

Analysis of the Gap Between Technological Ownership and Maturity of Management Control Roles in State-Owned Enterprises (SOEs): A Case Study of the Société Algérienne Des Mines De Phosphate (Algeria)

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Abstract

Digital transformation is widely expected to reshape management control roles by enhancing analytical, predictive, and decision-support capabilities. However, empirical evidence indicates that this kind of change does not automatically result from the adoption of advanced digital technologies. This study investigates this paradox by examining how an enterprise resource planning (ERP) system affects management control roles at state-owned enterprises (SOEs) in the Algerian context. Based on an interpretive qualitative case study of the Société Algérienne des mines de phosphate (SOMIPHOS), the study's methodology includes 7 semi-structured interviews with managers and controllers conducted between [April/2025 – May/2025], internal document analysis, and direct observation of management control procedures.

The findings, using Leavitt's Diamond Model, demonstrate a persistent gap between ERP technological capabilities and the real level of maturity of management control roles. Even with an ERP system in place, management control is still largely dependent on spreadsheet-based tools and manual data processing, with a focus on compliance and historical reporting. The study highlights five interconnected mechanisms that hinder digital capabilities from translating into managerial impact: functional integration gap, task inertia, competence lock-in, structural centralization, and symbolic digitalization.

By highlighting the misalignment between technological investment and organizational maturity, this study contributes to the literature on digital transformation and management control by offering a mechanism-based explanation of why ERP systems do not lead to functional role evolution in SOEs operating in transition economies.

Keywords : Digital transformation, management control roles, Leavitt Diamond, SOMIPHOS

1- Introduction

The global economy is undergoing a significant structural transformation driven by the digital revolution, forcing companies across all sectors and ownership structures to reinvent their business models and internal processes. The integration of digital tools has become inevitable for companies wishing to remain competitive (Verhoef et al., 2021, p. 889). At the heart of this transformation, lies the accounting profession and its practices including the roles and routines of management control (Barreto et al., 2025, p. 1), which is no longer just a tool for measuring financial performance, but a strategic compass facilitating the alignment of company objectives with fluctuations in the external environment (Fähndrich, 2023). Modern technologies, such as enterprise resource planning (ERP) systems, business intelligence (BI) platforms and artificial intelligence (AI), promise to free the management controllers from the constraints of routine historical data collection tasks and compliance, allowing them to act as “strategic business partners” bringing real added value through proactive analytics and intelligent decision support (Amer & Hilmi, 2024; Arkhipova et al., 2024; Barreto et al., 2024, 2025; Fähndrich, 2023; Fauzi, 2021; Järvenpää, 2007; Järvenpää et al., 2023; Meyssonier & Pourtier, 2006; Reutter et al., 2021)

However, the reality on the ground reveals a worrying “digital paradox”, a phenomenon reminiscent of the “productivity paradox” observed by Robert Solow in the 1970s and 1980s that the fast advancement of information

and communication technology (ICT) had not increased the productivity growth in the United States. In this context, this paradox can be reformulated as follows: despite substantial investments in information technology, the maturity of management control roles remains limited, illustrating a digital paradox characterized by the underutilization of available capabilities. This paradox is particularly marked in state-owned enterprises (SOEs) within transition economies. (Soja & Cunha, 2015, pp. 324–325) argue that transition economies face a unique set of barriers to digital transformation that are rooted in their historical, cultural, and institutional context—particularly the legacy of communism. These barriers include not only resource constraints and lower ICT sophistication but also deeper cultural and behavioral issues such as low trust, negative attitudes toward authority, and inadequate planning practices.

Existing literature has extensively covered digital transformation in Western, private-sector contexts, but there is a scarcity of research on how institutionalized bureaucracy and centralized structures in SOEs inhibit this evolution. This paper addresses this gap through an in-depth case study of the Algerian phosphate extraction company, SOMIPHOS. This state-owned company has heavily invested in ERP systems without experiencing substantive changes in management control roles. Controllers continue to focus on compliance-oriented reporting, manual reconciliations, and spreadsheet-based analysis despite the availability of integrated digital platforms. This disjunction raises a fundamental question: Why does adoption of advanced digital infrastructure fail to transform management control roles in an SOE? By applying Leavitt's Diamond Model (1965), this study aims to analyze the misalignment between the company's technological capabilities and its organizational components -structure, tasks, and people- to identify the systemic causes of this digital stagnation.

2- Theoretical and conceptual framework

2-1-ERP systems as digital transformation enablers

Before introducing ERP systems, it is best to define digital transformation and its relationship with two concepts that are often used interchangeably: digitization and digitalization. Sometimes, digitization also refers to the transition from analog tasks to digital tasks or the integration of information technology into existing tasks. The main objective of digitization is usually to achieve savings and optimize the use of resources for existing tasks. Digitalization, on the other hand, is an intermediate step towards digital transformation, which consists of a change of processes by technology. It is a modification and optimization of current processes without necessarily involving major strategic changes. Its objective is therefore to improve value creation within the existing model (Verhoef et al., 2021, p. 891).

However, digital transformation goes beyond simple digitalization by integrating digital technologies into all aspects of the business, to redefine business models, improve internal processes and stakeholder interactions (Fitzgerald et al., 2014, p. 2). Which means it requires a global strategic redesign. (Westerman et al., 2014, pp. 9–15) emphasize that digital transformation is not limited to simple technological adoption, but is a strategic approach that requires the renewal of managerial skills, processes, and models. (Vial, 2019, p. 133) affirms this outcome by defining digital transformation as an evolutionary process, engaging continuous organizational learning and a capacity for strategic response to contextual changes to remain competitive. It is not limited to the implementation of digital solutions, but encompasses the ability to consistently and continuously orchestrate organizational modes, technology and human resources in a dynamic environment. For this, (Verhoef et al., 2021, p. 891) consider it as a deeper and more complex phase comparing to digitalization. This phase profoundly changes the basic business model of the company and its modes of operation, resulting in a new model of costs and revenues. It requires a reorganization of processes to transform the business logic of the entire company. It is therefore seen as an ongoing strategic adaptation aimed at leveraging digital innovations for sustainable competitive advantage. Ultimately, we can adopt the definition of (Mergel et al., 2019, p. 12) who defined digital transformation as a holistic change in the business model, culture and structure.

Digital transformation is made possible by the use and application of digital innovations. Among the most discussed innovations we find Enterprise Resource Planning (ERP) systems. An ERP system is a specialized business software package designed to create seamless integration by connecting all types of information flowing within an organization. Essentially, it acts as a central data hub, enabling different departments -such as finance,

human resources, and supply chain- to communicate with each other through a single database (Davenport, 1998, p. 121). Instead of treating daily tasks as isolated, "stand-alone" activities, an ERP system links them together into a continuous process. For example, when a salesperson enters a new order, the system can automatically update inventory, schedule production, and notify the finance department in real time. It is seen also as software package that is multipurpose, integrated, centralized, and able to handle real-time data and share information throughout the entire enterprise (Mossa et al., 2025, p. 175). By providing a unified interface and a single source of truth, it enables the business in real time to achieve operational efficiency, cross-functional transparency, and evidence-based strategic decision-making (Gessa et al., 2023, p. 2).

Historically deployed as monolithic on-premises systems, ERPs have rapidly evolved to meet the imperatives of digital transformation, which emphasize agility, real-time analytics, cloud, and modularity. One of the most significant developments identified in recent literature is the transition from traditional monolithic ERP architectures to cloud and microservices-oriented systems (Lee et al., 2024, pp. 2–3). According to these authors, microservice architectures (MSAs) significantly improve the modularity and adaptability of ERPs over traditional enterprise software suites. Their analysis demonstrates that MSA-based cloud ERP platforms support modular deployment, service scalability, and simplified integration with edge digital technologies such as Internet of Things (IoT), data analytics, and mobile applications. Recent research on ERP trends shows that AI integration strengthens the ability of ERPs to support predictive analytics, automated decision processes, and advanced scenario planning, transforming the system from simple historical reporting engines to proactive intelligence platforms (Mannan et al., 2025).

In line with the more general work on digital transformation that focuses on continuous transformation rather than just one-time technology replacement, successful ERP systems implementation is not limited to IT projects, it involves deep organizational transformation (Davenport, 1998, p. 129). It is driven by a synergistic alignment of technological, organizational, and environmental factors. In terms of technology, by the integration of Cloud Computing, IoT, and Artificial Intelligence, which provide the scalable infrastructure and real-time data processing necessary to shift from legacy record-keeping to autonomous decision-making. Organizationally, success is based on proactive leadership, reengineering core business processes, and developing dynamic capabilities, namely the capacity to recognize changes in the market and capitalize on them through architectural adaptability. Environmental factors, such as changing customer expectations, international sustainability regulations, and the pressure of Industry 4.0 (Morawiec & Sołtysik-Piorunkiewicz, 2023).

2-2- Evolution of the Management Controller's Roles in the Age of Digital Transformation

The literature regarding the roles of the management controller frequently offers two types: that of verifier of the information produced, or the "scorekeeper", and that of business partner (Reutter et al., 2021, p. 87).

The role of verifier of the information produced is the classic role based on the management control framework of (Anthony, 1965). It includes technical activities that aim in particular to ensure the reliability of the data, hence the need to focus mainly on ex-post control. Its main tools are cost accounting, budgets, static dashboards and performance monitoring. Its main function is to ensure financial compliance and protect the company's assets. However, this role is criticized for being reactive and isolated from key business processes.

However, the role of business partner is defined as the willingness and ability of the management control function to add greater value to the company's management and decision-making (Järvenpää, 2007, p. 100). It must provide operational managers with all the information and tools necessary to measure and analyze their performance, that is to say to self-monitor, but it can also be a decision support for the manager, this role involves operational and strategic consulting missions (Reutter et al., 2021, p. 89). It uses tools such as the Balanced Scorecard to translate strategy into measurable performance indicators and engages with department managers to help them understand the financial implications of their decisions, breaking the isolation between finance and operations (Järvenpää, 2007).

Digital technologies have profoundly transformed the role of the management controller (Amer & Hilmi, 2024; Arkhipova et al., 2024; Barreto et al., 2024, 2025; Bhimani, 2020; Fährndrich, 2023; Fauzi, 2021; Järvenpää, 2007; Järvenpää et al., 2023; Latif et al., 2025; Meyssonier & Pourtier, 2006; Reutter et al., 2021). This shift began with the proliferation of ERP systems in the 1990s, when many tasks previously performed by management controllers were automated and executed directly by the integrated software. This is particularly evident in the data collection and reporting process. As observed in a manufacturing SME, ERP systems automate the raw data collection phase, thereby improving the availability, accuracy, and completeness of the information needed for management control, as well as the quality of reports (Latif et al., 2025, p. 9,12). This technical integration enhances organizational visibility by unifying functions such as general accounting and supply chain management into a single source of reliable and standardized data (Fauzi, 2021, p. 746).

ERP systems not only streamline data collection but also transform the role of the management controllers from information verifiers to business analysts, thereby improving decision-making (Amer & Hilmi, 2024; Fährndrich, 2023). Furthermore, empirical research demonstrates that these systems foster a more proactive management control style in large companies, enabling controllers to assist management in making informed and timely decisions under uncertainty (Bennani et al., 2024, p. 146). This role transformation from scorekeepers to business partners does not diminish their core function, as they continue to contribute to ensuring the reliability of incoming data, which is essential for maintaining confidence in the system's output (Järvenpää et al., 2023, p. 4). However, to optimize control through an ERP, it is necessary that the latter be adapted to the structure and strategies of the company, that the corporate culture be open and participative in order to reduce resistance to change, and that the management controllers possess the required skills (Bennani et al., 2024).

To sum up, this technology transforms management control into an agile and dynamic function that goes beyond simple error detection and compliance to focus on value creation, foresight and strategic partnership.

2-3- Analytical framework: The Leavitt Diamond model as a tool for understanding transformation

The diamond model is a fundamental socio-technical framework for understanding organizational change (Robertson et al., 2025, p. 3). Introduced by Harold J. Leavitt, this model views organizations as composed of four elements: technology, tasks, structure, and people. Its central tenet is mutual interdependence: any change in one dimension inevitably triggers changes in the others (Nair et al., 2014, p. 59). In this case, when a transformation initiative modifies technology, it inevitably impacts the design of work (tasks), the people who perform them and how, as well as the configuration of structure. Neglecting these interdependencies can lead to misalignments, resistance, and the failure of the transformation, even if the chosen technology is inherently effective (Wigand, 2007, p. 7).

This systemic view is widely adopted in recent work on digital transformation, where technology-driven change is understood as a multidimensional reconfiguration rather than a simple technical upgrade. For example, (Gorrell, 2023), applying the diamond model to examine the digital transformation of academic work at a British university, demonstrates that the introduction of digital teaching technologies is not limited to changing teaching tools; it transforms academic tasks (curriculum design, assessment practices), organizational structures (decision-making processes, digital governance), and professional identities (faculty roles and skills). (Riedinger et al., 2024), for their part, identify that achieving business-IT integration requires simultaneous development of capabilities across all four Leavitt dimensions, yet they note that "prevailing corporate culture" and "existing organizational structure" often impede this process. (Robertson et al., 2025), explicitly referencing the diamond model to examine the sociotechnical challenges retailers face when integrating AI, empirically validates the interdependence thesis. They demonstrate that resistance to AI is often due not to technological shortcomings, but to a lack of alignment between people, structure, and tasks.

In our theoretical framework, technology is considered the primary driver of change, but its impact is modulated by three complementary dimensions: (1) task redesign (how work is divided, sequenced, and automated), (2) people (skills, attitudes, leadership, and user engagement), and (3) structural arrangements (formal roles, coordination mechanisms, and governance). Thus, our research is structured by Leavitt's diamond model, which directs the identification of factors, conceptual connections, and anticipated trajectories via which

technological change brought about by digitalization translates into organizational performance or transformations. This paradigm guarantees that the study is sensitive to the whole organizational system within which this change takes place while also justifying our interest in technology-induced change.

3. Methodology

3.1. Research Design and Epistemological Positioning

This research uses an interpretative qualitative case study methodology, grounded in the premise that organizational reality is a social construct resulting from human interaction, and not an objective truth (Berger & Luckmann, 2011). To address the "how" and "why" of the digital paradox within the Algerian SOEs, a single case study was conducted because it enables in-depth analysis of contextualized practices and is appropriate when the case presents a theoretically relevant situation (Siggelkow, 2007). Based on a constructivist epistemology, the research aims to provide knowledge of how organizational actors make sense of technological change and how these interpretations influence the reconfiguration of control roles.

3.2. Case Selection and Context

SOMIPHOS, a public industrial company involved in phosphate mining, was chosen as the case study. In line with national modernization policies, the company acquired the SAGE ERP system in 2003, which became operational in 2008. The system includes several functional modules intended to support accounting, finance, human resources, inventory management, and reporting activities. Despite this technological investment, management control practices continue to rely heavily on manual data processing and spreadsheet-based tools, providing a fertile context for examining the disconnect between digital capability and organizational use.

The co-author holds an executive managerial position within the organization. This embedded position provided sustained access to strategic meetings, internal documentation, and key decision-makers throughout the transformation process. The insider role enabled real-time observation of evolving practices rather than retrospective reconstruction.

3.3. Data Collection

To ensure internal validity and provide a holistic view of the phenomenon, the study utilized data triangulation through three primary sources as summarized in table 1:

- **Semi-structured Interviews:** Primary data was gathered through seven interviews with key organizational actors across three hierarchical levels: Top Management (CEO), Middle Management (Heads of IT, Accounting, Synthesis/Communication, and Management Control), and Operational Management (Budget Control at the mining complex). Interviews lasted between [45–60] minutes, were conducted between [January/2025 – May/2025], and followed an interview guide covering ERP usage, management control practices, decision-making processes, skills, and organizational structure. All interviews were recorded with consent and fully transcribed;
- **Documentary Analysis:** Internal documents were analyzed, including organizational charts, quarterly/annual management reports, budgets, technical SAGE ERP documentation, procedural manuals, and training materials. These documents helped contextualize interview data and assess formal versus actual use of the ERP system;
- **Direct Observation:** Field observations were conducted by the co-author to validate the "actual" use of the system versus "reported" use.

Table 1 : Data Collection Summary

Source type	Participants	Focus of inquiry
Interviews	CEO, Head of IT, Accounting, MC Manager,	Strategic vision, technical hurdles, and role perception.

	Synthesis/Communication, Complex Budget Head	
Internal Docs	Management reports (2008– Present), SAGE manuals	Formalization of MC tasks and ERP utilization rates.
Observations	MC, Synthesis/Communication and Mining complex operational routines	Real-time data entry practices and "Excel-shadowing."

Source: Author's own elaboration

3.4. Data Analysis

Data were analyzed using an inductive thematic approach, using Leavitt's Diamond Model (1965) as the primary theoretical framework. Raw data from interview transcripts and field notes were coded and categorized into four mutually exclusive yet interdependent dimensions: Technology, Tasks, People and Structure. This step was conducted manually due to the limited volume of data collected.

This mapping allowed for a gap analysis to identify misalignments between the advanced technological infrastructure and the underdeveloped organizational components. The results were then subjected to a critical re-analysis to extract the underlying sociotechnical and institutional factors hindering the evolution of the management controller into a "Strategic Business Partner".

3.5. Methodological limitations

As a qualitative single-case study, the findings are not intended to be statistically generalizable. However, the objective is analytical generalization, whereby insights contribute to theory development regarding digital transformation and management control. Future research could adopt longitudinal or multi-case designs to extend and validate the findings.

4. Results

This section presents the findings structured according to Leavitt's socio-technical framework: technology, tasks, people, and structure, before examining their interdependencies.

4.1 Technology

SOMIPHOS acquired the modular "Sage line 100" system in 2003, however the actual commissioning was only in early 2008 after the acquisition of the "Sage line 100 SQL SERVER ERP" version. Interview evidence and internal document analysis demonstrate the following patterns:

4.1.1 Sage ERP Implementation Status and Module Usage

Analysis of the Sage ERP system reveals a fragmented adoption pattern across the organization (see Table 2). While the Pay & HR and Financial Management modules support basic administrative and accounting functions, the Manufacturing, CRM, and Sage BI Reporting modules have not yet been implemented. Consequently, the system is currently leveraged for routine back-office tasks, while core mining operations and market intelligence activities continue to be managed through manual, non-integrated processes.

Table 2: Sage ERP Functional Gap & Opportunity Analysis

Module	Current Status	Missing Opportunity	Business Consequences
Pay & HR Package	Basic Use: Limited to payroll processing.	Strategic HR: Talent management, training tracking, and performance KPIs.	HR remains an administrative cost center; inability to track workforce productivity or skill gaps.

Commercial Management	Medium Use: Expanded since 2024 from warehouse-only to almost full operations.	Logistics Optimization: Advanced inventory forecasting and automated reordering.	Improved, but still operates in a vacuum without direct links to production or market demand.
Financial Management	Medium Use : financial accounting and standard reporting.	Advanced Budgeting: Real-time cost control and automated financial consolidation.	Reactive financial posture; reliance on historical data rather than forward-looking financial strategy.
Manufacturing (Not Acquired)	Zero Capability: Manual tracking of mining/extraction.	Core Operations: Real-time yield monitoring, OEE (Equipment Effectiveness), and maintenance.	High Operational Risk: Inability to optimize the mine's output; high maintenance costs and unscheduled downtime.
CRM (Not Acquired)	Zero Capability: Disconnected customer data.	Market Intelligence: Lifecycle management for mining contracts and lead tracking.	Lost revenue opportunities; inability to forecast market shifts or manage long-term client relationships.
Sage BI Reporting (Not Acquired)	Zero Capability: Manual report generation via Excel.	Data-Driven Leadership: Automated dashboards, trend analysis, and "What-If" scenarios.	Information Silos: Decision-makers waste time compiling data rather than analyzing it; high risk of human error in reporting.

Source: Author's own elaboration

4.1.2 Non integration of the system

Although the ERP is designed as an integrated system, some modules are used as separate programs, without automated data flows between them while some of them are not acquired yet. Controllers systematically rework data outside the system environment, particularly for variance analysis and managerial reporting;

4.1.3 Restricted usage of the system

The ERP system is used primarily as a compliance tool (accounting entries, financial consolidation, and statutory reporting are the main functions). However, advanced functionalities like real-time dashboards, integrated performance analytics, and automated forecasting are not activated.

4.2 Tasks

4.2.1 Continuity of Traditional Tasks and Manual Workflows

The management control role continues to prioritize traditional activities, including budget monitoring, variance analysis, cost tracking, and the preparation of periodic financial reports. Observations of the daily workflow reveal that the introduction of the ERP system has not automated data integration. Instead, management controllers continue to collect operational data from disparate Excel files and paper reports, and then re-enter it manually into a master Excel spreadsheet for final analysis. These manual tasks completely cancel out the interest of a centralized database.

4.2.2 Historical reporting cycle

The tasks of the synthesis and communication manager always focus on preparing periodic reports (quarterly and annual) describing the past, rather than producing immediate analyses to guide the future;

4.2.3 Disconnection of critical operations

The management controller is not involved in the real-time monitoring of the performance of key operations (production, maintenance), and these operations are not integrated into the ERP system.

4.3 People

4.3.1 Resistance to integration and regulatory pressure

At the operational level, employees still preferring manual procedures and viewing integrated systems like ERP as a threat to existing workflows and job security. This behavioral resistance is reinforced by an organizational environment governed by a rigorous legal framework. The frequent inspections by the General Inspectorate of Finance (IGF) strictly monitors and penalizes management acts. Data from interviews with leadership indicate that these external regulatory pressures lead to a management style that prioritizes immediate financial reporting and strict adherence to procedural regularity over the activation of the advanced functionalities of the ERP system;

4.3.2 Skill Alignment and Time Allocation

Although the management control team demonstrates a proven mastery of accounting fundamentals and has benefited from a continuous and in-depth training course on ERP, observational data and time-logs indicate that the controllers' working time is massively absorbed by routine and time-consuming tasks, in particular the manual collection and consolidation of data intended for essentially historical reporting. Consequently, there is currently no evidence of the team engaging in high-value predictive analytics or strategic decision-support activities.

4.3.3 The Structure of Incentives and Regulatory Constraints

In the Algerian public sector context, employee compensation and career advancement are governed by standardized wage grids and seniority-based promotions. Interviews and document reviews reveal a lack of specific professional rewards or a "digital premium" for employees who demonstrate proficiency in sophisticated systems like ERPs. Furthermore, the institutional setting is characterized by strict oversight from the "Tutelle," which limits the ability of local management to implement customized incentive schemes or merit-based performance rewards. Observations indicate that, in the absence of these incentives and real benefit for the risk of adopting new techniques, employees consistently maintain legacy processes.

4.4 Structure

4.4.1 Centralization of Decision-Making and Reporting Flow

Empirical evidence indicates that decision-making authority remains concentrated at the top level of the organizational hierarchy which unable the departmental managers to make their own decisions based on real-time data provided by the ERP system. Instead, the management control task's primary responsibility is to prepare aggregated financial and operational reports for senior leadership. According to technical logs and interviews, information flows vertically from departments to the central authority without decentralized feedback loops.

4.4.2 Organizational Structure and Functional Inactivity

The organization has formally established a new management control structure at the general management level, in addition to the previously existing Synthesis/Communication department, and a separate budget control department at the mining complex. However, field observations and interviews reveal that these units are still inactive since operational departments continue to operate in silos, with workflows that are independent from the ERP system's integrated modules.

4.4.3 Functional Departmentalization

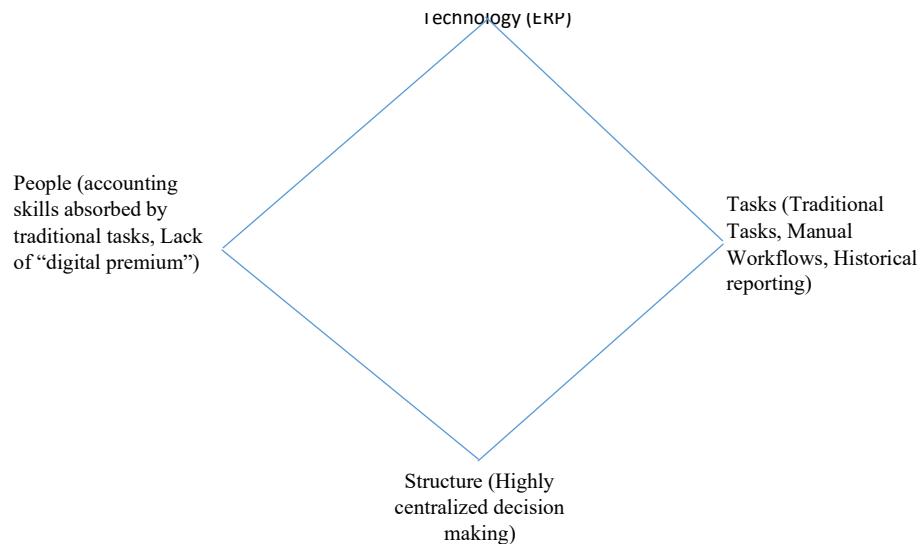
The organization is structured according to traditional functional lines, where management control is constituted as an autonomous department. Interviews and observations of the workflow indicate that the management control unit primarily interacts mostly with its own internal data and outputs, with limited formal cross-functional interaction or integrated data sharing with other operational departments.

4.5 The Mismatch between Technology and Organizational Variables

While Leavitt's Diamond implies mutual interdependence between technology, tasks, people, and structure, the application of Leavitt's diamond model in SOMIPHOS shows that these relationships are not automatically activated. The implementation of the ERP system has not been accompanied by corresponding changes in other organizational dimensions. Observations indicate that while the technological infrastructure was

updated in 2008, management control tasks have remained identical to pre-ERP manual processes and compliance-oriented performance expectations reinforce conservative task definitions. In addition, technological change does not enhance competencies in the absence of incentives following the ERP training. Furthermore, the organizational structure remains highly centralized, as shown in figure 1.

Figure 1 : Leavitt Diamond' components interdependencies



Source: Author's own elaboration

5. Discussion

The findings from the SOMIPHOS case study reveal a profound "IT productivity Paradox." Despite nearly two decades of ERP integration (SAGE SQL Server), the management control role is still rooted in traditional "scorekeeping" rather than expanding into "business partnering." This stagnation can be interpreted through the perspective of socio-technical misalignment and the specific institutional pressures of the Algerian public sector as follow:

5.1 The ROI Paradox, the Integration Gap and the Persistence of Task Inertia

The findings presented in Table 2 highlight that the Sage ERP system was significantly underutilized, which has likely resulted in a low Return on Investment (ROI) over its 15-year tenure which aligns with the "IT Productivity Paradox" of Solow (1987). SOMIPHOS has made significant investments in IT, but it has seen little to no gain in productivity because it fails to adapt its organizational processes to match the technology. This low ROI is due to limited adoption, resulting in a "missed opportunity" for entire operational integration. By failing to acquire modules related to manufacturing and business intelligence, the organization stays in a reactive position. This "integration gap" caused by partial ERP adoption forces the management control function to rely on manual workflows rather than automated processes. This finding supports (Dechow & Mouritsen, 2005), who argued that ERP systems often fail to deliver full integration, instead creating gaps where management control must still intervene manually. (Scapens & Jazayeri, 2003), for their part, suggested that the characteristics of ERP, particularly its integration across all business functions, is the first condition to automate routine administrative tasks.

The continued use of manual Excel-based routines by management controllers of SOMIPHOS -despite the presence of an integrated system- demonstrates a state of severe task inertia, in which the ERP technology is simply "layered" over previously established practices rather than transforming them. This finding is consistent with (Meyssonier & Pourtier, 2006, p. 48), who argued that ERPs often act as a tool for rationalizing existing tasks rather than innovating them, and the observations of (Granlund, 2001) regarding accounting stability. At

SOMIPHOS, the "resistance to digital integration" is not merely behavioral but structural; the technology is utilized to perform the same manual tasks faster, rather than transforming the nature of the tasks themselves. This result is also a perfect example of Path Dependency in which the organization tend to stay on a known path because of the high cost of switching to a new one, even when more efficient alternatives are available (Sydow et al., 2009). As a result, the management control function at SOMIPHOS is locked into a historical trajectory defined by manual reconciliations and the "Excel loop".

5.2 Competence Lock-in and the Identity Trap

The "competence lock-in" observed at SOMIPHOS reflects a state where the heavy "operational load" of historical reporting acts as a barrier to role evolution, maintaining management controllers in a "scorekeeper" typology that prioritizes compliance over strategic autonomy (Lambert & Sponem, 2011). This identity is further stabilized by a lack of the "institutional work" required to "break the cycle" of routine manual tasks. In this sense, rather than facilitating a shift toward analytical value creation, the ERP serves to reinforce existing accounting identities by fulfilling the hierarchy's demand for verified, auditable data (Goretzki et al., 2013). This creates a self-reinforcing cycle where management controllers remain occupied with traditional tasks, preventing the transition toward a "business partner" model -a finding consistent with Granlund and Malmi's (2002, p. 313) observation that ERP systems have had only a moderate impact on management control practices.

This dynamic is further reinforced by an institutional 'incentive trap', in which accountability mechanisms and regulatory oversight prioritize procedural compliance over strategic initiative. Consistent with the literature on audit-oriented governance (Power, 1997) and coercive institutional pressures (DiMaggio & Powell, 1983), the organizational environment emphasizes error avoidance, formal reporting accuracy, and seniority-based progression, thereby offering limited incentives for controllers to engage in high-value analytical activities. In such contexts, developing forward-looking insights may be perceived as risky, as deviations from established procedures can trigger scrutiny from oversight bodies such as the General Inspectorate of Finance (IGF). Consequently, the existing incentive systems ensure that the ERP reinforces compliance-oriented practices, functioning as administrative safeguards that effectively discourages any desire for strategic repositioning.

5.3 A highly centralized structure

The company exhibits a highly centralized structure, reflecting coercive isomorphism as defined by (DiMaggio & Powell, 1983), as a structural reaction to a regulatory environment characterized by "vertical guardianship" (Tutelle). In this context, the company is forced to adopt structures that meet external state legitimacy rather than internal operational efficiency since the concentration of authority at the top acts as a protective mechanism to reduce legal risks. As the state exerts formal pressure through strict reporting mandates, the organization goes through a process of homogenization where the "iron cage" of bureaucracy is reinforced by the very digital tools intended to modernize it.

This institutional pressure transforms the ERP from a decentralized decision-support system into what (Quattrone & Hopper, 2005) identify as a tool for "distance control", where each department remains an island that simply reports upwards rather than horizontally and the technology is used only as a compliance extraction engine. In their analysis of ERP-driven organizational change, (Bennani et al., 2024, p. 150) point out that in centralized structures, the management controller's task is reduced to data verification which is primarily used to serve the established hierarchy's need for oversight over the strategic agility and analytical value creation typically associated with digital transformation.

5.4 Symbolic digitalization

Our findings indicate that in SOMIPHOS, the "Technology" vertex of Leavitt's Diamond is advanced, but it remains an isolated island of modernization. ERP implementation meets only external modernization expectations while leaving internal practices largely unchanged. In another word, the ERP is predominantly employed for compliance and financial reporting, but its transformative potential is restricted.

This restricted usage stems from an institutional and legal framework that necessitates a survivalist management style where leaders place a high priority on quick financial reporting and rules compliance. This

behavior is structurally legitimized by a “bureaucratic logic” driven by the fear of penal liability and strict General Inspectorate of Finance (IGF) inspection which pushes leadership into a defensive posture. In this context, the enterprise falls into a “compliance trap”: the ERP serves as a “myth and ceremony” for external auditors and supervisory authorities, while the firm's internal logic still rooted in the traditional, centralized, and reactive reporting style of the pre-digital era, which is a classic example of institutional decoupling (Meyer & Rowan, 1977). Following the mechanisms of isomorphism described by (DiMaggio & Powell, 1983), the company appears to have adopted the ERP for symbolic reasons -to maintain legitimacy in a state-led modernization drive- rather than for functional efficiency.

As shown in the management Controller’ role evolution, SOMIPHOS is currently stuck in the traditional task -Information Provider, failing to cross the threshold into “Strategic Advisor”.

5.5 Blocked Socio-Technical Cascades and Digital Paradox

The application of Leavitt’s Diamond to SOMIPHOS reveals that the mutual interdependence between technology, tasks, people, and structure is not automatically activated as empirically confirmed by (Robertson et al., 2025, p. 5). Their study of AI implementation in retail reveals that "people-related challenges" (54% of all identified obstacles) and "structural challenges" (26%) most frequently block successful integration, particularly when "the corporate immune system of these organizations is resistant to change". Our case demonstrates what can be conceptualized as blocked socio-technical cascades: technological capability fails to induce task redesign and development of complementary organizational capabilities due to organizational inertia. (Riedinger et al., 2024) identify that achieving business-IT integration requires simultaneous development of capabilities across all four Leavitt dimensions, yet they note that "prevailing corporate culture" and "existing organizational structure" often impede this process. The specific mechanisms that block socio-technical cascades at SOMIPHOS are also due to the interplay between institutional inertia and structural centralization. This is consistent with the findings of (Wigand, 2007), who states that structural centralization—a defining characteristic of many SOEs—restricts the “formation of new communication paths” and “new ways of working”.

Since mutual interdependence between technology, management controller’s tasks, management controller’s competencies, and structure—as articulated in Leavitt's Diamond Model—is neutralized at SOMIPHOS, this creates what this study conceptualizes as a “Digital Paradox”: the coexistence of advanced digital infrastructure and persistent traditional management control practices.

5.6 The Digital Paradox in Transition Economies

A significant contribution of this study is the identification of the “Resource-Maturity Gap” specific to SOEs in transition economies, referring to the disconnect between substantial technological investments and limited organizational capacity for functional transformation. Unlike Western models which assume that technology drives organizational change, the SOMIPHOS case demonstrates that a dominant “Institutional Logic” -prioritizing stability and hierarchy- frequently overrides the “Digital Logic” of data-driven insights. This interpretation is consistent with the work of (Roztocki & Weistroffer, 2015), who argue that the legacy of central planning has created a unique organizational culture characterized by distrust of authority, a focus on stability over agility, and a tendency to use technology to automate existing bureaucratic processes rather than transform them, creating an environment where “models and theories developed in highly developed countries may be of limited use”. Similarly, (Soja & Cunha, 2015, p. 325) emphasize that the most critical barriers to information and communication technology success in transition economies are not technical or financial but rather human and cultural, reflecting a persistent “institutional inheritance” that fosters low trust and a strong orientation toward control.

Collectively, these sources confirm that the paradox of sophisticated digital infrastructure without functional transformation occurs when investment is directed solely at technological tools while neglecting the parallel need for investment in “institutional flexibility”. In this context, the bottleneck is not the adoption of technology but the absence of organizational maturity -defined as the ability to redesign processes, delegate authority, and cultivate a culture of agility and trust. For SOEs operating in transition economies, this means that

successful digital transformation requires a dual strategy: technology adoption must be coupled with deliberate efforts to reshape institutional and cultural foundations.

6. Conclusion

This study has explored, through an in-depth interpretive case analysis, the complex dynamics of digital transformation within the management control function in an SOE in a transition economy. The case of SOMIPHOS serves as a powerful illustration of a “digital paradox”: despite the presence of advanced digital infrastructure, the maturity of management control roles remains limited. In the domain of management control, ERP systems are assumed to enhance analytical capabilities, foster cross-functional integration, and reposition controllers as strategic partners. However, as this study demonstrates, the persistence of traditional management control roles reflects a configuration in which digital transformation is reduced to technological adoption rather than systemic organizational redesign.

While existing ERP literature commonly highlights barriers such as resistance to change, insufficient training, and limited top management support, these explanations remain largely descriptive and do not fully capture the underlying generative mechanisms. The present study advanced a more explanatory perspective by identifying five interrelated dynamics. The findings show that the observed digital paradox does not stem from technical deficiencies, but from a profound socio-technical misalignment reinforced by the specific institutional pressures of the Algerian public sector. More specifically, functional integration gap, task inertia, competence lock-in, structural centralization, and symbolic digitalization interact in a mutually reinforcing manner, thereby inhibiting the cascading adjustments predicted by socio-technical theory.

The SOMIPHOS case study provides important insights for managers and decision-makers: the digital transformation of management control is fundamentally a managerial and cultural change process, requiring the redesign of organizational processes, the delegation of decision-making authority, and the cultivation of a culture grounded in agility and trust, with technology acting only as an enabling catalyst. To overcome this paradox, SOMIPHOS and similar organizations must adopt a comprehensive transformation roadmap that extends beyond purely technical solutions and addresses the underlying institutional and organizational conditions shaping technology use.

References

- [1] Amer, M., & Hilmi, Y. (2024). ERP and the Metamorphosis of Management Control: An Innovative Bibliometric Exploration. *Salud, Ciencia y Tecnología - Serie de Conferencias*, 3. <https://doi.org/10.56294/sctconf2024.714>
- [2] Anthony, R. N. (1965). *Planning and Control Systems: A Framework for Analysis*. Division of Research, Graduate School of Business Administration, Harvard University. <https://books.google.fr/books?id=OY4uAAAAMAAJ>
- [3] Arkhipova, D., Montemari, M., Mio, C., & Marasca, S. (2024). Digital technologies and the evolution of the management accounting profession: a grounded theory literature review. *Meditari Accountancy Research*, 32(7), 35–64. <https://doi.org/10.1108/MEDAR-07-2023-2097>
- [4] Barreto, A., Gomes, P., Quesado, P., & O’Sullivan, S. (2024). Management Accounting and Digital Technologies: A Science mapping review. *6th International Conference on Advanced Research Methods and Analytics - CARMA 2024*, 305–316. <https://doi.org/10.4995/CARMA2024.2024.17814>
- [5] Barreto, A., Gomes, P., Quesado, P., & O’Sullivan, S. (2025). Advancements in Management Accounting and Digital Technologies: A Systematic Literature Review. *Accounting, Finance & Governance Review*, 34. <https://doi.org/10.52399/001c.137301>
- [6] Bennani, H., Outseki, J., & Benhaddouch, M. (2024). The influence of enterprise resource planning systems on the management control function in large companies. *Journal of Governance and Regulation*, 13(4), 144. <https://doi.org/10.22495/jgrv13i4art14>

- [7] Berger, P. L., & Luckmann, T. (2011). *The social construction of reality: a treatise in the sociology of knowledge*. Open Road Media Integrated Media.
- [8] Bhimani, A. (2020). Digital data and management accounting: why we need to rethink research methods. *Journal of Management Control*, 31(1–2), 9–23. <https://doi.org/10.1007/s00187-020-00295-z>
- [9] Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76(4), 121–131.
- [10] Dechow, N., & Mouritsen, J. (2005). Enterprise resource planning systems, management control and the quest for integration. *Accounting, Organizations and Society*, 30(7–8), 691–733. <https://doi.org/10.1016/j.aos.2004.11.004>
- [11] DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48(2), 147. <https://doi.org/10.2307/2095101>
- [12] Fährndrich, J. (2023). A literature review on the impact of digitalisation on management control. *Journal of Management Control*, 34(1), 9–65. <https://doi.org/10.1007/s00187-022-00349-4>
- [13] Fauzi, T. H. (2021). Impact of enterprise resource planning systems on management control systems and firm performance. *Uncertain Supply Chain Management*, 9(3), 745–754. <https://doi.org/10.5267/j.uscm.2021.4.003>
- [14] Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). *Embracing Digital Technology: A New Strategic Imperative*. 55(2), 1–12.
- [15] Gessa, A., Jiménez, A., & Sancha, P. (2023). Exploring ERP systems adoption in challenging times. Insights of SMEs stories. *Technological Forecasting and Social Change*, 195, 122795. <https://doi.org/10.1016/j.techfore.2023.122795>
- [16] Goretzki, L., Strauss, E., & Weber, J. (2013). An institutional perspective on the changes in management accountants' professional role. *Management Accounting Research*, 24(1), 41–63. <https://doi.org/10.1016/j.mar.2012.11.002>
- [17] Gorrell, A. (2023). The impact of digital transformation on academic work. *Studies in Technology Enhanced Learning*, 3(2). <https://doi.org/10.21428/8c225f6e.8efe18a1>
- [18] Granlund, M. (2001). Towards explaining stability in and around management accounting systems. *Management Accounting Research*, 12(2), 141–166. <https://doi.org/10.1006/mare.2000.0151>
- [19] Granlund, M., & Malmi, T. (2002). Moderate impact of ERPS on management accounting: a lag or permanent outcome? *Management Accounting Research*, 13(3), 299–321. <https://doi.org/10.1006/mare.2002.0189>
- [20] Järvenpää, M. (2007). Making Business Partners: A Case Study on how Management Accounting Culture was Changed. *European Accounting Review*, 16(1), 99–142. <https://doi.org/10.1080/09638180701265903>
- [21] Järvenpää, M., Hoque, Z., Mättö, T., & Rautiainen, A. (2023). Controllers' role in managerial sensemaking and information trust building in a business intelligence environment. *International Journal of Accounting Information Systems*, 50, 100627. <https://doi.org/10.1016/j.accinf.2023.100627>
- [22] Lambert, C., & Sponem, S. (2011). Roles, Authority and Involvement of the Management Accounting Function: A Multiple Case-study Perspective. *European Accounting Review*, 1–25. <https://doi.org/10.1080/09638180.2011.629415>
- [23] Latif, S., Salleh, S. I. M., Ahmad, B., & Saif, F. (2025). ERP Adoption and Strengthening of Management Accounting and Controls at a Pakistani Manufacturing SME: A Case Study Approach. *South Asian*

- Journal of Business and Management Cases*, 14(2), 145–161.
<https://doi.org/10.1177/22779779251349974>
- [24] Lee, C., Kim, H. F., & Lee, B. G. (2024). A Systematic Literature Review on the Strategic Shift to Cloud ERP: Leveraging Microservice Architecture and MSPs for Resilience and Agility. *Electronics*, 13(14), 2885. <https://doi.org/10.3390/electronics13142885>
- [25] Mannan, M. A., Shaikh, A. K., Khan, A. A., Raahemifar, K., & Mohamed, M. A. (2025). Transforming ERP systems with collaborative AI: Paving the path to strategic growth and sustainability. *Array*, 28, 100517. <https://doi.org/10.1016/j.array.2025.100517>
- [26] Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385. <https://doi.org/10.1016/j.giq.2019.06.002>
- [27] Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, 83(2), 340–363. JSTOR.
- [28] Meyssonier, F., & Pourtier, F. (2006). Les ERP changent-ils le contrôle de gestion?: *Comptabilité Contrôle Audit*, Tome 12(1), 45–64. <https://doi.org/10.3917/cca.121.0045>
- [29] Morawiec, P., & Softysik-Piorunkiewicz, A. (2023). ERP System Development for Business Agility in Industry 4.0—A Literature Review Based on the TOE Framework. *Sustainability*, 15(5), 4646. <https://doi.org/10.3390/su15054646>
- [30] Mossa, Y., Smith, P., & Bland, K. (2025). Reconceptualizing Enterprise Resource Planning (ERP) Systems from a Software Architecture Perspective Using a Framework Based on ERP System Characteristics. *Procedia Computer Science*, 256, 174–189. <https://doi.org/10.1016/j.procs.2025.02.110>
- [31] Nair, J., Reddy, D. B. S., & Samuel, A. A. (2014). Conceptualizing Dimensions of Enterprise Resource Planning Systems Success: A SocioTechnical Perspective. *International Journal of Enterprise Information Systems*, 10(1), 53–75. <https://doi.org/10.4018/ijeis.2014010104>
- [32] Power, M. (1997). *The audit society: rituals of verification*. Oxford University Press.
- [33] Quattrone, P., & Hopper, T. (2005). A ‘time–space odyssey’: management control systems in two multinational organisations. *Accounting, Organizations and Society*, 30(7–8), 735–764. <https://doi.org/10.1016/j.aos.2003.10.006>
- [34] Reutter, J., Allain, É., & Landagaray, P. (2021). L’évolution des rôles du contrôleur de gestion à l’ère de la Business Intelligence: *ACCRA*, N° 11(2), 85–107. <https://doi.org/10.3917/accra.011.0085>
- [35] Riedinger, C., Netscher, M., & Zimmermann, S. (2024). *Organizational Capabilities for Business-IT Integration in Digital Enterprises*. 493–500. <https://doi.org/10.15439/2024F9800>
- [36] Robertson, J., Botha, E., Oosthuizen, K., & Montecchi, M. (2025). Managing change when integrating artificial intelligence (AI) into the retail value chain: The AI implementation compass. *Journal of Business Research*, 189, 115198. <https://doi.org/10.1016/j.jbusres.2025.115198>
- [37] Roztock, N., & Weistroffer, H. R. (2015). Information and Communication Technology in Transition Economies: An Assessment of Research Trends. *Information Technology for Development*, 21(3), 330–364. <https://doi.org/10.1080/02681102.2014.891498>
- [38] Scapens, R. W., & Jazayeri, M. (2003). ERP systems and management accounting change: opportunities or impacts? A research note. *European Accounting Review*, 12(1), 201–233. <https://doi.org/10.1080/0963818031000087907>
- [39] Siggelkow, N. (2007). Persuasion With Case Studies. *Academy of Management Journal*, 50(1), 20–24. <https://doi.org/10.5465/amj.2007.24160882>

- [40] Soja, P., & Cunha, P. R. D. (2015). ICT in Transition Economies: Narrowing the Research Gap to Developed Countries. *Information Technology for Development*, 21(3), 323–329. <https://doi.org/10.1080/02681102.2015.1028734>
- [41] Sydow, J., Schreyögg, G., & Koch, J. (2009). ORGANIZATIONAL PATH DEPENDENCE: OPENING THE BLACK BOX. *Academy of Management Review*, 34(4), 689–709. <https://doi.org/10.5465/AMR.2009.44885978>
- [42] Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., 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>
- [43] Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- [44] Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Press.
- [45] Wigand, D. L. (2007). *Building on leavitt's diamond model of organizations: The impact of information technology on structure, people, and tasks*. 2, 1259–1267. Scopus. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84870220166&partnerID=40&md5=873cd2627166244944eaf10715e95470>