerability introduced. This architecture can be tested through surveys, accounting data, longitudinal interviews, or mixed methods.

Table 3. Summary of the theoretical propositions

Prop.	AI use / mechanism	Expected effect	Key condition
P1	Automation	↑ Organizational survival	Control, continuity, substitutability

Prop.	AI use / mechanism	Expected effect	Key condition
P2	Analytics / prediction	↑ Financial stability	Data quality and ROI
P3	Augmentation of judgment	↑ Strategic continuity	Limited substitution in ambiguous decisions
P4	Decision support / analytics	↑ Adaptive capacity	Learning and reconfiguration
P5	Data governance	Strengthens positive effects	Quality, traceability, compliance
P6	AI capabilities	Strengthens survival and adaptation	Absorptive capacity
P7	Augmentation orientation	Strengthens strategy and trust	Appropriate human control
P8	Vendor dependence	Reduces long-term viability	Low portability / low substitutability

Source: author's own elaboration

The table above converts the review into a theory-building contribution. By organizing the propositions in a single place, it makes the causal logic explicit and facilitates empirical testing, replication, and comparison across future studies.

Table 4. Proposed operationalization for an empirical study in Belgium

Construct	Examples of variables	Possible measure	Data sources
AI assimilation	Number of AI-enabled processes; frequency; criticality; information-system integration	Composite index or Likert scale	Owner-manager survey / information-system audit
Organizational survival	Incidents, downtime, supplier concentration, critical departures	Counts / ratios / scales	Survey + operational data
Financial stability	Cash-flow volatility, margin, working capital requirements, customer delays, AI cost	Accounting ratios; before/after change	Financial statements + ERP
Strategic continuity	Decision-strategy consistency, knowledge codification, succession preparedness	Scales + interviews	Owner-managers / family firms
Adaptation	Response time, innovations, reconfigurations, learning	Dynamic-capability scales	Longitudinal survey
Data governance	Quality, documentation, access rights, audits	Maturity index	Internal audit / questionnaire

Construct	Examples of variables	Possible measure	Data sources
Technological dependence	Share of critical processes tied to one provider; switching cost	Ratio / concentration score	Contracts / IT architecture

Source: author's proposal

The table above moves the article from conceptual synthesis to research design. It shows how each construct can be operationalized in a Belgian empirical study, which increases the article's publishability by making the framework testable. The table also demonstrates that the review can directly inform future surveys, case studies, or longitudinal mixed-method designs.

To provide a more synoptic synthesis of the review, Figure 6 maps the main literature streams, the key studies, their objectives, and the strategic insights that emerge from the article. This visual is designed to make the review more impactful for readers, reviewers, and future empirical researchers.



Figure 6. Spider-web map of the literature: AI and the long-term viability of Belgian SMEs

Source: author's own elaboration.

This figure provides a synthetic reading grid for the whole review. By bringing together the foundational streams, the major studies, the years of publication, and the purpose of each contribution, it helps readers quickly identify where the literature is concentrated and where the gaps remain. The figure also highlights the review's main added value: shifting attention from AI adoption alone toward the digital sustainability paradox and the four-dimensional analysis of SME long-term viability.

Taken together, Figures 4 to 6 and Tables 2 to 5 provide the article's analytical scaffolding: the four-dimensional definition of viability, the causal framework, the paradox mechanism, the theoretical propositions, the empirical operationalization, and the priority research agenda.

8. Discussion and theoretical contributions

The first contribution is to distinguish long-term viability from simple performance. A productivity gain or reduction in processing time does not in itself improve long-term viability if it is accompanied by critical dependence, financial fragility, or reduced adaptive capacity. This distinction is particularly important for SMEs because their margins for maneuver are more limited and several functions may depend on only a few individuals.

The second contribution is to shift the literature from adoption toward assimilation and capability. TOE and AI-readiness frameworks explain why some firms adopt more easily (Jöhnk et al., 2021; Apostoae et al., 2025). The present model proposes that these factors continue to operate after adoption by determining whether the tool is converted into a durable capability. This distinction opens an empirical avenue: two SMEs using the same tool may experience very different effects on long-term viability depending on their governance, skills, and architecture of dependence.

The third contribution lies in the digital sustainability paradox. Existing studies document the automation-augmentation paradox (Raisch & Krakowski, 2021) and the tensions of digital transformation; the proposed framework explicitly connects these tensions to organizational longevity. The argument is not simply that technology has an abstract positive side and negative side. It is more specific: the same AI decision can simultaneously increase a capability and a dependence, and long-term viability depends on how the organization governs this pair.

The fourth contribution concerns SME heterogeneity. Rather than treating firm size as a simple control variable, the model suggests that size changes the economics of technological risk. Small firms may gain considerable leverage when AI compensates for limited labor, but they may also be more exposed to fixed costs, vendor concentration, or the loss of key know-how. This tension justifies separate tests across micro, small, and medium-sized enterprises.

Finally, the Belgian context offers a potentially valuable empirical contribution. Belgium combines a high density of SMEs, one of the highest AI-adoption rates in the EU, and a European regulatory environment currently moving into application. It therefore provides a relevant setting for studying not merely the willingness to adopt AI, but whether and how already advanced diffusion is translated into long-term viability.

9. Managerial and public policy implications

9.1. Implications for SME owner-managers

The framework first suggests that the relevant question is not "Should we adopt AI?" but "What organizational problem are we trying to solve, and what new dependence are we willing to accept?" Every adoption decision should therefore link a measurable objective - lead time, cost, accuracy, continuity, revenue, or risk - to a vulnerability register covering data, vendors, skills, compliance, security, and reversibility.

Second, low-criticality uses that enable rapid learning generally provide a more robust entry point: document assistance, summarization, classification, automation of repetitive tasks, or exploratory analysis. Strategic decisions, sensitive financial decisions, HR decisions, and relationship-intensive decisions require greater control, documentation, and human validation. SMEs should also treat reversibility as an investment criterion: data exportability, process documentation, alternative vendors, minimum manual fallback procedures, and internal supervisory capabilities.

9.2. Implications for policymakers and business-support schemes

Public policies that focus solely on the number of firms that have "adopted AI" risk measuring diffusion without measuring the value created. Support programs could incorporate assimilation indicators such as skills, data quality, governance, security, process integration, and the capacity to assess return on investment.

The Belgian context also argues for size-differentiated support. Microenterprises need simple tools to assess vendor risk, model contractual clauses, pooled cybersecurity resources, and AI training. More structured SMEs may benefit from governance diagnostics, sectoral sandboxes, and support for integrating more complex systems. Innovation measures provided under the European framework, including testing and experimentation schemes, can reduce compliance and learning costs provided that they are genuinely accessible to smaller firms.

10. Limitations and research agenda

This study first faces the limitations inherent in an integrative review. The corpus was assembled for explanatory power rather than to provide an exhaustive estimate of all existing publications. A systematic or bibliometric review could complement this work by quantifying dominant streams, sectors, and methods. Second, empirical literature directly examining the long-term effects of AI on SME viability remains limited; some mechanisms are therefore derived from research on adoption, digital transformation, advanced analytics, and resilience.

A second limitation concerns Belgian statistics. Eurostat indicators of AI use mainly cover enterprises with ten or more employees, whereas microenterprises occupy a major place in the Belgian entrepreneurial landscape. Future research should therefore oversample firms with fewer than ten employees and distinguish self-employed businesses, employer microenterprises, small firms, and medium-sized enterprises.

Third, causality must be studied longitudinally. Better-performing SMEs often have more resources with which to adopt AI; a positive correlation between AI and long-term viability may therefore reflect prior selection rather than a causal effect. Panel data, difference-in-differences designs around an identifiable adoption event, longitudinal case studies, or mixed methods would be better suited than a single cross-sectional survey.

Fourth, types of AI need to be distinguished. Generative AI, automation, predictive models, and decision systems create different cost structures, dependencies, and risks. Future research should measure intensity of use, process criticality, the degree of autonomy granted to the system, and reversibility. Finally, sector, family ownership, and digital maturity should be tested as moderators rather than assumed to be constant.

Table 5. Priority research agenda on AI and the long-term viability of Belgian SMEs

Research question	Recommended design	Expected contribution
Does AI improve 3- to 5-year survival?	Panel of adopting vs non-adopting SMEs	Move from short-term performance to long-term viability

Research question	Recommended design	Expected contribution
Which uses produce the best capability/vulnerability ratio?	Multi-use survey + operational data	Test the digital sustainability paradox
Do microenterprises benefit as much as medium-sized SMEs?	Size-stratified sampling	Identify nonlinear size effects
Does family ownership change the effect of AI?	Family vs non-family comparison	Test knowledge codification and succession mechanisms
Does vendor dependence erode long-term gains?	Concentration measures + incidents + switching costs	Connect resource dependence and AI
Can AI Act compliance become a trust capability?	Sector studies, 2026-2028	Connect regulatory governance and legitimacy

Source: author's own elaboration

This table ensures that the article ends with a focused and actionable research agenda. It identifies the most promising directions for the field and shows that the review does not stop at synthesis, but actively structures the next wave of empirical work.

Conclusion

The rapid expansion of artificial intelligence in Belgian firms makes an approach limited to adoption determinants insufficient. The central question is now one of organizational consequences. The proposed framework argues that AI does not automatically improve long-term viability: it transforms processes and creates capabilities, but can simultaneously generate dependencies, costs, loss of know-how, or governance risks.

Long-term viability is therefore analyzed across four dimensions: organizational survival, financial stability, strategic and entrepreneurial continuity, and adaptive capacity. AI's effects on these dimensions depend on data quality, skills, augmentation-versus-substitution orientation, digital maturity, organizational structure, and technological dependence. The digital sustainability paradox captures this logic: value creation becomes durable when the SME retains enough control for the capability created to exceed the vulnerability introduced.

In a country where AI adoption is among the highest in Europe, the next research step is therefore no longer simply to measure how many SMEs use AI. It is to determine which uses actually make them more capable of enduring over time, under which organizational configurations, and with which safeguards.

References

- Almashawreh, R., Talukder, M., Chatrath, S. K., & Khan, I. (2024). AI adoption in Jordanian SMEs: The influence of technological and organizational orientations. *Global Business Review*, advance online publication. <https://doi.org/10.1177/09721509241250273>
- Apostoaie, C.-M., Roman, T., Maxim, A., & Jijie, D.-T. (2025). Determinants of AI adoption intention in SMEs: Romanian case study. *Journal of Business Economics and Management*, 26(2), 277–296. <https://doi.org/10.3846/jbem.2025.23650>
- Bughin, C., & Colot, O. (2008). La performance des PME familiales belges : une étude empirique [Performance of Belgian family SMEs: An empirical study]. *Revue française de gestion*, 34(186), 1-17. <https://doi.org/10.3166/rfg.186.1-17>

- Colot, O. (2009). Préparation des PME familiales belges à la transmission et impact sur la performance [Preparing Belgian family SMEs for succession and its impact on performance]. *Revue internationale P.M.E.*, 22(2), 95-132. <https://doi.org/10.7202/044032ar>
- Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, 96(1), 108–116.
- Duchek, S. (2020). Organizational resilience: A capability-based conceptualization. *Business Research*, 13, 215–246. <https://doi.org/10.1007/s40685-019-0085-7>
- Eller, R., Alford, P., Kallmünzer, A., & Peters, M. (2020). Antecedents, consequences, and challenges of small and medium-sized enterprise digitalization. *Journal of Business Research*, 112, 119–127. <https://doi.org/10.1016/j.jbusres.2020.03.004>
- European Commission. (2003). Commission Recommendation 2003/361/EC concerning the definition of micro, small and medium-sized enterprises. *Official Journal of the European Union*, L 124, 36–41.
- European Commission. (2026). Timeline for the implementation of the EU AI Act. AI Act Service Desk. <https://ai-act-service-desk.ec.europa.eu/en/ai-act/eu-ai-act-implementation-timeline>
- European Union. (2024). Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), as subsequently amended. *Official Journal of the European Union*. <https://eur-lex.europa.eu/eli/reg/2024/1689/oj>
- Eurostat. (2025). Usage of AI technologies increasing in EU enterprises. *Eurostat News*, 23 January 2025. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250123-3>
- Eurostat. (2026a). The use of artificial intelligence technologies in the European Union: Key results – 2026 edition. Publications Office of the European Union. <https://doi.org/10.2785/9221093>
- Eurostat. (2026b). Digitalisation in Europe – 2026 edition. Interactive publication. <https://ec.europa.eu/eurostat/web/interactive-publications/digitalisation-2026>
- Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., et al. (2018). AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Minds and Machines*, 28(4), 689–707. <https://doi.org/10.1007/s11023-018-9482-5>
- Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, 1(9), 389–399. <https://doi.org/10.1038/s42256-019-0088-2>
- Jöhnk, J., Weißert, M., & Wyrski, K. (2021). Ready or not, AI comes—An interview study of organizational AI readiness factors. *Business & Information Systems Engineering*, 63, 5–20. <https://doi.org/10.1007/s12599-020-00676-7>
- Julien, P.-A., & Marchesnay, M. (1988). *La petite entreprise : principes d'économie et de gestion* [The small firm: Principles of economics and management]. Vuibert.
- Marchesnay, M. (1991). *La PME : une gestion spécifique* [The SME: A specific form of management]. *Économie rurale*, 206, 11-17.
- Marchesnay, M. (2004). *Management stratégique* [Strategic management]. Les Éditions de l'ADREG.
- Mammadov Huseyn, Ruiz-Gándara, Á., González-Abril, L., & Romero, I. (2024). Adoption of artificial intelligence in small and medium-sized enterprises in Spain: The role of competences and skills. *Amfiteatru Economic*, 26(67), 848–866. <https://doi.org/10.24818/EA/2024/67/848>

- Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. A. (2020). Exploring the relationship between big data analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities. *Information & Management*, 57(2), 103169. <https://doi.org/10.1016/j.im.2019.05.004>
- OECD. (2024). OECD Economic Surveys: Belgium 2024. OECD Publishing. <https://doi.org/10.1787/c671124e-en>
- Pfeffer, J., & Salancik, G. R. (1978). The external control of organizations: A resource dependence perspective. Harper & Row.
- Raisch, S., & Krakowski, S. (2021). Artificial intelligence and management: The automation–augmentation paradox. *Academy of Management Review*, 46(1), 192–210. <https://doi.org/10.5465/amr.2018.0072>
- Rawashdeh, A., Bakhit, M., & Abaalkhail, L. (2023). Determinants of artificial intelligence adoption in SMEs: The mediating role of accounting automation. *International Journal of Data and Network Science*, 7, 25–34. <https://doi.org/10.5267/j.ijdns.2022.12.010>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Federal Public Service Economy. (2025). Statistiques relatives aux PME en Belgique [Statistics on SMEs in Belgium]. Federal Public Service Economy, SMEs, Self-employed and Energy. <https://economie.fgov.be/fr/themes/entreprises/pme-et-independants-en/statistiques-relatives-aux-pme>
- Statbel. (2025). 63,5 % des entreprises créées en 2019 étaient encore actives en 2024 [63.5% of firms created in 2019 were still active in 2024]. Belgian statistical office, 16 October 2025. <https://statbel.fgov.be/fr/nouvelles/635-des-entreprises-creees-en-2019-etaient-encore-actives-en-2024>
- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71(3), 393–410.
- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4(3), 356–367. <https://doi.org/10.1177/1534484305278283>
- Torrès, O. (1998). PME : de nouvelles approches [SMEs: New approaches]. *Economica*.
- Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2), xiii–xxiii.