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# Process Transformation Through SAP Business Process Intelligence: A Conceptual Framework for Data-Driven ERP Transformation

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**Abstract:** ***Enterprise Resource Planning (ERP) transformation programs are increasingly expected to deliver not only technology modernization but also measurable improvements in operational performance, process standardization, compliance, and enterprise agility. However, many ERP transformation initiatives remain constrained by fragmented process landscapes, legacy customizations, limited end-to-end visibility, and functionally siloed decision-making. Traditional process assessment methods, which often rely on stakeholder interviews, workshops, and static process documentation, provide useful qualitative insights but may not fully reveal how business processes operate across enterprise systems. Process mining and Business Process Intelligence (BPI) offer a more evidence-based approach by using event data from operational systems to discover, monitor, and improve real business processes. This paper develops a conceptual framework for SAP BPI-enabled ERP transformation, drawing on literature from Business Process Management (BPM), Business Process Reengineering (BPR), process mining, and ERP implementation critical success factors. The proposed framework integrates process discovery, process assessment, conformance analysis, optimization, governance, continuous monitoring, and business value realization. The paper argues that SAP BPI, supported by SAP Signavio and related process mining capabilities, can help organizations shift from system-centric to process-centric transformation. The study contributes to academic and practitioner understanding by positioning process intelligence as a governance and operating model capability rather than merely an analytical tool.***

**Keywords:** SAP Business Process Intelligence, process mining, Business Process Management, ERP transformation

## 1. Introduction

Enterprise Resource Planning (ERP) systems remain foundational to modern organizations because they integrate transactional processes across functions such as finance, procurement, supply chain, manufacturing, sales, and compliance. ERP transformation programs are therefore often positioned as strategic initiatives to improve efficiency, standardization, decision-making, and enterprise scalability. However, transformation success depends not only on system implementation but also on how thoroughly organizations redesign, govern, and continuously improve their business processes.

Many ERP programs historically focus on functional optimization, configuration decisions, and technical migration. While these activities are essential, they may not provide sufficient visibility into how processes perform across end-to-end value streams. For example, Procure-to-Pay, Order-to-Cash, Record-to-Report, and Plan-to-Produce processes usually span multiple departments, roles, systems, controls, and decision points. When transformation is managed primarily through functional workstreams, organizations risk optimizing local process steps while leaving enterprise-level inefficiencies unresolved.

Business Process Management (BPM) provides a useful theoretical foundation for addressing this challenge. Dumas et al. describe BPM as covering the full lifecycle from process identification to process monitoring, including process modelling, analysis, redesign, and automation [1]. This lifecycle perspective is especially relevant to ERP transformation because it shifts attention from system deployment to process performance and continuous improvement. Business Process Reengineering (BPR) also remains relevant because ERP transformations often require organizations to question existing process designs rather than replicate legacy practices in a new system.

Process mining has emerged as a powerful method for bridging the gap between designed processes and actual execution. The IEEE Task Force on Process Mining describes process mining as a discipline that extracts knowledge from event logs available in information systems to discover, monitor, and improve real processes [2]. SAP Signavio similarly describes process mining as a data-driven methodology that reconstructs and analyzes how business processes actually run by extracting event logs from IT systems [3].

SAP Business Process Intelligence (BPI), supported by SAP Signavio and SAP Process Insights, provides a structured way to apply process mining, benchmarking, process modelling, governance, and continuous improvement within enterprise transformation programs. SAP states that process mining and analysis solutions provide end-to-end visibility and help organizations identify opportunities for improvement, automation, and continuous process excellence [4].

### 1) *Research Problem*

Despite the growing adoption of process mining tools, many ERP transformation programs still treat process intelligence as a diagnostic activity rather than as a core transformation governance capability. This creates a disconnect between process insights and transformation decisions. Organizations may identify bottlenecks, variants, and compliance gaps but fail to embed these insights into their operating models, governance routines, change management, and continuous improvement mechanisms.

### *2) Research Gap*

Existing BPM literature provides strong lifecycle models for process management, while process mining literature explains how event logs can be used for discovery, conformance checking, and process enhancement. However, there remains a need for a structured conceptual framework that connects SAP BPI capabilities to ERP transformation stages, governance decisions, and value realization. This paper addresses that gap by proposing a framework that integrates BPM theory, ERP transformation success factors, and SAP BPI-enabled process intelligence.

### *3) Research Objectives*

- To examine the role of BPI in ERP transformation programs.
- To explain how process mining supports process discovery, conformance analysis, optimization, and continuous monitoring.
- To develop a conceptual framework for SAP BPI-enabled enterprise transformation.
- To identify managerial, technological, and governance implications for SAP S/4HANA transformation programs.
- To propose research propositions for future empirical validation.

## 2. Literature Review

### 1) Business Process Management and Enterprise Transformation

BPM provides a structured approach for understanding, designing, executing, monitoring, and improving business processes. The BPM lifecycle described by Dumas et al. includes process identification, process modelling, analysis, redesign, automation, and monitoring [1]. This lifecycle orientation is important because it places continuous improvement at the center of process transformation.

From an ERP transformation perspective, BPM helps organizations move beyond functional design toward end-to-end process ownership. Rather than treating finance, procurement, supply chain, or sales as isolated domains, BPM encourages organizations to analyze how activities, data, roles, controls, and outcomes are connected across the enterprise. This is particularly important where ERP-enabled processes extend into non-ERP applications, shared services, external partners, and regulatory reporting environments.

### 2) Business Process Reengineering and ERP Transformation

BPR emphasizes fundamental redesign of business processes to achieve substantial performance improvements. While early BPR literature focused on radical redesign, contemporary ERP transformation programs often combine standardization, selective process redesign, automation, and governance improvement [5].

ERP implementation literature confirms that BPR and change management are important success factors. Leyh and Sander's review of ERP implementation critical success factors identified business process reengineering, change management, clear goals and objectives, data accuracy, user involvement, monitoring and performance measurement, project management, and top management support among the relevant factors affecting ERP success [6]. This is directly relevant to SAP transformation programs because system conversion alone does not guarantee business value.

### 3) Process Mining

Process mining is positioned between data science and process management. The Process Mining Manifesto explains that process mining uses event logs from information systems to discover, monitor, and improve real processes [2]. SAP Signavio explains that process mining reconstructs end-to-end process flows from event logs and helps organizations understand variants, bottlenecks, delays, and deviations from intended workflows [3].

Three core process mining capabilities are especially relevant to ERP transformation: process discovery, conformance checking, and process enhancement. Process discovery identifies the actual as-is process from event logs. Conformance checking compares actual execution against intended process models or compliance rules. Process enhancement enriches process models with performance data such as cycle time, waiting time, cost, or error indicators [3], [7]. [9]

### 4) Business Process Intelligence

BPI extends process mining by connecting process data, analytics, governance, collaboration, benchmarking, and improvement execution. SAP describes SAP Signavio Process Intelligence as a process mining solution that provides actionable insight for data-driven analysis, continuous improvement, and strategic business transformation [4]. SAP Signavio also states that its Process Intelligence solution supports visibility across SAP and non-SAP systems, process flow visualization, deviation identification, root-cause analysis, and process improvement recommendations [8].

For ERP transformation, this means BPI can support both current-state diagnosis and future-state design. It provides a data-driven basis for identifying process inefficiencies, assessing standardization opportunities, validating transformation decisions, and continuously monitoring business outcomes after implementation.

## 3. Research Methodology

### 1) *Research Approach*

This paper adopts a qualitative conceptual research approach. The objective is not to test statistical relationships but to construct a theoretically grounded and practically relevant framework explaining how SAP BPI can support

ERP transformation. A conceptual approach is appropriate because the research topic connects established theory, including BPM and process mining, with emerging enterprise practices around SAP Signavio and SAP BPI.

### 2) *Research Design*

The study follows a three-stage design. First, a thematic literature review examines BPM, BPR, process mining, and ERP implementation success factors. Second, a technology-framework analysis reviews SAP Signavio and SAP process mining resources to understand how process intelligence capabilities are described in current enterprise transformation practice. Third, the literature and technology-framework analysis are synthesized into a proposed SAP BPI-enabled ERP transformation framework. [10]

### 3) *Scope and Limitations*

This paper is conceptual and does not include primary empirical data, case-study interviews, or quantitative process-mining datasets. Therefore, the proposed framework should be interpreted as a theoretically informed model for future validation rather than as a statistically proven causal model. Future research may apply the framework to multiple SAP transformation programs, compare outcomes across industries, or measure the relationship between process intelligence maturity and ERP value realization.

## 4. Proposed Conceptual Framework

### 1) *Framework Overview*

The proposed framework positions SAP BPI as an integrated capability that supports ERP transformation from initial discovery through continuous improvement. The framework is based on the premise that transformation value is maximized when process intelligence is embedded into governance, design, and operational routines rather than used only as a one-time diagnostic activity.




**Figure 1:** SAP BPI-enabled ERP transformation framework.

### 2) *Current-State Process Discovery*

The first stage involves discovering how processes operate. SAP Signavio explains that process mining bridges the gap between traditional process documentation and real-world execution by analyzing digital footprints left in enterprise systems [3]. This is critical because documented process maps often reflect intended procedures, while actual execution may include workarounds, exceptions, rework loops, manual interventions, and compliance deviations.

### 3) *Process Assessment and Benchmarking*

After discovery, organizations should assess process performance against strategic goals, operating model expectations, regulatory requirements, and available benchmarks. SAP states that SAP Signavio process mining enables organizations to optimize business processes using data and industry benchmarks to analyze current operations and identify potential improvements [4].

### 4) *Conformance and Variant Analysis*

Conformance analysis compares actual process execution against expected models, policies, or control requirements. SAP Signavio describes conformance checking as comparing actual execution against designed models or compliance rules [3]. Variant analysis is equally important because enterprise processes often have many execution paths. Some variants may reflect legitimate business needs, while others may indicate fragmentation, policy non-compliance, master data issues, or unnecessary manual work.

### 5) *Future-State Process Design*

Future-state design should not be based only on workshops or generic best-practice templates. It should be informed by process evidence. SAP Signavio states that its Process Intelligence capabilities help organizations visualize process progression, identify blockers, deviations, and improvement opportunities, and compare results against internal and industry benchmarks [8].

### 6) *Optimization and Automation Prioritization*

Process intelligence can help organizations identify high-value improvement opportunities. SAP states that process mining and analysis solutions can help identify areas for improvement and automation and support corrective action [4]. However, automation should not be treated as the default solution for every inefficiency. A critical process transformation approach should first determine whether the root cause is poor process design, inconsistent master data, unclear ownership, weak controls, insufficient training, or system fragmentation.

### 7) *Process Governance and Ownership*

Process governance converts insights into sustained operating discipline. Without clear process ownership, process intelligence may generate dashboards without accountability. Governance should define process owners, control owners, KPI accountability, management review cadence, escalation mechanisms, and improvement prioritization criteria.

### 8) *Continuous Monitoring and Value Realization*

Continuous monitoring is where process intelligence creates long-term value. SAP describes SAP Signavio Process Intelligence as supporting continuous improvement and strategic business transformation [4]. In ERP transformation, continuous monitoring should begin before go-live and continue after stabilization so that organizations can compare pre-transformation and post-transformation process

performance, monitor adoption, identify emerging exceptions, and quantify value realization.

## 5. Research Propositions

***P1:*** Organizations that use process mining during ERP transformation achieve greater visibility into actual process execution than organizations relying primarily on workshops and static process documentation.

***P2:*** BPI improves ERP transformation decision quality by linking process evidence to standardization, redesign, automation, and governance decisions.

***P3:*** Continuous process monitoring strengthens post-implementation value realization by identifying deviations, bottlenecks, and performance gaps after ERP go-live.

***P4:*** The value of SAP BPI-enabled transformation is moderated by organizational factors such as governance maturity, data quality, process ownership, change management, and user adoption.

## 6. Discussion

### 1) *Theoretical Implications*

This paper contributes to BPM and process mining literature by proposing a framework that connects process intelligence capabilities with ERP transformation governance. BPM literature emphasizes lifecycle management from process identification to monitoring [1]. Process mining literature emphasizes discovering, monitoring, and improving real processes from event logs [2]. This paper integrates these perspectives into an ERP transformation context.

The framework also extends the discussion from process analysis to process governance. Process mining alone can reveal what is happening, but transformation value depends on whether the organization can translate insights into design decisions, accountability, change adoption, and sustained improvement.

### 2) *Managerial Implications*

For executives and transformation leaders, the framework suggests that SAP BPI should be introduced early in the transformation lifecycle. If process intelligence is applied only after solution design, organizations may miss opportunities to use process evidence in defining scope, standardization decisions, and business case assumptions.

For process owners, the framework highlights the importance of moving from reactive issue management to proactive process governance. Process owners should use BPI not only to identify exceptions but also to monitor process health, review performance trends, and prioritize improvement initiatives. For finance, tax, procurement, supply chain, and compliance leaders, the framework connects operational process performance with controls, auditability, compliance, and value realization.

### 3) *Technology Implications*

SAP Signavio and related BPI capabilities provide technology support for process mining, process visibility, root-cause analysis, benchmarking, and continuous improvement. SAP Signavio states that its Process Intelligence solution helps organizations discover where processes stand, analyze SAP and non-SAP systems, visualize process flows, identify blockers, compare benchmarks, and support transformation [8].

However, technology alone is insufficient. Organizations need strong data governance, process ownership, and business-led interpretation of insights. Poor data quality, incomplete event logs, inconsistent master data, and unclear process definitions can reduce trust in process intelligence outputs. Therefore, BPI programs should include data readiness assessment and process governance design.

### 4) *Critical Risks and Challenges*

Several risks should be considered. First, process mining depends on event data quality. SAP Signavio explains that process mining requires event logs with key elements such as case ID, activity, and timestamp [3]. If these elements are incomplete or inconsistent across systems, process mining outputs may be difficult to interpret.

Second, organizations may confuse process visibility with process improvement. Dashboards and process maps do not create value unless they lead to decisions, ownership, and action. Third, excessive reliance on tool-generated recommendations may overlook contextual factors such as regulatory requirements, customer commitments, local market constraints, and organizational readiness. Fourth, process standardization must be balanced with legitimate business differentiation.

## 7. Practical Application in SAP S/4HANA Transformation

SAP S/4HANA transformation programs provide a strong context for applying the proposed framework. Before solution design, organizations can use process discovery to understand current process variants and pain points. During design, process assessment can support decisions on fit-to-standard, process redesign, and clean-core strategy. During implementation, conformance analysis can validate whether configured processes align with intended operating models. After go-live, continuous monitoring can support stabilization, adoption tracking, and value realization.

In practical terms, the framework supports an evidence-based transformation lifecycle. Pre-transformation assessment uses process discovery to establish the business case. Solution design uses process assessment to support standardization and redesign decisions. Build and testing activities use conformance analysis to reduce process risk. Deployment uses monitoring to track adoption and exceptions. Post-go-live governance uses KPIs and deviation analysis processes to sustain continuous improvement.

## 8. Conclusion

ERP transformation programs increasingly require organizations to move beyond technical implementation and focus on end-to-end process excellence. Traditional process assessment methods provide useful stakeholder insight but

may not sufficiently reveal how enterprise processes operate. Process mining and BPI address this limitation by using event data to discover, monitor, and improve real processes.
This paper developed a conceptual framework for SAP BPI-enabled ERP transformation. The framework integrates current-state discovery, process assessment, conformance and variant analysis, future-state design, optimization, governance, continuous monitoring, and value realization. The paper argues that SAP BPI should be understood not merely as an analytical tool but as a transformation governance capability.

The conceptual model contributes to academic literature by connecting BPM lifecycle theory, process mining principles, ERP implementation success factors, and SAP Signavio-enabled transformation practices. It contributes to practice by providing transformation leaders with a structured approach for embedding process intelligence into SAP S/4HANA and broader ERP transformation programs.

Future research should empirically validate the proposed framework through case studies, cross-industry comparisons, and quantitative analysis of process performance before and after SAP BPI adoption. Important future research areas include measuring the relationship between BPI maturity and ERP value realization, evaluating the impact of conformance monitoring on compliance outcomes, and studying how process ownership influences sustained process improvement.

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