ERP Systems and Complementary Digital Platforms in Regulated Manufacturing: A Mixed-Methods Study of an Anonymised Algerian Case

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Received: 02/08/2026 **Accepted: 22/09/2026** **Published: 20/11/2026**

Abstract

Purpose: This study examines how enterprise resource planning (ERP) systems and complementary internal digital platforms are perceived to support organisational efficiency and compliance-related workflow control in an anonymised Algerian pharmaceutical manufacturer. Methods: A descriptive, convergent single-case design combined aggregate survey results from 88 employees, documented managerial summaries and workflow material. Results: Positive satisfaction was reported by 84 of 88 respondents (95.46%). ERP was associated with integration, standardisation, traceability and compliance-oriented control, whereas complementary platforms were associated with accessibility, coordination, training support, request follow-up and mobile validation. Contribution: The case shows how ERP and platform layers can be complementary in regulated work. Limitations: Because the evidence is aggregate and cross-sectional, results are descriptive and case-specific rather than causal or statistically generalisable.

Keywords: ERP systems; digital platforms; organisational efficiency; regulatory compliance; pharmaceutical industry.

JEL Classification Codes: M15; L65; O33.

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1- INTRODUCTION

For pharmaceutical manufacturers, digital transformation is not simply a matter of replacing paper with software. It is a practical response to a demanding operational problem: products must be produced, released and distributed efficiently, while every relevant action must remain traceable, documented and defensible during internal or external review. In this setting, efficiency and compliance are not competing goals. Delays, fragmented data and unclear responsibilities can weaken both operational performance and control.

Enterprise resource planning systems have become a core infrastructure for integrating finance, inventory, production, quality and human-resources information. Yet the daily experience of employees is increasingly shaped by complementary platforms for learning, internal services, attendance, employee information, requests and technical support. These tools can make formal processes easier to access and faster to complete, especially when workers need to validate or follow up tasks away from a fixed workstation.

Purpose of the study. This study examines how a core ERP system and complementary internal digital platforms are perceived to support organisational efficiency and compliance-related workflow control in Company A, an anonymised pharmaceutical manufacturer in Algeria. It focuses on employee perceptions, managerial summaries and workflow documentation; it does not seek to estimate causal effects or generalise statistically beyond the case.

The study makes three contributions. First, it treats ERP and complementary platforms as an integrated ecosystem rather than isolated technologies. Second, it combines descriptive employee evidence with managerial themes and workflow evidence. Third, it protects organisational confidentiality while preserving the operational mechanisms through which digital tools affect work. The paper does not claim causal inference: the available survey evidence is aggregated, so the quantitative analysis is descriptive.

The literature supports three case-based propositions. First, ERP systems are expected to improve efficiency and regulatory compliance by integrating records, standardising transactions and strengthening traceability. Second, complementary platforms are expected to support efficiency and compliance by making workflows, training, communication and approvals more accessible. Third, the combined use of ERP and platforms is expected to offer greater value than isolated tools when integration, data governance and user support are adequate. These propositions guide interpretation; they do not represent causal claims beyond the evidence of a single case.

a. Research propositions

The study is guided by three descriptive propositions: (P1) ERP systems are associated with perceived efficiency and compliance-related workflow control through shared records, standardised transactions and traceability; (P2) complementary digital platforms are associated with perceived efficiency and compliance-related

workflow control through accessible requests, learning, approvals and follow-up; and (P3) their combined use is perceived as more valuable when governance, data quality and user support are adequate. These propositions guide interpretation rather than constitute causal hypotheses.

The Algerian pharmaceutical setting is important because firms are pursuing operational modernisation while facing evolving requirements related to local production, quality assurance and public-health resilience. National digital-transformation initiatives create an additional policy context for organisational investment in connected information systems. Yet evidence remains limited on how ERP systems and supplementary digital platforms jointly shape both efficiency and compliance within Algerian pharmaceutical firms.

b. **Algerian context and research gap**

This study uses that insight without reproducing Ma's model or empirical design. The present analysis focuses on Company A's ERP environment and complementary platforms, using employee perceptions, interviews and workflow evidence. It examines whether the two technology layers appear to make compliant work more manageable while supporting coordination, timeliness and transparency.

The relationship between compliance and performance is not necessarily fixed. Compliance can consume resources when it depends on manual documentation, repeated checking and fragmented information. It can also generate value when it supports reliable processes, reduces preventable errors and demonstrates credible control to regulators, customers and partners. (Ma, 2026) frames digital transformation as a contextual factor that can change this relationship by reducing the effort involved in compliance work and increasing the practical value of compliance information.

c. **Digital compliance and performance**

Socio-technical perspectives emphasise that digital performance arises from the relationship between technology, users, work design and organisational arrangements. Employees must understand why systems are used, have the confidence to use them correctly and receive support when problems arise. User satisfaction can indicate that digital tools fit routine work, but it is not proof that every process is effective. Training quality, managerial support, workload, process clarity and change management remain important conditions for sustained adoption.

Organisational efficiency concerns the effective use of time, labour and information to achieve operational objectives. In digital settings, it may appear in faster access to reliable data, fewer repeated handovers, more timely approvals and smoother coordination between departments. However, speed alone is not evidence of improvement in a regulated environment. An efficient process must also maintain the documentation, review and accountability needed to demonstrate compliance.

d. **Efficiency, adoption and socio-technical fit**

The distinction between ERP and platforms is analytical rather than absolute. ERP generally provides structured, cross-functional records, while platforms often improve the accessibility and responsiveness of specific tasks. Together, they may reduce waiting time and make process status more transparent. Their joint impact should nevertheless be assessed through actual work practices, not merely through system availability.

Digital platforms complement the ERP backbone by supporting user-facing activities that require simple access, communication or rapid follow-up. Examples include e-learning, HR self-service, internal service portals, mobile approvals and workflow-tracking applications. In the Company A case, these tools are relevant because they can bring routine requests and learning activities closer to the people who need to complete them.

e. **Platforms and everyday responsiveness**

For regulated firms, this integration also has a control dimension. Configured workflows can direct approvals, preserve responsibility, link evidence to transactions and provide an auditable sequence of actions. These features can improve consistency, but they are not automatically effective. Poor master data, unclear ownership, inadequate training or weak system controls can reproduce existing problems in digital form. The value of ERP therefore rests on governance as well as software functionality.

ERP systems connect functions that might otherwise maintain separate records, such as procurement, finance, inventory, planning, production and quality. Their main contribution is a shared transaction base: when authorised users work from the same record, handovers become more visible and duplicated data entry can be reduced. (Kumar,k & Van Hillegerberg,J, 2000, pp. 22-26) describe ERP as an enterprise-wide approach to integrating core processes and information.

f. **ERP systems: integration and control**

In biopharmaceutical operations, compliance has special significance because product safety and quality cannot be demonstrated solely at the end of production. They must be supported by controlled processes and complete, credible records across the lifecycle. (Ma, 2026) argues that this makes traceability, process integrity and reliable quality information central to the sector. A lapse can lead to disruption, rejected batches, recall exposure, regulatory intervention and loss of stakeholder confidence; compliance is thus both a legal obligation and a condition of operational legitimacy.

(Foorthuis,R & Bos,R, 2011, pp. 1570-1577) distinguish three complementary forms of compliance activity. Preventive controls seek to avoid problems through training, clear procedures and standardised work. Detective controls identify departures from requirements through monitoring, review and auditing. Corrective controls address discovered weaknesses through investigation, remediation and process improvement. This

distinction is useful because a mature compliance system needs all three functions rather than relying on inspections alone.

Compliance management refers to the organised activities through which a firm meets external obligations and internal rules (Parker,C & Nielsen,V.L, 2011). It is therefore broader than checking whether a rule has been followed after an event. It involves designing processes, allocating responsibility, documenting decisions and responding when weaknesses are identified.

g. **Compliance as a managed capability**

Pharmaceutical value chains depend on accurate information across development, manufacturing, quality assurance, distribution and post-market activities. (Ma, 2026) notes that compliance obligations span the medicine lifecycle, including laboratory practice, clinical work, manufacturing, distribution and use. Digital systems can make these obligations easier to coordinate by connecting records, workflows and approvals. Yet their benefits depend on validation, data integrity, appropriate access rights and disciplined day-to-day use.

Digital transformation is not limited to replacing paper with software. It involves redesigning the way information, decisions and responsibilities move through the organisation. (Vial,G, 2019, pp. 118-144) describes it as organisational change triggered by digital technologies, whereas dynamic-capability research emphasises the capacity to adapt and reconfigure resources as conditions change. In pharmaceutical organisations, this broader view matters because digital tools must support reliable operations while remaining compatible with demanding quality and regulatory expectations.

h. **Digital transformation in regulated pharmaceutical work**

Although ERP systems and employee-facing platforms are increasingly used in regulated pharmaceutical organisations, there is limited case-based evidence on how their complementary use is perceived to shape operational efficiency and compliance-related workflow control in Algeria. This study therefore asks: how do ERP systems and complementary digital platforms support perceived organisational efficiency and regulatory compliance in Company A, an Algerian pharmaceutical manufacturer? The study does not test causal effects; it examines descriptive patterns and the organisational mechanisms reported in the available case evidence.

2. LITERATURE REVIEW

Industry and policy reports complement the academic literature by tracking the pace and scale of digital transformation. (Deloitte, 2022, p. 3) and (McKinsey & Company, 2023, p. 2) both describe digital transformation as an ongoing organisational capability rather than a one-time project, while the International Data Corporation (2023) documents continued growth in global digital transformation spending. The World Economic Forum (2023) links these trends to changing skill requirements in the workforce, and the OECD's outlooks on productivity, innovation and the digital economy (OECD, 2021, 2023, 2024–2025) consistently associate digital

adoption with productivity gains when accompanied by adequate institutional support. The (United Nations, 2022, p. 63) E-Government Survey extends this perspective to public-sector digitalisation, offering a comparative benchmark for national digital-readiness efforts such as Algeria's SNTD 2030 strategy.

a. Industry and institutional outlooks on digital transformation

Because compliance in pharmaceutical manufacturing is defined largely by international frameworks, this review also draws on regulatory guidance rather than academic sources alone. The ICH Q10 pharmaceutical quality system guideline establishes the principle that quality must be built into products through process understanding and control rather than verified only through final testing (ICH Q10, 2008, pp. 1-3). Good manufacturing practice requirements issued by the U.S. Food and Drug Administration (FDA, 2018), the European Medicines Agency (EMA, 2022) and the World Health Organisation (WHO, 2014) similarly require documented, traceable and validated processes across production and distribution. These frameworks provide the regulatory backdrop against which ERP-supported traceability and digital documentation should be evaluated in the Algerian pharmaceutical context.

b. International regulatory and quality frameworks

Firm size has also been shown to shape digital transformation outcomes. In a study of Chinese pharmaceutical companies, (Luo, X & Yu, S.C, 2022, pp. 3-5) find that larger firms are better able to absorb the costs and organisational adjustments associated with digital transformation, moderating its effect on performance. At a broader level, digital transformation in pharmaceutical development and manufacturing has been described as a multi-stage process spanning research, production and distribution (Steinwandter,V, Borchert,D, & Herwig,C, 2019, pp. 1795-1805), while healthcare-focused research links digital transformation to innovation outcomes across the pharmaceutical value chain (Lee,I, Shin, Y.J, & Wang, Q, 2019, pp. 277-290). Sector-wide analyses of manufacturing science further argue that digital tools are becoming integral to how pharmaceutical quality and process control are conceived, not merely how they are executed (Rantanen,J & Khinast, J, 2015, pp. 3612-3615).

c. Firm-level and macro perspectives on digital transformation

Complementary to ERP, digital platforms increasingly mediate everyday organisational interaction. (Suokas, H, Henttonen, k , & Piispanen, R, 2025, pp. 79-83) describe how digital platforms reshape communication and coordination within organisational ecosystems, a perspective consistent with this study's treatment of platforms as a responsiveness layer around the ERP backbone. (Ullagaddi, S, 2024, pp. 45-59) further notes that pharmaceutical firms adopting digital platforms alongside core systems face a dual challenge: capturing efficiency gains while maintaining data integrity and regulatory compliance, reinforcing the need to evaluate platforms and ERP jointly rather than in isolation.

d. Digital platforms and organisational interaction

Beyond operational efficiency, ERP systems have also been linked to improved financial transparency. (Bellaha, S & Drif, K, 2026, pp. 70-73) argue that ERP-driven standardisation of financial data supports more reliable reporting and reduces opportunities for undetected errors or manipulation. This governance dimension complements the compliance-oriented view developed earlier in this review: ERP systems do not only support traceability of production and quality data but can also strengthen the credibility of financial information provided to regulators, auditors and other stakeholders.

e. Financial transparency and governance value of ERP

Digital transformation in Algeria unfolds within a specific institutional and infrastructural context. (Berkane & Rais, 2025, pp. 22-23, 32) document persistent infrastructure and human-capital constraints that slow digital adoption across Algerian organisations, while (Lazhari, 2025, pp. 437-438, 441) frames digital transformation more broadly as a process shaped by both opportunities and structural challenges at the national level. (Mahdhdar, S & Abdelmalek, F, 2025) provide a comparative assessment of digital maturity across Algerian sectors, showing considerable variation in readiness. These constraints are addressed, at least in policy terms, by the National Strategy for Digital Transformation (High Commission for Digitalization, 2024, pp. 10-11), which encourages Algerian organisations to modernise administrative and operational practices (Government of Algeria, 2023). This policy context is directly relevant to Company A, which operates within the same national digitalisation push while managing pharmaceutical-specific regulatory demands.

f. Digital transformation constraints and national strategy

Evidence from Algerian studies and policy discussions suggests that ERP outcomes depend on implementation governance, user preparation and organisational fit. In this context, ERP adoption should be assessed as a change process rather than as a purely technical installation.

g. Algerian ERP implementation evidence

In pharmaceutical manufacturing specifically, production and process handbooks emphasise that quality, traceability and batch integrity depend on tightly controlled information flows across formulation, processing and packaging stages (Gad, S.C. (Ed), 2008). This underlines why ERP integration is not merely an efficiency tool in this sector but a structural requirement for demonstrating process control and product safety.

The theoretical case for ERP adoption rests on the idea that integrating core business processes around shared data reduces fragmentation and improves managerial visibility (Davenport, T.H, 1998, pp. 121-131) (Kumar,k & Van Hillegerberg,J, 2000, pp. 22-26). Early enterprise-systems research already identified this integration potential, while also warning that large packaged software introduces implementation risks that are still under-researched (Gable, G.G, 1998). Critical-success-factor studies later showed that ERP benefits depend

heavily on top-management support, change management, and user training rather than on the software alone (Nah, F.F-H, Lau, J.L.-S, & Kuang, J, 2001, pp. 285-296). Broader reviews of ERP research confirm that adoption outcomes vary widely across industries and are shaped by organisational readiness as much as by technical design (Shehab, E.M, Sharp, M.W, Supramaniam, L, & Spedding, T.A, 2004, pp. 359-386).

h. ERP systems: theoretical and industry foundations

Their relevance to efficiency and compliance lies in the work they make visible. The Learning Platform can record training completion and certification status, which is important for GMP-related competence requirements. Legal Home and the service portals create a documented route for requests, actions and follow-up. People Connect, Time Attendance and HR Shared Services improve the reliability and accessibility of employee records, while mobile-enabled approval functions can reduce delays without removing accountability. The case therefore evaluates platforms not as replacements for ERP, but as complementary interfaces that make formal processes easier to access, monitor and complete.

The company also uses Legal Home as an internal support and compliance channel for reporting issues, submitting improvement suggestions and following requests. The Self-Service Portal brings multiple departmental services together, while the Administration module manages requests concerning transport, facilities and office maintenance. The IT Service Catalogue structures requests concerning hardware, software, networks and connectivity; Clinic Services supports personal medical-related requests; and HR Shared Services centralises requests for official documents, payroll support and attendance assistance. These applications illustrate that the platform layer is not a generic concept in this study but a concrete set of employee-facing systems linked to HR, training, support and administrative work.

The analysis treats digital platforms as a defined set of tools used alongside the core ERP system at Hikma Pharma Algeria. These include People Connect for human-resource information and employee self-service; the Payslip module for secure access to monthly payroll records; Time Attendance for attendance, leave and approval workflows; and the Learning Platform for online training, certification and continuous development. Together, these platforms place routine employment information, training requirements and administrative actions in accessible digital channels.

i. Digital platforms in the case organisation

This wider ecosystem does not replace internal ERP or employee-facing applications. Rather, it creates an external layer of digital interaction that can improve the timeliness, visibility and traceability of exchanges with public bodies when organisations have reliable data, trained users and clear responsibilities. For a pharmaceutical manufacturer, the practical implication is that internal systems should be capable of supplying accurate

information for external declarations, registration processes, customs procedures and other regulatory transactions.

Other external platforms are relevant to pharmaceutical supply, imports and financial administration. The Ministry of External Trade and Export Promotion operates digital services for managing the Special Fund for Export Promotion (FSPE), for monitoring imports of raw materials, production inputs and equipment, and for tracking forecast import programmes. Algeria Customs provides the ALCES platform for online clearance and payment, while the tax administration provides Jibayatic for online tax declaration and payment. Together, these platforms extend digital workflow design beyond Company A by linking firms to the institutional environment in which purchasing, importation, declarations and regulatory compliance occur.

Within the pharmaceutical domain, the National Agency for Pharmaceutical Products (ANPP) provides online channels for stock-level and related declarations through Etat Déclaratif, electronic product-registration submissions through Etasjil, and online appointment requests through RDVPP. The Ministry of Pharmaceutical Industry also has developing platforms, including "Intaj–Tabadul" and "Rou'ya". These initiatives support a gradual move from paper-based or fragmented regulatory interaction toward more structured digital submission and follow-up.

Digitalisation in the Algerian pharmaceutical sector extends beyond firm-level systems. Ministries and public agencies are developing online services that connect pharmaceutical companies with regulatory, administrative, trade, customs and fiscal processes. This external platform environment matters because compliance is partly performed through exchanges with public authorities, not solely through a company's internal ERP and quality-management systems.

3. METHODS AND MATERIALS

3.1 Research design and case anonymity

This research uses a descriptive, convergent case-study design. It brings together aggregate employee survey results, managerial summaries and workflow documentation, which are first considered separately and then interpreted together. The design is appropriate for examining how digital workflows are experienced and understood in their organisational setting; it does not provide a basis for estimating causal effects. The organisation is anonymised as Company A, and names of people and proprietary system identifiers are omitted to protect confidentiality.

Company A operates in an Algerian pharmaceutical setting where operational processes are shaped by strict requirements for documentation, quality management, traceability and controlled workflows. The case is suitable for examining digital complementarity because it uses a core ERP system alongside several internally oriented digital platforms.

3.2 Data sources and sample

The quantitative evidence consists of aggregate survey results for 88 employees across relevant functional areas. The available material reports role categories, user-satisfaction counts and five-point assessments of ERP systems and complementary digital platforms. Individual-level records, response rates, item-level responses and measures of dispersion were not available; results are therefore reported only as descriptive aggregates. The qualitative evidence consists of documented managerial summaries, an information-systems leadership account and workflow descriptions. Because full interview recordings, transcripts and a formal interview sampling frame were unavailable, this component is treated as document-based qualitative evidence rather than as a standalone interview study.

Table 1. Sample profile.

Role	n	%
Director	1	1.14
Managers	9	10.23
Section heads	15	17.05
Operational staff	63	71.59
Total	88	100.00

Source: Authors' compilation from anonymised case evidence.

3.3 Measures and analysis

The descriptive assessment considered five case-defined dimensions: operational efficiency, time optimisation, decision-making support, coordination and regulatory compliance. Each dimension was reported in the source material on a five-point assessment scale; the available evidence does not contain the underlying survey items, construct-validity tests, reliability coefficients or respondent-level scores. User satisfaction was reported in three categories: very satisfied, satisfied and not satisfied. Accordingly, the numerical results are used to describe perceived patterns, not to test statistical relationships or establish the reliability of multi-item scales.

The qualitative analysis used focused thematic reading of the managerial summaries and workflow material. Initial descriptive codes included validation delay, remote access, physical movement, workflow visibility, traceability, training support and cross-functional coordination. These codes were consolidated into broader themes of operational efficiency, accessibility, coordination and visibility, compliance-related governance, and technology complementarity. No claims are made about interview saturation, inter-coder reliability or verbatim participant quotations.

Integration followed a joint-interpretation logic: the aggregate numerical results describe reported user perceptions, while documented managerial and workflow evidence provides contextual explanations for those

patterns. Where the two forms of evidence align, the article presents convergence; where evidence is incomplete, claims are kept cautious. This integration supports analytical explanation within the case but not causal inference.

4. RESULTS

4.1 User satisfaction and perceived impact

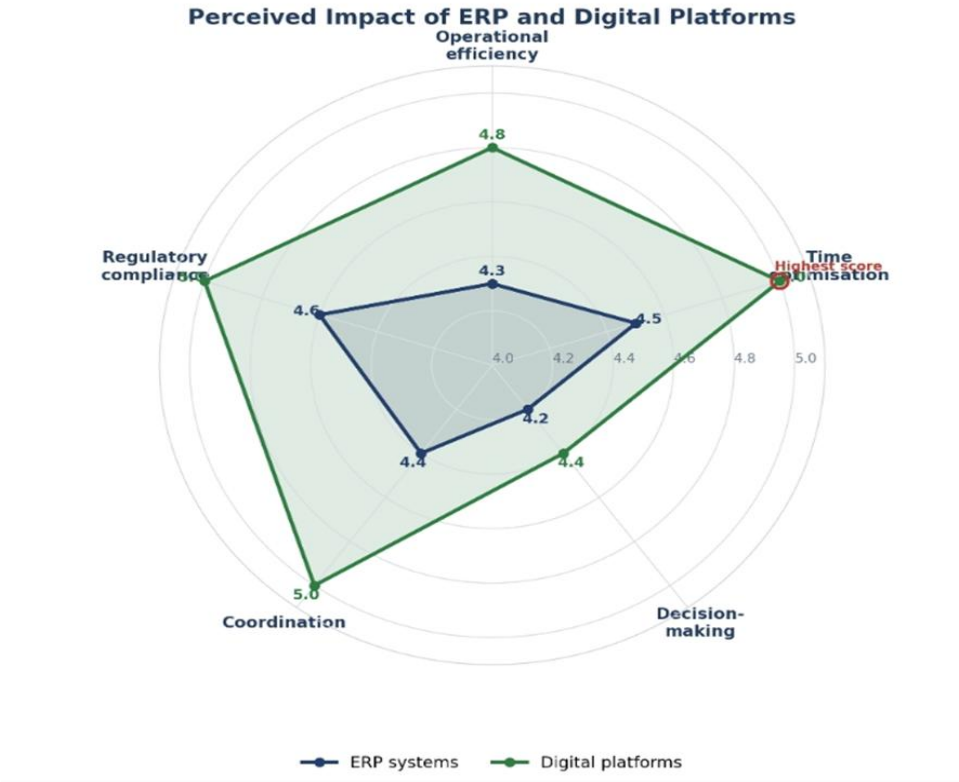
User satisfaction was strongly positive. Seventy-two respondents (81.82%) were very satisfied and 12 (13.64%) were satisfied. Thus, 84 of 88 respondents, or 95.46%, reported positive satisfaction. Four respondents (4.55%) were not satisfied. The result indicates broad acceptance of the digital environment, but it should be interpreted as perceived user experience rather than as an independent technical-performance measure.

Table 2. User satisfaction with ERP systems and digital platforms.

Satisfaction category	n	%
Very satisfied	72	81.82
Satisfied	12	13.64
Not satisfied	4	4.55
Total	88	100.00

Source: Authors' compilation from anonymised case evidence.

Fig N° 1: Perceived impact of ERP systems and complementary digital platforms across organisational performance dimensions.



4.2 Perceived impact of ERP and digital platforms

Both technology groups received high perceived-impact ratings. ERP scores ranged from 4.2 to 4.6, with regulatory compliance receiving the highest rating. Complementary platforms received higher ratings on all dimensions and achieved the maximum score for time optimisation, coordination and regulatory compliance. These values show perceived patterns; no statistical significance test is possible because respondent-level observations and dispersion measures were not available.

Table 3. Semi-quantitative assessment of perceived impact (five-point scale).

Dimension	ERP	Platforms	Descriptive difference
Operational efficiency	4.3	4.8	+0.5
Time optimisation	4.5	5.0	+0.5
Decision-making	4.2	4.4	+0.2
Coordination	4.4	5.0	+0.6
Regulatory compliance	4.6	5.0	+0.4

Source: Authors' compilation from anonymised case evidence.

The pattern supports a complementary interpretation. ERP appears particularly important for structured control, integrated data and compliance-related processes. Platforms appear especially valuable for the speed and accessibility of everyday coordination. The largest descriptive difference concerns coordination (+0.6), consistent with the role of request, service and mobile workflows in connecting users across functions.

4.3 Thematic analysis of managerial evidence

The qualitative material provides a mechanism-based account of the score patterns. Rather than treating digital systems as abstract infrastructure, managers described changes in validation, access, visibility, documentation and work movement. Five themes were identified.

Table 4. Thematic analysis of managerial summaries and workflow evidence.

Theme	Initial codes	Interpretation
Operational efficiency	Reduced validation delay; automation; less physical movement	Digital workflows shortened routine follow-up and lowered non-value-added movement.
Mobile accessibility	Remote validation; portable-device access	Location-independent access enabled faster decisions and continuity of work.
Coordination and visibility	Shared information; request status; workflow progress	Users could see work status and coordinate handoffs more effectively.
Compliance governance	Traceability; documentation; accountability	Recorded actions and clear ownership supported control and audit readiness.
Technology complementarity	ERP integration; platform agility	ERP standardised core processes; platforms made interaction faster and easier.

Source: Authors' thematic analysis.

The operational-efficiency theme was supported by managerial estimates that some validation cycles were reduced by six to seven days, around 70% of validations were carried out through mobile devices, and physical movement between departments declined by approximately 80%. These are managerial estimates, not independently audited performance measures. Their value lies in illustrating the practical changes attributed to the digital environment.

The coordination-and-visibility theme explains why platforms received the strongest relative advantage for coordination. Users could submit, track and follow up requests in a more transparent way, while managers could monitor progress without relying exclusively on informal communication. The compliance-governance theme emphasises that transparency was not merely operational: documented actions, traceability and clearer task ownership helped make responsibilities visible.

4.4 Joint interpretation

Table 5. Joint display integrating quantitative and thematic evidence.

Dimension	Quantitative pattern	Qualitative mechanism
Operational efficiency	ERP 4.3; platforms 4.8	Automation, reduced validation delay and fewer physical handoffs.
Time optimisation	ERP 4.5; platforms 5.0	Mobile validation, faster service follow-up and parallel tasks.
Decision-making	ERP 4.2; platforms 4.4	Access to integrated information and visible request status.
Coordination	ERP 4.4; platforms 5.0	Shared workflows, cross-functional information and service tracking.
Compliance	ERP 4.6; platforms 5.0	Traceability, documentation, training support and accountability.

Source: Authors' analysis.

The results describe reported perceptions and documented organisational practices. They do not prove that the systems caused the reported outcomes, nor do they establish the magnitude of performance change. Estimates from managerial material, including reduced validation delays, higher mobile validation use and reduced physical movement, are reported as organisational estimates and not as independently audited performance indicators.

4.6 Interpretation boundaries

P3 is also consistent with the case evidence. The data suggest complementarity rather than substitution: ERP provides the formal backbone for integrated data and control, while the platform layer makes selected processes more accessible and responsive in daily work. These assessments are descriptive and case-specific; they do not demonstrate causal effects or statistical hypothesis confirmation.

P2 is consistent with the descriptive evidence. Complementary platforms received perceived scores of 4.8/5 for operational efficiency, 5.0/5 for time optimisation, 4.4/5 for decision-making support, 5.0/5 for coordination and 5.0/5 for regulatory compliance. These results align with documented uses of people, training, service-request and approval platforms for accessible routine work and follow-up.

P1 is consistent with the descriptive evidence. ERP received high perceived scores for operational efficiency (4.3/5), time optimisation (4.5/5), coordination (4.4/5) and regulatory compliance (4.6/5). Workflow descriptions of goods receipt, inventory ageing, batch release and vendor creation further indicate how shared system records can support parallel checks and traceable handovers across functions.

4.5 Assessment of research propositions

The main research question asked how ERP systems and complementary internal digital platforms support perceived organisational efficiency and regulatory compliance in Company A. The integrated case evidence indicates that the two technology layers serve distinct but connected functions. ERP is perceived as the control and integration layer: it supports shared records, standardised transactions, traceability and cross-functional coordination. Complementary platforms are perceived as the accessibility and responsiveness layer: they support employee self-service, training, requests, workflow follow-up and remote validation. Together, they make regulated workflows easier to access, monitor and complete while retaining a documented operational record.

5. DISCUSSION

5.1 From digital tools to a digital operating system

The evidence suggests that Company A's digital environment is most usefully understood as a digital operating system for regulated work. ERP provides the durable organisational backbone: shared records, standardised workflows and control points. Complementary platforms make that backbone usable in everyday interactions by allowing employees to request services, access information, complete training and validate actions without excessive delay.

This distinction helps explain the pattern of results. ERP's strongest perceived contribution was regulatory compliance, which is consistent with the role of integrated records and standard processes. Digital platforms scored particularly highly for time optimisation and coordination, which is consistent with the value of accessible, user-facing workflows. The technologies are not substitutes; their contribution emerges in combination.

5.2 Efficiency without losing control

A common tension in regulated operations is the concern that faster work may weaken control. The case suggests the opposite can occur when digital design makes the compliant route easier to follow. Mobile validation, request tracking and recorded workflows can accelerate action while preserving a history of that action. This is

important because operational delays can encourage informal workarounds, whereas transparent digital processes can make timely and documented work compatible.

The findings therefore support a broader view of efficiency. Efficiency is not only reduction in cycle time; it includes fewer unnecessary movements, less repeated follow-up, clearer allocation of responsibility and more timely availability of information. In this sense, organisational efficiency and compliance governance can reinforce each other.

5.3 Implications for Managers

Managers should avoid evaluating ERP and complementary platforms through separate technology budgets alone. The appropriate unit of analysis is the end-to-end workflow: where does data originate, who acts on it, where does approval occur, what record remains, and how can exceptions be monitored? This approach makes it easier to identify gaps between the ERP backbone and user-facing platforms.

First, organisations should map high-friction workflows that involve several functions or repeated follow-up. Second, they should prioritise mobile and self-service functionality where approval speed is important but control must be retained. Third, they should connect training, support and request-management platforms to compliance objectives, not treat them as peripheral administrative systems. Finally, managers should monitor user experience because a formally compliant process that users find difficult may still generate workarounds.

5.4 Implications for Research

The study contributes to research by bringing user satisfaction, semi-quantitative perceptions and process-level themes into the same case account. It suggests that the conceptual separation between “core systems” and “support platforms” may obscure their combined role in organisational performance. Future work can test this complementarity using respondent-level measures of system use, process performance and compliance practices.

Further research should also examine whether the benefits found here vary by department, managerial level and digital capability. Qualitative work based on full transcripts could explore whether employees perceive different trade-offs between speed, autonomy, visibility and control. Longitudinal data could assess whether improved user satisfaction is sustained after implementation maturity.

6. CONCLUSION

This descriptive case study examined how a core ERP system and complementary employee-facing digital platforms are perceived to support organisational efficiency and compliance-related workflow control in an Algerian pharmaceutical manufacturer. The available aggregate evidence indicates high user satisfaction and points to complementary roles rather than a single-technology effect.

Within the case, ERP functions as an integration and control backbone by supporting shared records, standardised processes, traceability and compliance-oriented governance. Complementary platforms support access to requests, training, approvals and follow-up, making formal workflows more responsive in everyday work. The contribution of the study is therefore to show how efficiency, accessibility and compliance can be considered connected outcomes of digital-workflow design.

The study is limited by aggregate quantitative results, unavailable item-level data, summarised managerial material and a single organisational setting. It should consequently be interpreted as descriptive and exploratory, not as a causal test or a basis for generalising to all pharmaceutical firms. Future research should use multi-site and longitudinal designs, transparent sampling, validated survey measures, full qualitative protocols, and independently observed indicators such as processing times, training completion, deviations, audit findings and batch-release performance.

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