

Articulating ISO 9001 and ERP Systems Reconfiguring Customer Complaints Management in the Era of Quality 4.0

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ABSTRACT

In an environment marked by chronic disruptions to global value chains, the operational resilience of logistics platforms has become a strategic imperative. However, the performance of these hubs is frequently hindered by organizational fragmentation and information systems operating in silos. This article examines how the shift from traditional “paper-based” management to digitalized dashboard-driven steering transforms customer claims management — a process at the crossroads of normative compliance and the real-time resolution of unique incidents — from a reactive and scattered practice into a structured lever for operational optimization and customer satisfaction. To address this question, we mobilize the dynamic capabilities theoretical framework through a four-year longitudinal action-research study conducted within a logistics platform. The transformation trajectory involved standardizing the process (ISO 9001:2015), modeling information flows with BPMN (*Business Process Model and Notation*), and integrating them into the ERP system to enable dynamic steering. Our empirical findings reveal that digitalization is not merely a technological choice; it acts as a catalyst for contextual ambidexterity by reducing operational fragmentation and freeing up cognitive capacity for problem-solving. This article discusses how quality-digital alignment enables frontline teams to dynamically adjust their practices in the face of the unexpected while maintaining strict compliance, thereby contributing to the literature on the micro-foundations of logistics resilience.

Keywords: Quality 4.0, Contextual ambidexterity, Claims management, Logistics platforms, Dynamic capabilities, Action research.

INTRODUCTION

Since the start of the decade, global value chains have experienced chronic, systemic disruptions. Health crises, geopolitical tensions, recurring supply shortages, and growing demand instability are forcing logistics infrastructures to absorb a succession of major shocks, profoundly redefining their performance and agility imperatives (Ivanov, 2021; Sheffi, 2023). In this turbulent context, the operational resilience of logistics platforms cannot be decreed solely at the level of overarching strategic orientations. It is built incrementally through day-to-day operational processes. Among these processes, customer claims management occupies a unique position: it constitutes the critical point of contact where the organization's real operational strengths and weaknesses materialize, well beyond formal discourse on service quality.

At the outset of our intervention, this process at the site under study displayed the characteristics of traditional, non-digitalized management: predominant use of paper forms, informal reporting by phone or e-mail, and archiving practices that varied from one team to another, precluding any centralized traceability or shared performance indicators. This situation is not unique to the logistics sector. As Zhang and Huang (2025) demonstrated through a grounded theoretical analysis of logistics claims, although claims are often treated as isolated, one-off incidents, their systematic centralization and structuring in fact reveal deep organizational dysfunctions. It was precisely this comprehensive, structured analysis that manual paper-based processing made impossible within the platform under study: processing times kept lengthening, information became fragmented across departments, and management lacked real-time visibility into the actual performance of customer service.

Faced with such a diagnosis, the most common managerial response is to deploy an immediate technological solution by simply replacing physical media with a digital tool. However, several recent studies suggest moving beyond this technological determinism. In studying the digitalization of claims management, Esperança et al. (2025) point out that the shift to digital can initially exacerbate organizational complexity rather than resolve it. The proliferation of digital channels and the heterogeneity of user phrasing generate a cumbersome volume of data that, absent any prior structure, reproduces the biases of the old physical system. Consequently, it is the prior standardization of the process itself that enables digitalization to successfully transform reactive management into proactive steering.

This methodological and theoretical stance guided the intervention conducted within the logistics platform under study. The shift from paper-based management to dynamic dashboard-driven steering was not approached as a mere IT deployment, but as a structured organizational transformation process comprising several phases:

- Standardize the claims-handling process within the framework of the ISO 9001:2015 Quality Management System (QMS).
- Rigorously model information flows using the BPMN standard (*Business Process Model and Notation*).
- Integrate this modeled flow into the ERP system to ensure data centralization and dynamic real-time reporting.

Accordingly, this research addresses the following question: To what extent does the shift from paper-based management to digitalized dashboard-driven steering transform customer claims management from a reactive, scattered practice into a structured lever for customer satisfaction and operational optimization?

This research question is part of a broader theoretical inquiry aimed at understanding how aligning quality management with digitalization (the concept of Quality 4.0) enables a fragmented logistics organization to durably reconfigure itself in the face of uncertainty. To address it, we mobilize the theoretical framework of dynamic capabilities and contextual ambidexterity. Empirically, we draw on data from a four-year longitudinal action-research study conducted within this logistics platform, retracing the precise transformation trajectory of this process, from its initial unstructured state to its current digitalized steering.

The article is structured as follows. The second section reviews the literature on the operational resilience of logistics hubs, the tensions between normative rigidity and digital flexibility, and Quality 4.0 as a catalyst for contextual ambidexterity. The third section presents our methodological approach based on longitudinal action research, along with the specific context of the case study. The fourth section details the empirical results stemming from the process transformation trajectory. Finally, the fifth section discusses these results in light of the theoretical frameworks mobilized, before concluding with the scientific contributions and managerial implications of this work.

LITERATURE REVIEW

Operational resilience of logistics hubs facing global disruptions

Global logistics is confronted with structural instability: crises are no longer exogenous anomalies but have now become the norm. Logistics centers find themselves on the front line of this chronic chaos, making operational resilience a matter of survival rather than a mere secondary performance indicator (Ivanov, 2024). In practice, organizational fragmentation remains the primary obstacle to this resilience. The various actors within a single platform still too often operate in isolated silos, withholding information about their data. This compartmentalization generates severe information asymmetries: in the absence of a shared version of operational reality, decisions during periods of shock are made under critical opacity. This lack of a common view exacerbates the impact of disruptions and paralyzes the collective capacity of value chains to recover (Wieland & Durach, 2021).

Quality management and digital transformation: between rigidity and flexibility

Faced with these disruptions, managers confront a managerial dilemma. On one hand, traditional quality management offers a reassuring structure by standardizing and securing processes. However, it has a well-documented perverse effect: by freezing rules in place, it can generate bureaucratic rigidity that hampers execution speed in emergency situations. Conversely, digital transformation promises greater agility, ushering in an era of rapid adaptation, experimentation, and real-time control (Piotrowska et al., 2026).

For a long time, research pitted these two views against each other, suggesting a necessary trade-off between the rigor of standards and digital flexibility. Nevertheless, the emergence of “Quality 4.0” (Sader et al., 2022) makes it possible to move beyond this classic dualism. The central idea is to leverage modern technologies to make quality management dynamic. Digitalization thus converts the rigidity of standards into flexible guidelines capable of adjusting to environmental fluctuations, notably through organizational adaptability processes (Alsmairat & Aldhanhani, 2026).

Quality-Digital alignment (Quality 4.0) through the lens of ambidexterity

To reconcile normative compliance with digital flexibility, the concept of organizational ambidexterity proves highly heuristic. Introduced by March (1991), this concept illustrates an organization's ability to optimize its current operations while simultaneously innovating and adapting. Applied to logistics platforms, quality management embodies the exploitation pole (through regulated, standardized processes), while digital transformation supports the exploration pole (by providing the flexibility needed to manage uncertainty).

Faced with this dual constraint, the classic mistake made by fragmented organizations is to opt for a purely structural form of ambidexterity (Gibson & Birkinshaw, 2004). In this configuration, responsibility for compliance is delegated exclusively to the quality department, while innovation is managed by the Information Systems department. This compartmentalization reinforces silos, disrupts interdepartmental communication, and reduces the platform's overall responsiveness. In a logistics hub where flows are inherently interdependent, such a strict separation paralyzes the capacity to respond in a crisis.

Quality 4.0 as a catalyst for contextual ambidexterity

It is at this point that Quality 4.0 comes fully into its own (Sader et al., 2022; Oliveira et al., 2026). Rather than separating structures, it relies on digital technologies (IoT, predictive analytics, collaborative platforms) to simultaneously instill control and agility into the day-to-day practices of actors. This is what the literature refers to as contextual ambidexterity. In other words, Quality 4.0 embeds digitalization within quality management systems to achieve optimal standards, which requires a deep theoretical and practical articulation as well as visualization tools suited to its complexity (Mahin et al., 2024).

Access to real-time traceability data radically transforms the posture of the logistics operator. The operator is no longer forced to choose between blindly following a strict procedure and deploying a non-compliant emergency workaround. Digital technology allows operators to immediately perceive the impact of their decisions on the chain as a whole. Quality standards cease to be rigid constraints and instead evolve into dynamic, adaptive guidelines (Alsmairat & Aldhanhani, 2026).

Synthesis and empirical anchoring: Claims management as a micro-foundation of Quality 4.0

Analysis of this theoretical corpus leaves one question open: how does this articulation between normative rigidity and digital flexibility materialize concretely at the level of operational routines? It is at this micro-operational level that customer claims management emerges as a privileged field of observation.

This process perfectly embodies the central tensions of contextual ambidexterity. On one hand, it demands rigorous exploitation: handling a claim must follow a strict protocol (traceability, recording, compliance with ISO 9001:2015 requirements) to avoid data dispersion. On the other hand, it demands agile exploration: each

claim is a unique incident and a symptom of a break in the chain, requiring teams to demonstrate adaptability and creative real-time problem-solving in order to preserve customer satisfaction.

Consequently, analyzing the shift from paper-based claims management (fragmented and reactive) to digitalized, dashboard-driven steering (integrated and proactive) allows us to study Quality 4.0 not as an abstract concept, but as an active dynamic capability, able to resolve the dilemma between compliance and flexibility at the heart of a logistics hub.

METHODOLOGY

Research design

To explore the underlying mechanisms linking digital transformation, quality management, and operational resilience, we adopted an action-research design. This methodological approach meets two simultaneous requirements: theoretically, the relationship between rigid normative standards and digital flexibility constitutes a dynamic, complex, and often conflictual phenomenon; by adopting an “active observer” stance, the researcher actively contributes to solving concrete operational problems while producing actionable scientific knowledge. Temporally, our intervention spans a longitudinal period of four years, structured into four iterative action-research cycles, each combining diagnosis, planning, action, and evaluation (Table 1).

Action-research cycles

In line with the canonical action-research spiral, each of the intervention's four phases was organized as a complete cycle rather than a one-off action. At the end of each cycle, the results were reported back to the platform's Quality Committee, which validated (or amended) the corrective orientations before the next cycle began. This cyclical structure, summarized in Table 1, helped ensure that the research remained both scientifically documented and grounded in operational reality.

Period	Initial state	Main actions	Evidence produced / Validation
Year 1 — Diagnosis	Reactive management: paper forms, informal reporting, no centralized traceability	Analysis of paper forms, e-mails, interviews, and claims files	Bottleneck map and baseline indicators — reported back and validated by the Quality Committee
Year 2 — Standardization	Heterogeneous procedures and poorly defined responsibilities despite initial findings	Definition of responsibilities, procedures, categories, and KPIs	ISO 9001-aligned claims procedure — validated by the Quality Committee
Year 3 — Modeling and integration	Persistent information breakdowns between departments despite standardization	BPMN modeling and ERP workflow implementation	Digital claims register and traceability history — module adoption monitored by the Quality Committee
Year 4 — Optimization	Persistent gaps between the theoretical (BPMN) process and actual execution; insufficient managerial visibility	Power BI dashboards, event-log analysis, and corrective actions	Process performance monitoring and improvement cycle — process-deviation rate reduced from 42% to 18% (Table 3), validated in management review

Table 1. Structure of the four action-research cycles

Empirical framework and case description

This action research was conducted within a Tunisian logistics platform specializing in the distribution of fast-moving consumer goods. The platform manages receiving, warehousing, order preparation, distribution, and customer claims management. It serves as a strategic node in the supply chain, coordinating physical and information flows among suppliers, internal departments, and customers.

The customer claims management process was selected as the pilot area for this research. This process is inherently cross-functional, involving multiple organizational actors, including the sales department, logistics operations, transport, quality assurance, purchasing, and general management.

The choice of the customer claims management process as the empirical field is justified by several scientific, normative, and managerial considerations:

- First, this process is central to the Quality Management System (QMS), serving as the primary mechanism for assessing customer perception, detecting nonconformities, and feeding continuous improvement initiatives.
- Second, although the ISO 9001:2015 standard does not explicitly prescribe a dedicated claims-management process, it requires organizations to monitor customer satisfaction (clause 9.1.2), address nonconformities and implement corrective actions (clause 10.2), and continually improve the effectiveness of the QMS (clause 10.3). Claims management therefore represents an essential supporting process for meeting these normative requirements.
- Third, owing to its cross-functional nature, this process acts as a point of intersection between physical flows, information flows, and customer interactions, making it an ideal observatory for analyzing organizational coordination mechanisms.
- Finally, in the context of digital transformation, claims management is particularly relevant for analyzing the contributions of Quality 4.0. Digitalizing this process through ERP integration, *Business Intelligence* (BI), and *Process Mining* strengthens case traceability, speeds up processing times, increases the effectiveness of corrective actions, and supports data-driven decision-making.

This case study thus offers an environment particularly well suited to examining how aligning quality management with digital transformation improves process performance and strengthens the platform's operational resilience.

Intervention design

The action research was conducted over a four-year period, following a progressive trajectory of continuous improvement:

- **Phase 1: Diagnosis:** We carried out an in-depth diagnosis of the former claims process. This step made it possible to identify the main bottlenecks, including processing delays, information loss, redundant tasks, lack of traceability for corrective actions, and communication breakdowns between departments.
- **Phase 2: Standardization:** We implemented a QMS compliant with the requirements of the ISO 9001:2015 standard. Claims-processing procedures were standardized, responsibilities clarified, and key performance indicators (KPIs) established.
- **Phase 3: Modeling & Integration:** We modeled the standardized process using the BPMN (*Business Process Model and Notation*) standard and integrated this workflow into the company's ERP system. This made it possible to digitalize the claims circuit, automate validation pathways, and improve end-to-end traceability.
- **Phase 4: Optimization:** We developed dynamic dashboards via Power BI to track key metrics in real time. In addition, ERP event logs were analyzed using *Process Mining* techniques to assess actual process execution and identify opportunities for continuous improvement.

Throughout this process, we maintained a dual posture as observer and change agent, taking part in quality meetings, root-cause analyses, and periodic indicator reviews, while systematically documenting organizational developments.

Data collection and analysis

To ensure the robustness of the analysis, we deployed a triangulation strategy combining qualitative and quantitative data, detailed in Table 2.

Method	Sources / Participants	Volume	Objective
Participant observation	Intervention logbook kept by the lead researcher during quality meetings, process reviews, and strategic decisions	47 meetings over 4 years	Track the process transformation as it unfolded
Documentary analysis	Quality procedures, internal audit reports, claims forms, nonconformity files, management review minutes, corrective action plans	63 documents / reports	Reconstruct the formally prescribed process
Semi-structured interviews	1 quality manager; 1 customer service manager; 4 logistics/sales staff; 1 information systems manager; 2 supervisors (9 participants in total)	9 interviews, 40–55 minutes each	Compare actors' perceptions against the formal process and ERP/BI data
Quantitative ERP / BI data	Transactional data from the ERP system and Power BI dashboards	Approximately 209 claims over 4 years	Calculate resolution time, closure rate, corrective-action effectiveness, satisfaction, and process deviations (Table 3)

Table 2. Data sources mobilized for triangulation.

The interviews followed a semi-structured guide covering three themes:

- The perceived limitations of the former paper-based process,
- The lived experience of each digitalization phase,
- The perceived effects on coordination, workload, and customer outcomes.

Each interview was recorded with participants' consent, transcribed, and then analyzed using a thematic-analysis approach: an initial deductive coding grid was developed from the theoretical frameworks of dynamic capabilities and ambidexterity (categories such as “exploitation practices,” “exploration practices,” “coordination,” “perceived resilience”), subsequently refined inductively as new themes emerged from the transcripts.

Two members of the research team independently coded a subsample of transcripts and compared their results to strengthen intercoder reliability.

Coding was carried out using *NVivo* software. The intercoder agreement rate, calculated on the 3 double-coded transcripts, stood at 0.82 (*Cohen's kappa coefficient*), deemed satisfactory.

The quantitative data analysis relied on descriptive statistics calculated from ERP exports and Power BI dashboards (resolution time, closure rate, corrective-action effectiveness, customer satisfaction, and process deviations), compared on a before/after basis relative to the start of the intervention (Table 3). The qualitative and quantitative components were then systematically cross-referenced: themes emerging from the interviews were set against changes in the corresponding indicators over the same period, making it possible to compare actors' perceptions with objective measures and to assess the systemic impacts of Quality 4.0.

Validity, reliability, and evaluation criteria

Given the interpretive and interventionist nature of action research, we relied on the standard criteria for evaluating the rigor of this methodology (credibility, transferability, reliability, and confirmability) rather than

purely positivist validity criteria. Credibility was strengthened through data triangulation (observation, documents, interviews, ERP/BI data) and through the periodic reporting of interim results to the Quality Committee, which played a cross-validation role among field actors. Reliability was supported by the intervention logbook, which chronologically documents decisions and their rationale throughout the four cycles. Transferability is necessarily limited by the single-case design (see Limitations); we therefore describe the organizational context in sufficient detail to allow readers to assess the applicability of the results to other logistics platforms.

RESULTS

In this action-research study, the customer claims management process served as the pilot vehicle for assessing the joint effects of quality management and digital transformation. This choice was driven by the cross-functional nature of claims, which cut across the functional silos of the logistics platform while serving as a direct barometer of operational performance.

The intervention aimed to move the platform from a traditional, paper-based, fragmented claims-handling system to a digitalized, integrated, data-driven process operating according to Quality 4.0 principles. The transformation was carried out in four progressive stages:

1. **Process modeling:** Mapping the claims-handling flow using the BPMN standard in order to identify non-value-added activities and information disconnects.
2. **ERP digitalization:** Direct integration of claims data into the ERP system to establish a single source of truth and deploy a digital tracking flow.
3. **BI dashboards:** Development of an interactive Power BI dashboard tracking metrics such as claims volume, mean time to resolution (MTTR), root causes, corrective-action effectiveness, and customer satisfaction.
4. **Process Mining & Optimization:** Extraction of ERP event logs to perform *Process Mining* analyses, comparing the theoretical model with actual execution to detect bottlenecks and apply corrective adjustments

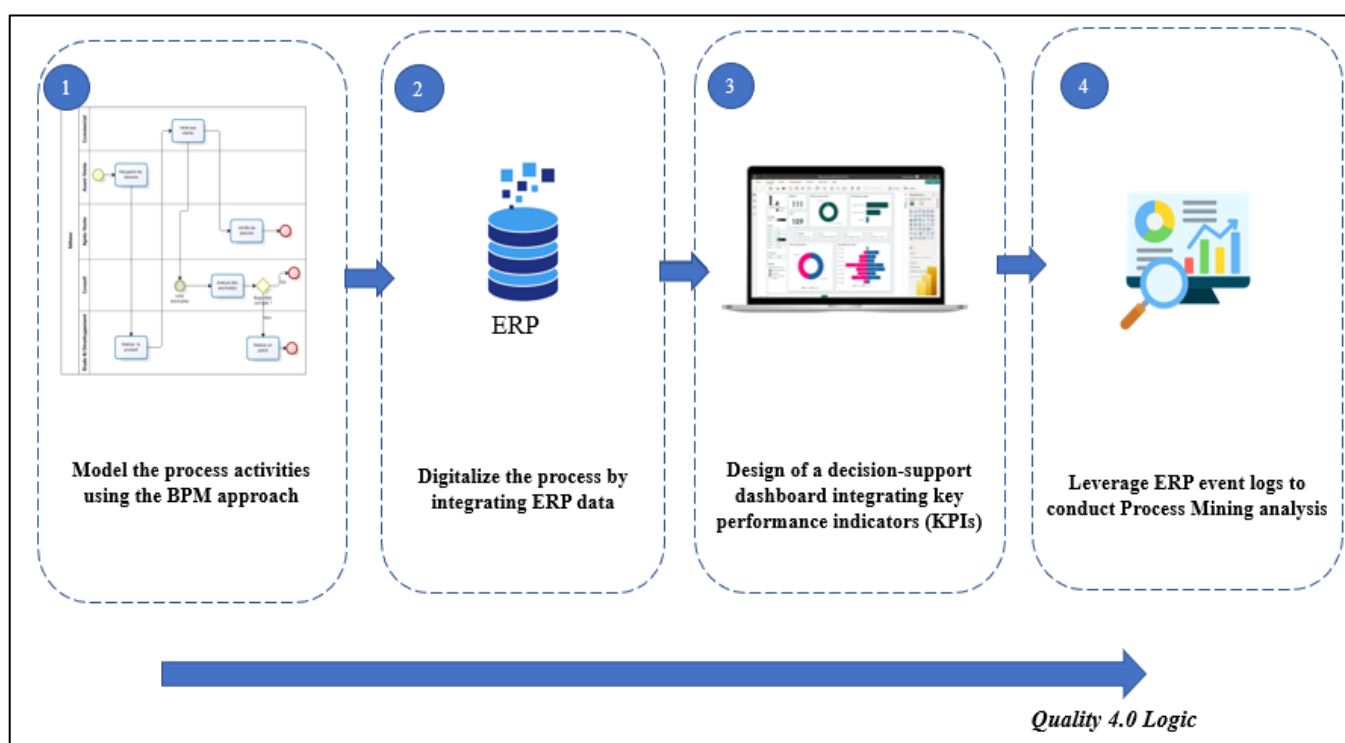


Figure 1: the stages of the transformation cycle

Initial diagnosis

Before the intervention, claims were received through several channels, including phone, e-mail, sales communications, and paper forms (the “Customer Claim Form”). The absence of a single registration point generated multiple versions of the same file and made it difficult to determine a claim's official status.

The diagnosis identified five recurring weaknesses: delays in forwarding claims; incomplete information at the time of registration; difficulty identifying the current owner of a file; limited traceability of investigations and corrective actions; and an inability to produce reliable consolidated indicators.

The baseline mean resolution time was five business days. This indicator should be supplemented with **the reference number of claims, the median resolution time, the minimum and maximum values, and the distribution by claim category.**

Step 1: BPMN Modeling

Modeling the customer claims management process using BPMN enabled a clear, structured visualization of operational activities and cross-functional interactions. This mapping facilitated a comprehensive understanding of the platform's workflows by highlighting the sequencing of tasks and information exchanges between departments, and served as the reference model against which actual execution was subsequently compared through Process Mining (see Step 4).

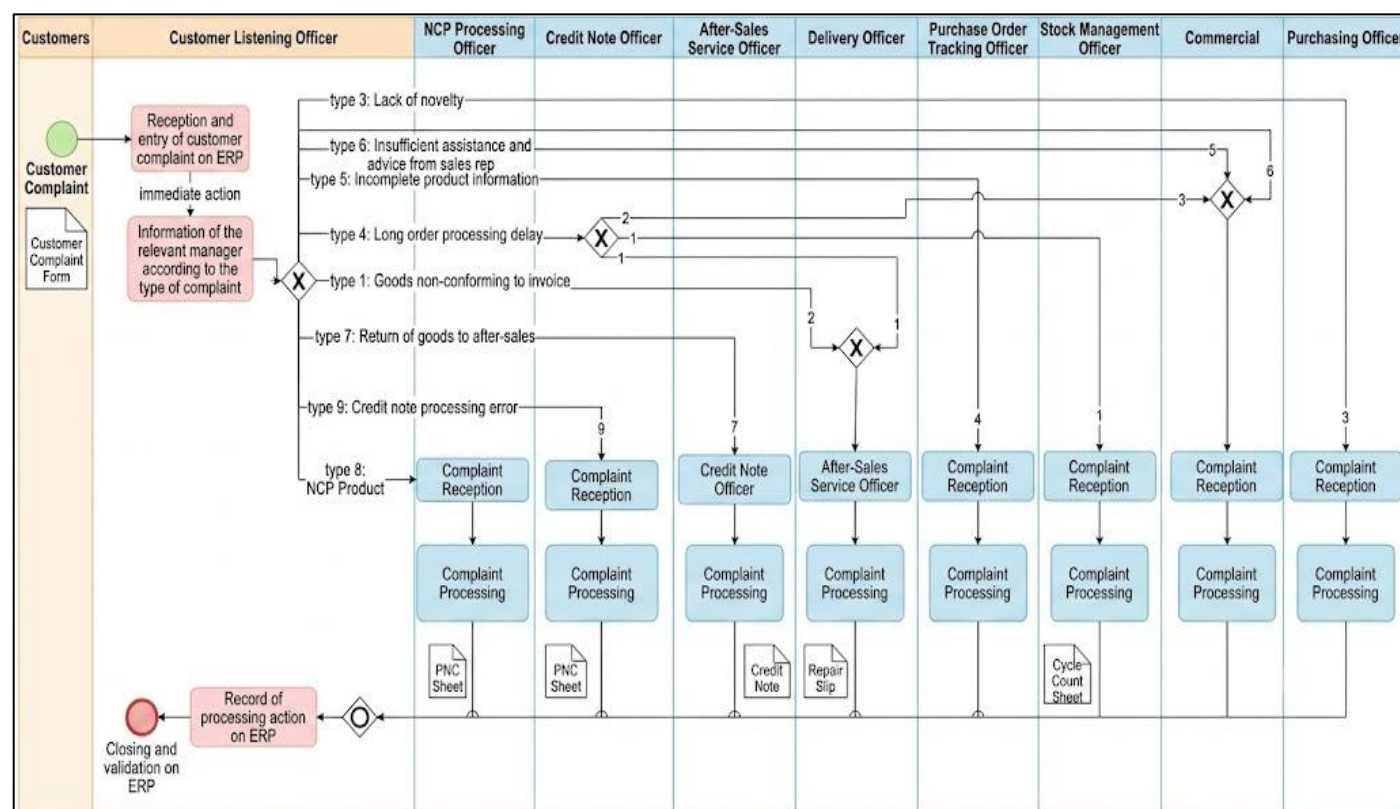


Figure 2: BPMN Modeling

Step 2: ERP Integration and Digitalization

Our initial diagnosis revealed that the former process relied heavily on informal e-mail exchanges, phone calls, and a physical paper document (the “Customer Claim Form”). As a result, critical data was scattered across departments, leading to poor traceability, extended resolution times, and a total lack of visibility into file status. Root-cause analyses were conducted on an ad hoc basis, and corrective actions were difficult to track or enforce.

To address these issues, we migrated the physical flow to a dedicated ERP module, centralizing all claims data and enabling digital tracking.

Each claim was assigned a unique identifier and allocated to a responsible actor or department. This integration produced four main changes: a single source of information replaced scattered files and informal exchanges; file ownership became visible; status tracking became possible without repeatedly contacting other departments; and historical records became available for trend analysis and recurrence detection.

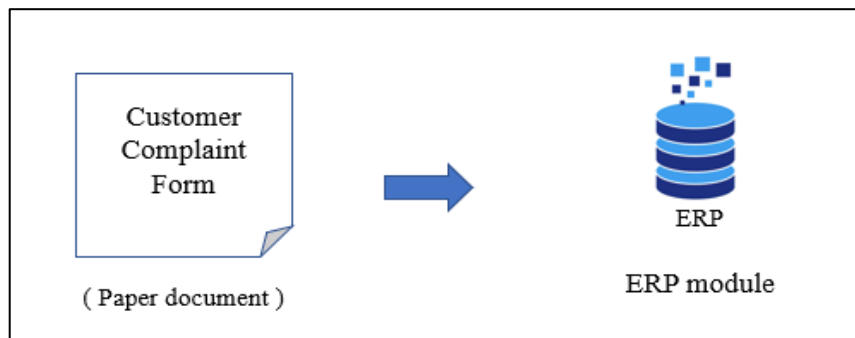


Figure 3: **Step 2: ERP Integration**

Step 3: BI Dashboard Development

The Power BI dashboard consolidated the main claims-process indicators: number of claims, categories, mean resolution time, open and overdue files, root causes, corrective-action effectiveness, and customer satisfaction. It changed the role of quality meetings, enabling participants to discuss trends, exceptional cases, delays, and recurring causes based on a shared information base.

KPI	Year 1	Year 2	Year 3	Year 4
Number of claims	72	65	42	30
Mean resolution time	5.00 days	3.8 days	2.9 days	2.3 days
Closure rate	34%	55%	61%	91%
Corrective-action effectiveness	65%	74%	82%	88%
Customer satisfaction (1-5)	3.2	3.5	3.9	4.1
Process deviation rate	42%	32%	24%	18%
Traceability completeness	55%	72%	88%	96%

Table 3. *Claims-process indicators over the 4 years*

Step 4: Process Mining & Root-Cause Structuring

Process Mining revealed gaps between the prescribed BPMN process and actual execution.

The main gaps concerned: delays between claim registration and assignment; repeated investigation activities; missing or late records of corrective actions; files closed without documented verification of effectiveness; and variations in activity sequencing across departments.

These findings were used to formulate targeted improvement actions. The link between the Process Mining findings and the corrective actions is summarized below.

Process Mining finding	Operational interpretation	Corrective action	Monitoring indicator
Long waiting time before assignment	Unclear ownership or manual handoff	Automatic routing and escalation rules	Average assignment time
Repeated investigation	Incomplete information or	Mandatory fields and	Rework loop rate

loops	unclear root-cause criteria	investigation checklist	
Missing corrective-action verification	Closure before effectiveness review	Approval gate before closure	Verified-actions rate
Repeated deviations from the BPMN model	The standard process does not reflect operational reality	BPMN revision and user training	Compliance rate
High recurrence of a claim category	Root cause not durably addressed	Cross-functional root-cause analysis	Recurrence rate

Table 4. *Process Mining findings and corrective actions*

This analysis turned Process Mining from a descriptive visualization tool into a process-learning mechanism. The results should be presented with precision: Process Mining identifies patterns in recorded system events; it does not capture activities that remain entirely outside the ERP system.

Quantitative Assessment Before / After the Intervention

Table 5 summarizes the numerical results observed over the entire study period, demonstrating dramatic performance gains.

Performance Indicator (KPI)	Initial Phase (Paper / Manual entry)	Final Phase (Quality 4.0 / ERP & BI)	Change (%)	Data source
Mean resolution time	5.00 days	2.3 days	-54%	ERP / Power BI
On-time closure rate (< 48h)	34%	91%	+57 pts	Power BI
Corrective-action effectiveness	65%	88%	+23 pts	Quality Audits / Management review
Customer satisfaction (1-5)	3.2	4.1	28%	Annual Surveys
Process deviation rate	42%	18%	-24 pts	Quality Audits / Management review
Traceability completeness	55%	96%	+41 pts	ERP / Process Mining
Recurring claims rate	31%	12%	-19 pts	ERP / Audits Qualité

Table 5. *Before/after quantitative indicators of the claims-handling process.*

Summary of operational impacts

The empirical results of this action research demonstrate that digitalizing the claims process has profoundly reconfigured the logistics platform's operations:

- Before the intervention, the average claim resolution time was five business days; information was fragmented across disconnected files, and tracking a claim's root cause required manual, sequential coordination among several departments, severely limiting organizational responsiveness.
- Since the implementation of the Quality 4.0 framework, every customer claim is automatically recorded in the ERP, routed to its designated owner, and tracked through to closure. Power BI dashboards provide real-time visibility into key indicators, while Process Mining highlights operational bottlenecks. As Table 3 shows, post-implementation data reveal a reduction in average resolution time, as well as gains in traceability, cross-departmental coordination, and the success rate of corrective actions. Quality meetings now rely on consolidated real-time data, speeding up decision-making and continuous-improvement cycles.

Beyond these immediate operational gains, digitalizing the process has uncovered systemic root causes linked

to order-preparation errors, delivery delays, and stockouts. This structured data now feeds the platform's continuous-improvement loop, directly strengthening its long-term operational resilience.

DISCUSSION

Our empirical results confirm that customer claims management constitutes a particularly relevant micro-operational field for observing the organizational impacts of Quality 4.0. The integration of ERP databases, interactive dashboards, and Process Mining transformed a reactive, fragmented activity into a proactive, data-driven capability. These results align with the work of Sader et al. (2022) and Mahin et al. (2024), who define Quality 4.0 as the convergence of quality management principles and digital technologies.

It is important, however, to distinguish what is directly demonstrated by our case data from what constitutes a broader theoretical interpretation. Directly supported by the case's empirical evidence (Table 3 and the Process Mining compliance analysis) are: the reduction in resolution time, the gains in traceability and cross-departmental coordination enabled by the ERP/BI infrastructure, and the specific process deviations identified and corrected. Interpreting these operational gains as evidence of contextual ambidexterity and a broader gain in operational resilience, by contrast, constitutes a theoretical reading that we propose on the basis of these elements, rather than a directly measured phenomenon; it should be read as a plausible interpretation consistent with the literature, rather than as a demonstrated causal mechanism.

In our study, this convergence materialized through faster resolution, more complete information traceability, and more effective corrective actions. Our analysis further suggests a mediating role for process performance: digital technologies do not automatically or directly generate operational resilience. They appear first to raise the operational performance of the claims process, which could in turn reduce recurring nonconformities, improve customer satisfaction, and support the organization's adaptive capacity. Given the single-case design of this study, this pathway should be understood as a conceptual proposition consistent with our data, to be tested more formally in future comparative or multi-case research, rather than as a generalizable causal finding.

CONCLUSION

This research addressed a critical issue for contemporary global supply chains: the operational resilience of fragmented logistics hubs facing chronic disruptions. By examining the intersection between digitalization and normative quality management through the lens of customer claims management, this study illustrates how the concept of contextual ambidexterity, operationalized through Quality 4.0, can help reconcile the traditional tension between normative standardization and digital flexibility. Empirically, our results — quantified in Table 3 and detailed through the four action-research cycles in Table 1 — show that integrating ERP flows, interactive dashboards, and Process Mining transformed a reactive process into a proactive, data-driven capability. This study also highlights a mediating role for process performance, suggesting that digital tools must first optimize targeted business routines before a broader effect on organizational resilience can be expected.

Theoretically, this article contributes to the discussion on the paradox between standards and flexibility. Our case suggests that normative-digital formalization does not necessarily paralyze action; on the contrary, in this context, it appears to structure the platform's adaptive capacity. The combination of standardized quality frameworks and real-time digital tools provided operational teams, in this particular case, with a safer and more reliable environment for adapting during periods of disruption.

Managerially, this study offers practitioners an illustrative, empirically grounded roadmap for guiding the digital maturity of complex logistics ecosystems, as well as a practical framework for breaking down informational and functional silos.

LIMITATIONS

This research rests on a single, in-depth longitudinal action-research study, conducted over four years within a Tunisian logistics platform. This single-case design constitutes the study's main limitation: it does not allow for

statistical generalization, and the magnitude of the improvements reported in Table 3 is specific to this organizational context (its size, sector, prior digital maturity, and management commitment). Furthermore, since the researcher held a dual posture as observer and change agent, an intervention bias cannot be entirely ruled out, even though it was mitigated through triangulation and periodic reporting to the Quality Committee (see Validity, reliability, and evaluation criteria). Future research should replicate this design across multiple logistics platforms and sectors, ideally following a comparative multi-case protocol, in order to test the transferability of the contextual ambidexterity mechanism proposed here and to assess whether the magnitude of the quantitative gains observed is context-specific or more broadly generalizable.

Not with standing these limitations, this single case offers solid empirical foundations for designing the logistics hubs of tomorrow: organizations that are both highly standardized and deeply agile.

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