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A DATA-DRIVEN SMALL BUSINESS OPERATING SYSTEM BASED ON INTEGRATED IT, FINANCIAL ACCOUNTING, AND OPERATIONAL ARCHITECTURE

ОПЕРАЦІЙНА СИСТЕМА УПРАВЛІННЯ МАЛИМ БІЗНЕСОМ НА ОСНОВІ ДАНИХ, ПОБУДОВАНА НА ІНТЕГРОВАНІЙ ІТ, ФІНАНСОВО-ОБЛІКОВІЙ ТА ОПЕРАЦІЙНІЙ АРХІТЕКТУРІ

The article substantiates the conceptual foundations of a data-driven small business operating system based on the integration of IT solutions, financial accounting architecture, and operational procedures. It is argued that the use of multiple digital tools does not automatically ensure managerial clarity if these tools remain disconnected from accounting logic and everyday business processes. The proposed system is conceptualized as an integrated management architecture in which financial accounting serves as the core mechanism for structuring, verifying, and interpreting operational data. The study identifies the objectives and principles of such a system, including data integrity, a single source of truth, closed information loops, process discipline, accrual-based accounting, tax readiness, and business value measurement. Particular attention is given to the coordination of CRM, payment, payroll, banking, accounts payable, and accounting systems within one coherent operating framework. The results demonstrate that this approach can reduce informational fragmentation, improve financial transparency, strengthen managerial control, support informed decision-making, and increase the scalability and transferability of small businesses.

Keywords: data-driven *management, small business, operating system, IT integration, financial accounting architecture, operational procedures, management control, information integration.*

У статті обґрунтовано концептуальні засади побудови операційної системи управління малим бізнесом на основі даних, що базується на інтеграції ІТ-рішень, фінансово-облікової архітектури та операційних процедур. Доведено, що використання окремих цифрових інструментів саме по собі не забезпечує формування цілісного управлінського середовища, якщо ці інструменти не узгоджені з логікою фінансового обліку та повсякденними бізнес-процесами. Запропонований підхід передбачає трансформацію ролі фінансового обліку з функції ретроспективної звітності у центральний елемент операційної архітектури, який забезпечує структурування, перевірку та інтерпретацію даних, що виникають у процесі діяльності малого бізнесу. Визначено ключові цілі операційної системи, серед яких забезпечення відповідності вимогам законодавства, формування умов для управління на основі даних, досягнення постійної податкової готовності та підвищення інвестиційної привабливості бізнесу. Сформульовано принципи функціонування системи, зокрема єдиного джерела даних, замкненого інформаційного циклу, інтегрованості ІТ-рішень і бізнес-процесів, простоти як базового стандарту та використання методу нарахування. Обґрунтовано, що дотримання цих принципів забезпечує узгодженість інформаційних потоків, достовірність фінансових показників і підвищення якості управлінських рішень. Окрему увагу приділено формуванню інтегрованого технологічного середовища, яке поєднує облікову систему, CRM, системи управління персоналом, платежами, банківськими операціями та зобов'язаннями в єдину інформаційну архітектуру. Показано, що узгоджене функціонування цих елементів дозволяє забезпечити безперервний рух даних, їх контрольну перевірку та трансформацію у фінансово значущу інформацію, придатну для аналізу, контролю, податкового планування й оцінювання вартості бізнесу. Доведено, що впровадження запропонованої операційної системи дозволяє підвищити прозорість фінансової інформації, посилити контроль за діяльністю

підприємства, знизити ризики помилок і невідповідності, а також забезпечити більш обґрунтоване оцінювання результативності та вартості бізнесу. Отримані результати свідчать про те, що перехід до такої системи є не лише технологічною зміною, а й трансформацією логіки управління малим бізнесом у напрямі підвищення його стійкості, керованості та довгострокової ефективності.

Ключові *слова: управління на основі даних, малий бізнес, IT-рішення, фінансово-облікова архітектура, операційні процедури, операційна система управління, управлінський контроль, інтеграція даних.*

Problem statement. Small businesses today rarely suffer from a complete absence of digital tools. On the contrary, many of them use CRM platforms, accounting software, payment systems, payroll applications, banking integrations, and industry-specific solutions. Yet this digital abundance often does not produce managerial clarity. Data are generated in different systems, interpreted through different logics, and frequently reconciled manually. As a result, the owner may see sales, payments, payroll expenses, and accounting reports, but still lack a reliable understanding of profitability, tax exposure, cash flow pressure, and the economic value of the business.

This problem is especially important for small firms because managerial decisions are usually concentrated around the owner. The owner often makes daily financial and operational decisions under time pressure, liquidity constraints, and incomplete information. A positive bank balance may be perceived as evidence of success, while in fact it may coexist with weak profitability, accumulated obligations, or delayed tax liabilities. Conversely, temporary cash shortages may obscure a fundamentally viable business model. In both cases, the absence of an integrated operating architecture distorts the interpretation of business performance.

The key issue, therefore, is not digitalization itself, but the lack of coordination between IT solutions, financial accounting architecture, and operational procedures. A data-driven small business operating system addresses this gap by connecting these elements into a unified management logic. In such a system, financial accounting is no longer limited to retrospective reporting; it becomes the core infrastructure for control, tax readiness, performance evaluation, and business value measurement.

The relevance of this research lies in the need to conceptualize small business management not as a set of disconnected digital practices, but as an integrated operating architecture capable of transforming dispersed data into reliable managerial knowledge.

Analysis of recent research and publications. Recent research increasingly examines ERP systems, digital transformation, accounting information systems, and management accounting in SMEs. However, the literature remains fragmented: some studies focus on ERP adoption, others on digital capabilities, and others on management accounting practices. Far less attention has been paid to a unified, data-driven operating system for small business that integrates financial accounting, tax readiness, and business value measurement into one managerial framework.

A significant group of studies addresses ERP and accounting information quality. Abu Afifa M., Saleh I., Vo H. [1] show that ERP adoption improves the relevance and faithful representation of accounting information. AlMuhayfith S., Shaiti H. [2] demonstrate that ERP use is positively associated with both financial and non-financial SME performance, with management support, training, and user satisfaction playing an important role. Research on adoption determinants also shows that ERP implementation depends on organizational and technological readiness, compatibility, top management support, and firm-specific context (Al-Shboul M.A. [3]; Seethamraju R. [17]; Gessa A., Jiménez A., Sancha P. [7]). Hong P.W., Dorasamy M., Low J.H., Malarvizhi C.A.N. [9] complement this stream by focusing on cloud ERP and open innovation in SMEs from the perspective of practitioners, which confirms that ERP-related research is increasingly moving beyond internal automation toward more flexible, externally connected digital environments. Molina-Castillo F.-J., Rodríguez R., López-Nicolas C., Bouwman H. [12] broaden the discussion by examining the moderating role of ERP in business model innovation in SMEs, comparing firms that are considering ERP adoption with those that have already implemented it, and analyzing whether ERP enables or constrains the relationship between business model experimentation and business model performance. These studies explain why SMEs adopt ERP and how ERP may influence broader business development, but they do not conceptualize ERP as the basis of a broader business operating system.

Another stream of literature considers digital transformation more broadly. Garzoni A., De Turi I., Secundo G., Del Vecchio P. [6] propose a staged approach to SME digitalization, while Li L., Su F., Zhang W., Mao J.Y. [11] emphasize the role of entrepreneurial and organizational capabilities. Ghobakhloo M., Iranmanesh M. [8] and Sassanelli C., Terzi S. [16] further show that successful digital transformation in SMEs requires structured organizational support rather than isolated technology adoption. Broccardo L., Tenucci A., Agarwal R., Alshibani S.M. [5] further develop this line of inquiry by examining the relationship between digitalization and management control system maturity in SMEs, showing that digitalization

may improve performance and internal and external communication, while its effectiveness depends on top management support, human resources, financial resources, and employee training. Yet these studies do not place financial accounting and tax readiness at the core of the transformation model.

The intersection of enterprise systems, analytics, and management accounting is explored by Appelbaum D., Kogan A., Vasarhelyi M., Yan Z. [4], who argue that enterprise systems and analytics shift management accounting toward performance measurement and decision support. Rikhardsson P., Yigitbasioglu O. [15] also identify strong potential for business intelligence and analytics in management accounting research. Pedroso E., Gomes C.F. [14], Uyar M. [18], and Weerasekara U., Gooneratne T. [19] show that management accounting systems, planning and control, and ERP-based reporting strengthen managerial decision-making and internal control. In addition, Msomi T.S., Vilakazi S.P. [13] confirm the positive relationship between accounting information systems and SME operational efficiency.

Taken together, the reviewed studies cover important but still relatively separate dimensions of the problem: ERP adoption, digital transformation, management accounting utilization, and operational efficiency. This reveals a clear research gap. The existing literature has not yet sufficiently conceptualized a data-driven operating system for small business as an integrated architecture that connects IT solutions, financial accounting logic, and operational procedures within a single management framework. Such a perspective is important because the effectiveness of digital tools depends not only on their technical availability, but also on their coordination with accounting structures, process discipline, and the everyday managerial routines through which business data are transformed into actionable knowledge.

The purpose of the article is to substantiate the conceptual foundations of a data-driven small business operating system based on the integration of IT solutions, financial accounting architecture, and operational procedures. The study aims to demonstrate that the effectiveness of digital tools in small business depends not only on their functional capabilities, but also on their coordination within a unified operating architecture in which financial accounting serves as the core mechanism for data structuring, managerial control, informed decision-making, tax readiness, and sustainable business development.

Research methodology. The study is based on a conceptual and analytical research design aimed at substantiating a data-driven small business operating system as an integrated IT, financial accounting, and operational architecture. The methodological basis of the research includes a critical review of scientific publications on ERP systems, digital transformation of SMEs, accounting information systems, management accounting, and business analytics; comparative analysis to distinguish the proposed operating system from related concepts such as ERP, management accounting systems, and digital transformation frameworks; and structural-functional analysis to define the objectives, principles, components, and expected outputs of the system. The systems approach is applied to examine the interdependence between IT solutions, accrual-based financial accounting, operational procedures, tax readiness, and business value measurement. General scientific methods of abstraction, synthesis, logical generalization, and conceptual modeling are used to formulate the internal logic of the operating system and to demonstrate how fragmented business data can be transformed into reliable managerial knowledge, financial control, and value-oriented decision-making.

Results. Business Operating System (BOS) differs fundamentally from adjacent concepts in management and information systems literature. An ERP system is a software platform designed to automate and integrate transactional processes across business functions; BOS, by contrast, is a managerial architecture that defines the logic by which financial meaning is extracted from those transactions and translated into control, compliance, and value. This distinction is also supported by Latif S., Mohd Salleh S. I., Ahmad B., Saif F. [10], who show that ERP becomes managerially significant only when it is embedded in accounting routines, standard operating procedures, and organizational learning processes rather than treated as a purely technical implementation. A management accounting system, as discussed by Pedroso and Gomes [14] and Uyar [18], focuses on the production of information for internal decision-making, but does not prescribe the organizational and technological conditions under which that information remains reliable, continuous, and tax-ready by design. Digital transformation frameworks, such as those proposed by Garzoni et al. [6] and Sassanelli and Terzi [16], address the staged adoption of digital capabilities in SMEs, yet they treat financial accounting as one functional domain among many rather than as the foundational layer of the entire management architecture. BOS integrates these dimensions into a single construct: it is not a software category, not a reporting methodology, and not a digitalization roadmap – it is the underlying operating logic that determines how a small business converts operational activity into financially governed, tax-compliant, and value-measurable outcomes on a continuous basis.

A data-driven small business operating system may be understood as an integrated managerial architecture that combines IT solutions, financial accounting architecture, and operational procedures within a single

structured information environment. Its purpose is not merely to automate separate business functions, but to coordinate digital tools, accounting logic, and process discipline in such a way that dispersed operational and financial data are transformed into a reliable basis for managerial control, decision-making, compliance, tax readiness, and long-term value creation.

The conceptual distinctiveness of such an operating system lies in its effort to overcome a structural weakness common to many small businesses: the coexistence of multiple digital tools without a unified managerial logic. In practice, sales platforms, customer relationship systems, payroll applications, payment tools, and accounting software often operate in parallel, producing fragmented datasets and incompatible interpretations of business performance. The operating system addresses this fragmentation by constructing a unified data environment in which each function has a defined informational role and each process is linked to financial outcomes, control points, and reporting consequences.

From a managerial perspective, the system should be viewed as a control infrastructure rather than as a set of isolated software products. Its value lies in the fact that it creates an institutionalized mechanism through which the owner or management can continuously answer fundamental questions about profitability, tax position, operational integrity, and transferable business value. This makes the operating system particularly relevant for small businesses, where management is often highly personalized and where the absence of structured information can rapidly turn operational activity into financial opacity.

The first objective is data-driven management. This objective reflects the idea that effective management is impossible without timely, accurate, and comprehensible financial information. The system therefore aims to generate reliable answers to the core financial questions of the business on a continuous basis rather than retrospectively. Its value lies in converting accounting and operational data into an ongoing management resource. Instead of relying on intuition, bank balances, or fragmented reports, the owner gains a structured basis for evaluating financial performance, operational efficiency, and emerging risks. This objective gives the system its central managerial significance.

The second objective of the operating system is compliance. In the proposed architecture, compliance is treated as the foundational layer of the operating system rather than as an external or episodic obligation. The system is designed to align business processes with statutory documentation requirements and tax obligations, thereby reducing exposure to audit risk, penalties, and reporting inconsistencies. Its value lies in institutionalizing documentary discipline and ensuring that routine business transactions are supported by verifiable records. In small business settings, where administrative procedures are often informal, this objective is especially important because it stabilizes the legal and fiscal legitimacy of day-to-day operations.

The third objective is tax filing readiness and basic tax planning. Within this logic, tax readiness is not postponed until the end of the fiscal year, but embedded in everyday reporting design. The value of this objective is twofold. First, it reduces the probability of unexpected tax liabilities by ensuring that tax implications are visible in advance. Second, it creates conditions for lawful tax optimization through earlier recognition of deductions and planning options. For small businesses, which frequently treat bookkeeping as a year-end filing task, this objective changes the temporal logic of tax management: taxation becomes a continuously monitored dimension of financial governance rather than a delayed compliance burden.

The fourth objective is business sale readiness. This objective extends the system beyond operational control toward asset formation. A business that depends entirely on its owner, lacks process documentation, and cannot demonstrate stable financial logic has limited marketability. By structuring processes, isolating the components of Seller's Discretionary Earnings (SDE) – the total economic benefit available to an owner-operator, usually calculated as pre-tax profit adjusted for owner compensation, interest, depreciation and amortization, and verifiable discretionary, non-recurring, or non-operating expenses — and producing predictable reporting, the operating system increases the transparency and assessability of the business as an asset. The value of this objective lies in shifting the owner's perspective from short-term survival to long-term capitalization. Even if a sale is not imminent, a business that is sale-ready is also more governable, more transparent, and more strategically coherent.

To ensure the achievement of these objectives, the following operating principles have been formulated.

1. Single source of truth. Within this operating logic, each business function is assigned one authoritative data source, while all other systems perform secondary or referencing roles. Thus, the CRM serves as the primary source for sales-related information, whereas the accounting system constitutes the authoritative basis for financial reporting. Such an arrangement minimizes duplicate entry, prevents the coexistence of conflicting records, and reduces the need for manual reconciliation across parallel datasets. For small businesses, where informal spreadsheets and fragmented records are common, this principle establishes informational consistency and strengthens the reliability of managerial conclusions.

2. Closed information loop. According to this principle, data should circulate through the system in

a complete and verifiable sequence, with each process block connected to control checkpoints in adjacent blocks. For instance, sales information must be reconciled with bank statement data before it is accepted as a valid basis for subsequent reporting procedures. In this way, information quality becomes embedded in process design rather than dependent solely on individual diligence. This approach is especially important in small business management, where errors often emerge not because data are unavailable, but because they are insufficiently connected, verified, or interpreted across functions.

3. Integrated operational environment. This principle does not imply the use of a single software product. Rather, it refers to the creation of a coordinated operational and financial environment in which IT solutions, financial accounting architecture, and operational procedures function according to a common data logic. Within such an environment, CRM, accounting, payroll, banking, and accounts payable systems may remain technologically distinct, but they are connected through unified rules of data generation, verification, interpretation, and reporting. This reduces informational fragmentation, eliminates competing versions of business reality, and makes it possible to trace the relationship between operational actions, financial consequences, and compliance obligations within one coherent management framework.

4. Simplicity as a standard. Within this framework, each additional software application is treated not as an automatic improvement, but as a potential source of complexity, inconsistency, and error. The introduction of new tools must therefore be justified by actual operational necessity and supported by sufficient organizational capacity for their disciplined use. For small businesses, this principle is of particular significance, since their administrative and analytical resources are usually limited. Under such conditions, technological overexpansion often weakens rather than strengthens managerial effectiveness. Simplicity, therefore, functions here as a criterion of sustainability and systemic coherence rather than as a reduction of capability.

5. Accrual basis only. The system is deliberately grounded in accrual accounting because cash-based accounting does not provide an adequate foundation for business management. Cash balances and economic performance reflect different aspects of business reality, and conflating them can distort the owner's understanding of profitability, financial position, and future obligations. Accrual accounting, by contrast, makes it possible to capture the economic substance of transactions, separate the timing of value creation from the timing of payment, and generate information suitable for forward-looking analysis. This makes it substantially more appropriate for performance measurement, tax readiness, and business valuation in the context of small business management.

Taken together, these principles define the internal logic of the operating system. They do not function as isolated rules, but as interdependent design conditions that ensure the integrity of information flows, the consistency of financial interpretation, and the practical applicability of the system for managerial decision-making.

The operating system also includes an integrated technology stack composed of an accounting core, industry CRM, payroll layer, and accounts payable management layer (fig. 1). Excel is used only as a non-authoritative ad hoc analytical layer for temporary scenario modeling, supplementary calculations, and visualization based on verified data from the unified dataset; it is not a source of truth, transaction repository, or part of the closed operational data loop. Its value does not lie merely in software coexistence, but in the layered coordination of these functions through a structured dataset assembled for analytical and reporting purposes. The system does not rely only on transactional data transfer from one platform to another; instead, it constructs a unified dataset capable of supporting flexible analysis and accounting-ready summarization. This is a major conceptual advantage because it prevents the accounting system from being burdened with analytical tasks for which it was not originally designed, while still preserving accounting as the reporting core.

In this sense, each element of the stack has a distinct value. The accounting core provides formal financial structure and reporting discipline. The CRM layer captures commercial activity and sales reality. Payroll systems connect labor cost and compensation obligations to financial reporting. Accounts payable management adds control over outgoing cash commitments and vendor obligations.

Their coordinated integration creates the basis for a multidimensional view of the business, in which revenue generation, labor expense, tax exposure, and operational commitments can be interpreted within one management logic.

The implementation of a data-driven operating system for small business generates a set of interrelated outputs that collectively transform the quality of management, financial transparency, and strategic positioning of the enterprise. These outputs should not be interpreted as isolated benefits, but rather as systemic effects emerging from the integration of financial accounting, operational data, and control mechanisms within a unified informational architecture.

One of the primary outputs of the system is the generation of reliable financial information. This reliability is achieved through the alignment of data

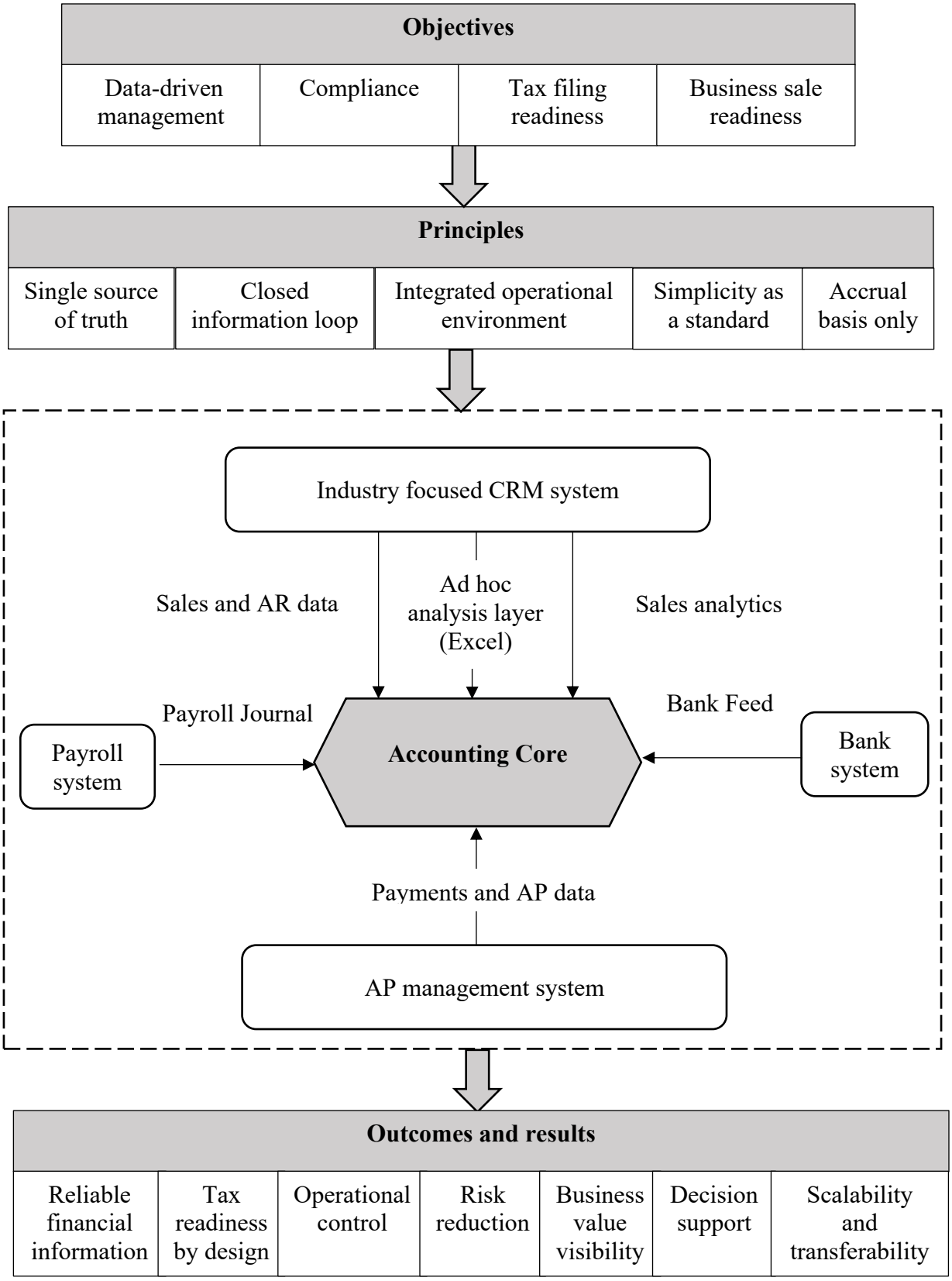

Fig. 1. Data-Driven Operating System for Small Business

Source: compiled by the authors

sources, the elimination of duplication, and the introduction of verification checkpoints across the information flow. As a result, financial data become accurate, timely, and internally consistent.

A closely related outcome is tax readiness by design. Because financial data are structured according to accounting standards and systematically reconciled with operational transactions, the business maintains an ongoing state of preparedness for tax reporting. Tax obligations are no longer identified retrospectively at the end of the reporting period, but become visible throughout the operational cycle. This reduces the likelihood of unexpected liabilities, improves compliance with regulatory requirements, and creates opportunities for lawful tax planning.

The system also produces a high level of operational control. By integrating data from sales, payroll, payments, and banking systems into a unified accounting framework, it becomes possible to trace the relationship between operational activities and financial outcomes. Management gains continuous visibility into revenue streams, cost structures, cash flow dynamics, and key performance indicators. This visibility enables earlier detection of inefficiencies, deviations, and emerging risks.

Another significant result is the reduction of operational and compliance-related risks. The structured nature of data flows, combined with the presence of control checkpoints and standardized processes, minimizes the probability of errors, omissions, and inconsistencies.

The operating system further enables continuous business value visibility. By maintaining structured financial records on an accrual basis and isolating key components of financial performance, such as SDE, the system allows for ongoing assessment of the economic value of the business. This represents a fundamental shift from episodic valuation, typically performed only in the context of a potential sale, to continuous value monitoring.

In addition, the system enhances decision support capabilities. The integration of financial and operational data into a coherent analytical framework provides management with actionable insights rather than fragmented indicators. Decisions related to pricing, cost control, hiring, investment, and expansion can be evaluated in terms of their measurable financial impact. This strengthens the analytical dimension of management and reduces dependence on intuition or incomplete information.

Finally, the system contributes to scalability and transferability of the business. The standardization of processes, the formalization of data structures, and the documentation of financial logic reduce the dependence of the business on the owner's personal involvement. A business organized within such a system becomes easier to manage, replicate, and evaluate by external stakeholders, including investors and potential buyers.

Conclusion. The study conceptualizes a data-driven small business operating system as an integrated architecture in which IT solutions, financial accounting logic, and operational procedures are coordinated to produce reliable managerial information. The proposed approach makes it possible to interpret small business digitalization not as the accumulation of separate software tools, but as the construction of an operating environment where data are generated, verified, summarized, and used according to a common financial and procedural logic. In this respect, the article contributes to the discussion on SME digital transformation by showing that the managerial value of digital tools depends on their embeddedness in accounting structures, process discipline, and clearly defined data flows.

The proposed operating system creates conditions for more reliable financial information, tax readiness, operational control, risk reduction, business value visibility, decision support, and scalability. However, these outcomes should not be interpreted as automatic consequences of implementation. They can be achieved only under certain organizational and technical conditions. First, the business must have a sufficient level of accounting discipline, including timely transaction recording, proper documentation, and the use of accrual-based financial logic. Second, the organization must clearly define authoritative data sources for each functional area and establish responsibility for data quality. Third, successful implementation requires managerial commitment, employee training, and acceptance of standardized operational procedures. Without these prerequisites, even a well-designed operating architecture may reproduce existing fragmentation rather than eliminate it.

The implementation of such a system also involves potential risks and costs. These include the financial cost of software integration and advisory support, temporary disruption of routine processes, resistance to changes in established work habits, errors during data migration, incomplete or inconsistent historical records, and insufficient technical capacity to maintain the system after implementation. Additional risks may arise if analytical tools are used outside the verified data environment or if the organization introduces excessive customization that weakens simplicity and process consistency. Therefore, the proposed operating system should be implemented gradually, with diagnostic assessment, data cleansing, definition of control checkpoints, staff training, and post-implementation monitoring.

The scientific contribution of the study lies in the conceptualization of a data-driven small business operating system as a distinct managerial construct

that differs from ERP systems, accounting information systems, and general digital transformation frameworks. Unlike software-centered approaches, the proposed model emphasizes the interdependence between digital infrastructure, financial accounting architecture, and operational procedures. From a practical perspective, it provides small business owners with a framework for reducing informational fragmentation, improving financial discipline, strengthening tax readiness, and increasing the transferability of the business as an asset.

At the same time, the study is primarily conceptual and does not include large-scale empirical validation. Future research should therefore be focused on the empirical assessment of the proposed operating system by examining its impact on financial performance, tax compliance, operational control, and business value measurement in small enterprises. Particular attention should be paid to the conditions under which implementation produces measurable results, as well as to the organizational barriers that may limit its effectiveness.

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