DOI: 10.32347/2412-9933.2025.63.14-26
UDC 5.008

Chernenko Yuri
Doctoral Student, Department of Doctoral Studies,
https://orcid.org/0000-0002-7008-7274
International University of Business and Law, Ukraine
Tkachenko Valentyn
PhD, Associate Professor, Associate Professor of the Department of Electrical Engineering Systems,
https://orcid.org/0000-0001-6290-2286
Cherkasy State Technological University, Cherkasy

ENHANCING CRISIS RESILIENCE VIA A DYNAMIC ERP-BPMS RESOURCE ALLOCATION MODEL: A MULTI-CASE STUDY

Abstract. *This study investigates how integrating Enterprise Resource Planning (ERP) with Business Process Management Systems (BPMS) enhances organizational resilience in crisis contexts via a dynamic resource allocation model. A convergent parallel mixed-methods design was employed across four anonymized organizations: utilities, construction, water technology, and energy. Data were drawn from operational logs, 47 semi-structured interviews, and crisis simulation observations over 8–12 months before and after the implementation of the ERP-BPMS. The empirical results show a 35–50% reduction in crisis response times, 20–30% decrease in crisis-related costs, and 5–15% improvement in operational continuity. By combining real-time dashboards, predictive analytics, and structured override protocols, the model combines automated efficiency with human judgment. Smaller firms achieved gains comparable to those of larger ones when socio-technical alignment was prioritized. This work advances Business Process Management scholarship by illustrating how configurable parameters (α, β, γ), representing cost, continuity, and reputation, permit agile reconfiguration under disruptive conditions. The multi-case evidence challenges the assumption that digital transformation benefits hinge on an organizational scale and highlights structured human–system collaboration as essential to sustaining crisis performance gains.*

Keywords: ERP-BPMS integration; Crisis resilience; Business Process Management; Dynamic capabilities; Resource allocation; Crisis management; Socio-technical systems; Override protocols; Digital transformation; Predictive analytics

Introduction

Today, organizations encounter a range of disruptive events such as geopolitical tension, cyber breaches, supply chain breakdowns, and infrastructure failures [1; 2]. These crises often evolve too rapidly for traditional risk management methods, especially when firms lack unified data or streamlined processes to adapt to short notices [3]. Research in Business Process Management (BPM) suggests that well-designed, flexible workflows reduce operational variability and accelerate decisions under stress [4; 5]. Consequently, many organizations now explore merging Enterprise Resource Planning (ERP) systems, which consolidate organizational data, with Business Process Management Systems (BPMS), which govern and optimize process flows. Known here as the ERP-BPMS, this integration promises greater crisis resilience; however, evidence of its real-world effectiveness remains limited. Several theoretical perspectives must be considered to better understand the potential of ERP-BPMS in crisis management.

Multiple theoretical perspectives underscore the potential of ERP-BPMS for crisis management. Crisis management theory highlights proactive risk identification and swift organizational responses as pivotal for survival [1; 6]. Socio-technical systems theory emphasizes that high-stakes technology solutions must align with human expertise and cultural values to ensure their adoption and efficacy [7; 8]. Dynamic capabilities theory posits that firms build a competitive advantage by sensing emerging threats, seizing strategic opportunities, and reconfiguring internal processes [9; 10].Empirical studies confirm that ERP systems streamline data handling, whereas BPMS fosters real-time process improvement [11; 12]. However, most studies explore ERP or BPMS separately under stable conditions, leaving uncertainty about how their integration performs amid significant disruptions [12].

Despite increasing evidence that digital transformation strengthens resilience, certain gaps persist in the ERP-BPMS literature. First, while the accelerating pace of digital transformation across industries creates both opportunities and challenges for crisis management capabilities [13], current research lacks a comprehensive framework to guide this transformation. Many studies have focused on only one firm or sector, thereby limiting broader applicability [14]. Some claim notable crisis response gains–sometimes 50–70% faster reaction–without accounting for the "low base effect," where minimal pre-automation inflates results [15]. Others debate whether automated recommendations ignore local nuances, whereas manual processes can be slow or inconsistent [16]. Thus, recent calls advocate a socio-technical approach that includes override protocols to blend algorithmic outputs and human insight [5]. However, large-scale cross-industry evidence of such an integrated framework remains scarce.

To address these gaps, this study proposes and tests a novel crisis management framework that merges ERP-BPMS integration with socio-technical principles and dynamic capability insights. This approach aligns with emerging research on building organizational resilience through strategic digital transformation [17]. We develop a mathematical resource allocation model that calibrates three weighting parameters–financial cost (α), operational continuity (β), and reputational concerns (γ–while embedding structured override mechanisms. Instead of relying on single-case observations or simulations, we examined four anonymized organizations that recently adopted ERP-BPMS and faced high-stakes disruptions. Case Company A (a utility company in Eastern Europe) experienced severe infrastructure failures and workforce shortages, while Case Company B (a construction firm in Central Europe) confronted cross-border supply chain disruptions. Case Company C (a water technology startup in North America) managed cybersecurity incidents during rapid scaling, and Case Company D (an energy conglomerate in the Middle East) dealt with regulatory shocks and extreme weather. We hypothesize that by calibrating this model to local conditions, firms can achieve realistic performance gains of approximately 35–50% reductions in crisis response times and 20–30% cost savings once baseline automation levels are considered.

Based on this framework, three research questions guided the investigation. First, how does adopting an integrated ERP-BPMS affect crisis response metrics such as decision speed, cost efficiency, and operational continuity across varied organizational sizes, sectors, and regional settings? Second, which BPM-driven features, including predictive analytics, dynamic workflow reconfiguration, and structured override protocols, are most effective in strengthening resilience under different crisis types? Third, how can organizations balance system-generated recommendations with context-driven human judgment to ensure agile yet tailored responses? Our multi-case approach aims to extend the BPM scholarship by offering empirical insights into whether these solutions function robustly beyond controlled models or single-sector settings.

This research contributes to the BPM theory and practice in two principal ways. Theoretically, it extends crisis management perspectives by demonstrating how socio-technical overrides and dynamic resource allocation can reconcile automated efficiency with necessary expert oversight. Practically, it provides a roadmap for managers seeking to optimize ERP-BPMS deployments, suggesting actionable steps for customizing automation parameters, override thresholds, and user training. The following sections outline our methods, present cross-case results, and discuss theoretical and managerial implications. Through this broad evidence, we demonstrate that integrated digital infrastructure, coupled with strategic human involvement, can yield significant and realistic improvements while mitigating the risks associated with excessive reliance on automation.

Purpose of the article

Development of a dynamic resource allocation model by integrating ERP and BPMS.

Analysis of latest research

This study uses a convergent parallel mixed-methods design to investigate how an integrated Enterprise Resource Planning and Business Process Management System (ERP-BPMS) contributes to organizational crisis resilience. Four anonymized organizations, labeled Case Companies A, B, C, and D, served as the focal cases. Each implemented the ERP-BPMS within the past three years and then faced a substantial disruptive event. This section explains the rationale for the multi-case approach, describes the data collection and validation procedures, details a new resource allocation framework, addresses ethical considerations, and outlines the methods of analysis. This section follows established guidelines for multi-case studies in management research [18; 19] and business process management scholarship [2; 11].

A convergent parallel mixed-methods approach was chosen to collect quantitative and qualitative data simultaneously and then integrate them for a holistic interpretation [18; 19]. This design was considered suitable because it captures both measurable shifts in crisis response metrics and the underlying organizational or socio-technical processes that foster resilience. This study employed a multiple case strategy to compare ERP-BPMS outcomes across various contexts, which enhances analytical generalizability and highlights both common mechanisms and local nuances [8; 19]. The data collection window stretched from January 2023 to December 2024, covering an eight- to twelve-month interval before ERP-BPMS adoption and another eight–12 months afterward in each organization. This two-phase structure allowed for within-case pre-/post-comparisons, which helped reduce retrospective inaccuracies.

Implementation economics was tracked as a secondary research objective to provide a contextual understanding of resource requirements and return-on-investment (ROI) timelines. The initial implementation costs, ongoing maintenance expenses, and financial benefits were documented through financial records and validated through interviews with financial controllers in each organization. Implementation costs were categorized as small-scale (under $100,000), mid-range ($100,000–$500,000), or large-scale (above $500,000) deployments. The ROI was calculated using standard discounted cash flow analysis over projected timeframes ranging from 12 to 36 months, with annual ROI percentages derived by dividing annual savings by implementation costs.

Four organizations were selected through theoretical sampling to ensure variation in size (from about 20 to over 2,700 employees), sector (utilities, construction, water technology, and energy), geographic setting (Eastern Europe, Central Europe, North America, Middle East), and crisis type (infrastructure disruptions, supply chain shocks, cybersecurity incidents, and weather/regulatory pressures). Each firm had maintained at least eight months of pre-implementation records, granted access to post-implementation logs, and met the prerequisite of encountering a significant disruptive event after adopting the ERP-BPMS. Case Company A, a utility in Eastern Europe with around 170 employees, suffered infrastructure failures and workforce shortages during the regional turmoil. This case provides valuable insights into how utilities can leverage digital transformation to enhance crisis-response capabilities. Case B, a small construction provider in Central Europe with approximately 45 employees, contended with intense cross-border supply chain issues. Case Company C, a North American water technology startup of about 20 staff, grappled with cybersecurity breaches amid rapid expansion. Company D, a large energy conglomerate in the Middle East with over 2,700 employees, faced weather-related and regulatory disruptions. These four contexts capture a broad spectrum of operational environments and crises while aligning with the research objectives of examining how ERP-BPMS supports resilience in distinct settings. Using this diverse set of cases, we collected comprehensive data from each organization.

Data were gathered from quantitative logs, interviews, observations, and documentation, ensuring a thorough perspective on each organization's crisis response and ERP-BPMS practices [2; 11]. Each organization contributed at least eight to 12 months of baseline data before ERP-BPMS adoption and a similar span of post-adoption observations.

The quantitative metrics included response time (hours from detection to targeted action), resource utilization (proportion of available resources deployed), operational continuity (percentage of critical functions sustained), reallocation time (hours to redirect tasks), and crisis-related costs (fraction of baseline operating expenses). Archival records and ERP-BPMS logs supplied relevant data, which were standardized through z-score transformations to account for differences in scale [8].

Qualitative data were collected through 47 semi-structured interviews for all four cases. Fourteen interviews occurred in Company A, 11 in B, nine in C, and 13 in Company D. Participants ranged from senior leadership to frontline employees in operational and support roles. Interviews, each lasting 45–90 minutes, were transcribed verbatim, and the crisis management processes, system usage, and user perceptions of automated recommendations were recorded. Three organizations (A, B, D) allowed direct observations of crisis simulation exercises, resulting in 37 h of field notes that captured real-time interactions with the ERP-BPMS. Internal documents such as crisis protocols and training materials were also collected. Building on this comprehensive data collection approach, we developed a framework to formalize the decision-making process within the ERP-BPMS integration.

A resource allocation framework was developed to improve how crisis decisions are made using ERP-BPMS. It adapts multi-criteria decision-making by combining quantitative measurements from the system with expert-derived heuristic factors and accommodates multiple objectives. The framework consists of two main formulas and builds on existing approaches to process execution and service generation.

Figure illustrates the proposed dynamic ERP-BPMS resource-allocation framework with its key components and implementation process. This framework integrates research design elements, data collection methods, mathematical formulation, and implementation processes to enhance crisis resilience.

The resource priority formula (top) and strategic factor formula (middle) guide automated decision making while allowing structured human overrides (10-15% of decisions).

The first formula is:

$$a_i(t) = w_i \times x_i(t) + h_i(t),$$

where $x_i(t)$ represents a normalized metric between 0 and 1 (for instance, the fraction of tasks that remain unresolved or the proportion of resource capacity still needed), and w_i is a weight derived from Analytical Hierarchy Process (AHP) sessions. The term $h_i(t)$ adjusts for intangible local concerns (e.g., reputational or safety aspects) and is calculated using expert inputs. Each expert assigns a severity score e_j for factor j in the range of 0–10 multiplied by a Delphi-based weight v_j. The sum of all these products forms $h_i(t)$:

$$h_i(t) = \sum_j e_j \times v_j.$$

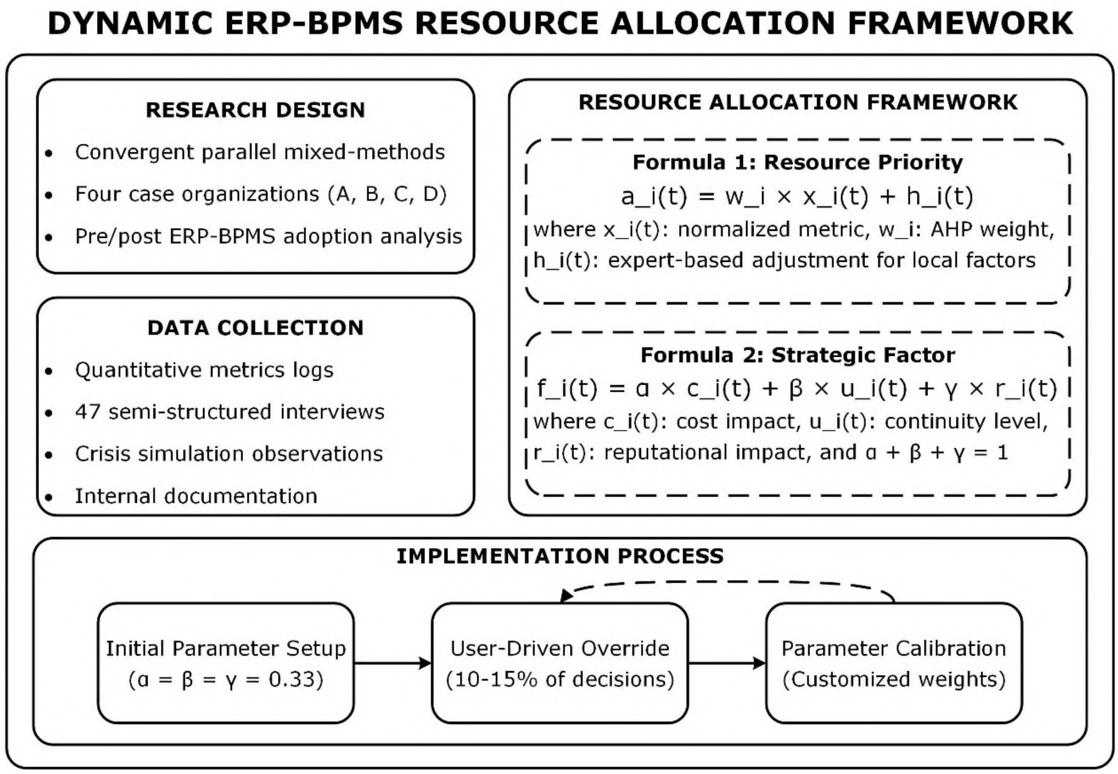

Figure – Dynamic ERP-BPMS Resource Allocation Framework.
Note: Figure developed by the authors based on the integrated analysis of four case organizations.

The second formula is the strategic factor:

$$f_i(t) = \alpha \times c_i(t) + \beta \times u_i(t) + \gamma \times r_i(t),$$

where $\alpha + \beta + \gamma = 1$.

Each term in the equation corresponds to the normalized values in [0,1]. The variable $c_i(t)$ tracks the fraction of crisis-related expenses relative to the baseline costs, while $u_i(t)$ measures the continuity level, and $r_i(t)$ captures the projected reputational impact. The coefficients α, β, and γ underwent pilot testing and scenario analyses over two to three months, during which managers fine-tuned them based on expert feedback and regression-based checks. All firms started with α=β=γ=0.33, and then recalibrated each weight to prioritize cost, continuity, or brand image. This linear approach was adopted for interpretability under time pressure, although it could be extended to more complex multi-criteria decision models if data availability and managerial acceptance permit.

A brief illustration clarifies the operation of these formulae. In Case Company A, assuming $x_i(t) = 0.70$ indicates 70% of tasks remain unresolved, with $w_i = 0.65$ weight assigned through AHP, while $c_i(t) = 0.25$ signals a 25% increase in crisis expenditures. Suppose the intangible term $h_i(t) = 1.8$ accounts for reputational concerns noted by local staff (derived from three experts scoring 6-8 on severity with weights of 0.7-0.9), and the continuity measure $u_i(t)$=0.75. If the firm's initial testing favored continuity (β>0.40), the system would allocate a higher priority to any option that maintains a broad range of critical services, although the final calibrated model used β=0.3, as shown in Table III. Managers can override these algorithmic suggestions, and each override is logged to refine the future calibrations.

Quantitative analyses were performed using IBM SPSS version 28.0). Descriptive summaries and paired t-tests ($p < 0.05$) examined changes in crisis metrics from pre- to post-adoption for each firm, with effect sizes illustrating practical relevance. The small sample of four organizations constrained formal generalizability; thus, the findings were interpreted cautiously as indicative trends rather than final proofs [8]. Sensitivity checks included altering the observation window (six, nine, or 12 months) and introducing potential confounders (such as leadership turnover or external market volatility) in the exploratory regressions.

Qualitative validation followed the thematic coding process in NVivo (version 14.0). Two researchers jointly refined a codebook linking crisis management constructs [2] to the emergent ERP-BPMS themes. They independently coded a subset of transcripts and reconciled discrepancies until they achieved an inter-rater agreement (Cohen's kappa) of approximately 0.80. Triangulation with archival documents and field notes strengthened the internal validity. Managers from each case firm pilot-tested the resource allocation model for past crises and used Delphi feedback to refine the weighting parameters (α, β, γ). These pilot simulations provided evidence of a moderate correlation ($r \approx 0.56$)

between heavier use of system recommendations and improved outcomes, representing an observed pattern rather than a causal relationship, as sample constraints limit strong causal inferences [15].

User acceptance metrics were systematically tracked across all four organizations using standardized surveys before implementation, immediately after training, and quarterly thereafter. Performance boost attribution was calculated by comparing crisis response times and resource utilization rates between teams with high user acceptance scores (80%+) and those with lower acceptance scores (below 70%), controlling for technical equivalence through matched-pair analysis. This difference, expressed as a percentage improvement, allowed us to isolate the impact of user acceptance from that of other technical factors.

All research procedures followed the ethical research principles and guidelines. Participants provided informed written consent and retained the right to withdraw at any time. To ensure confidentiality and privacy, the case companies are identified only as A, B, C, and D, and the ERP-BPMS vendor remains unnamed. Financial details and proprietary data are aggregated or reported in relative terms to protect sensitive information. All digital transcripts and logs were stored on secure servers with restricted access following data protection best practices. The research protocols were internally reviewed and agreed upon by all participating organizations prior to data collection.

Quantitative measures were processed using descriptive statistics and paired t-tests in SPSS to identify shifts in performance following the ERP-BPMS deployment. Qualitative data were subjected to thematic analysis in NVivo, focusing on user experiences, organizational culture, and override patterns that shape socio-technical changes [5]. Cross-case synthesis then integrates numeric trends with contextual interpretation [19], highlighting recurrent findings, such as reduced response times and increased resource coordination. This methodological strategy provided a balanced view of the measurable impacts and processes behind them. The next section presents the main results and discusses how firms reconfigured their crisis practices under this digital transformation.

The main material of the article

This section presents empirical findings from a multi-case study of four anonymized organizations that adopted an integrated Enterprise Resource Planning and Business Process Management System (ERP-BPMS) to strengthen crisis management. The organizations are labeled Case Company A (utility), Case Company B (construction firm), Case Company C (water-technology startup), and Case Company D (energy conglomerate). All references to the specific platform have been replaced by “ERP-BPMS.” Data were collected from operational logs, standardized crisis reports, and 47 semi-structured interviews over comparable eight- to twelve-month intervals before and after ERP-BPMS implementation. The small sample size (n=4) means that p-values at $p < 0.05$ should be viewed as indicative rather than definitive [8]. Some cases, notably Case Company C, started with limited automation, resulting in larger percentage gains commonly referred to as the "low base effect" [15]. While these percentage improvements appear substantial, the absolute gains in hours or cost reduction may be comparatively modest, given the smaller operational scale. This section is structured around two research questions (RQ1 and RQ2), followed by comparative insights, challenges, critical success factors, and case illustrations.

RQ1 Findings: Cross-Case Performance Enhancements.

Overview of Key Metrics. The first research question investigated whether ERP-BPMS adoption yielded measurable improvements in crisis response speed, resource utilization, operational continuity, reallocation time, and crisis-related costs. Table I shows the five performance indicators standardized across the four organizations. Time-based metrics appear in hours, and percentages are used for resource utilization, operational continuity, and crisis-related costs. The numerical ranges capture minor case-level fluctuations.

The interviews revealed that real-time data visibility, predictive scheduling, and automated workflows contributed to these performance shifts. The dramatic 60-65% improvement in reallocation time reflected the elimination of previously fragmented manual processes, where resource identification and reassignment often required multiple approval cycles and disparate system entries. Case Company A estimated annual cost savings of approximately $150,000–$200,000, whereas Case Company D saved around $1.2 million, corroborating the 20–25% cost reduction across all four organizations.

Paired t-tests suggest that the pre- to post-adoption changes are statistically significant at $p < 0.05$ within each case, although the small sample size means that these findings should be treated as indicative [9, 29]. Case C, with minimal prior digital infrastructure, noted the greatest percentage improvements in crisis response and reallocation speed (50–70%). Case Companies A and D, which had moderate digital systems, reported meaningful but somewhat lower relative gains, such as a 35–45% drop in response time. The interviews revealed that real-time data visibility, predictive scheduling, and automated workflows contributed to these performance shifts. Case Company A estimated annual cost savings of approximately $150,000–$200,000, whereas Case Company D saved around $1.2 million, corroborating the 20–25% cost reduction across all four organizations.

RQ2 Findings: Mechanisms of Resilience.

*Table 1 – **Performance Metrics Before and After ERP-BPMS Implementation***
(Data from operational logs, standardized crisis reports, and 47 interviews)

Metric	Case A (Utility)	Case B (Construction)	Case C (Water Tech)*	Case D (Energy)
Crisis Response Time(hours)	Before: 8–9 After: 4–5 (~40–45% ↓)	Before: 5–7 After: 3–4 (~35–40% ↓)	Before: 4–5 After: 2–3 (~50–55% ↓)	Before: 9–10 After: 5–6 (~40–45% ↓)
Resource Utilization(%)	Before: 65–70 After: 75–80 (~15–20% ↑)	Before: 60–65 After: 75–80 (~15–20% ↑)	Before: 60–65 After: 75–80 (~20–25% ↑)	Before: 65–70 After: 75–80 (~15–20% ↑)
Operational Continuity(%)	Before: 85–90 After: 90–95 (~5–10% ↑)	Before: 80–85 After: 85–90 (~5–10% ↑)	Before: 75–80 After: 85–90 (~10–15% ↑)	Before: 80–85 After: 90–95 (~5–10% ↑)
Reallocation Time(hours)	Before: 6–7 After: 2–3 (~60–65% ↓)	Before: 5–6 After: 1–2 (~65–70% ↓)	Before: 3–4 After: 1–2 (~65–70% ↓)	Before: 7–8 After: 3–4 (~60–65% ↓)
Crisis-Related Costs(% revenue)	Before: 3–4 After: 2–3 (~20–25% ↓)	Before: 4–5 After: 3–4 (~20–25% ↓)	Before: 5–6 After: 3–4 (~25–30% ↓)	Before: 2–3 After: 1.5–2 (~20–25% ↓)

*Case C's larger percentage gains reflect a "low base effect," given minimal pre-adoption automation [22, 23]. All improvement percentages represent relative changes from baseline values

Qualitative Insights and Representative Quotes. The second research question investigated which ERP-BPMS features supported organizational resilience under severe disruptions. A thematic analysis of the 47 interviews identified five main mechanisms, as summarized in Table II. Each mechanism links digital coordination to enhanced adaptability during a crisis.

*Table 2 – **Key Resilience Mechanisms Identified in 47 Interviews***

Mechanism	Approximate Frequency	Illustrative Quote (Anonymized)
Enhanced Situational Awareness	~70%	“We no longer scramble across different systems; one dashboard shows real-time data.” (A)
Accelerated Decision Cycles	~80%	“System alerts cut our decision time by half.” (D)
Predictive Capacity	~75%	“We spot anomalies early and prevent bigger breakdowns.” (C)
Decentralized Execution with Central Oversight	~60%	“Local teams act quickly, but HQ sees the bigger map.” (B)
Structured Human-System Collaboration (Override)	~65%	“We override around 10–15% of recommendations to handle local factors.” (A)

Approximate frequency denotes the share of interviewees who cited each theme.

Enhanced Situational Awareness. Before ERP-BPMS adoption, managers spent 30–40% of their initial response time gathering data from disparate sources. After adoption, centralized dashboards integrated resource availability, location-specific conditions, and live progress logs, which accelerated risk detection. An operations lead in Case Company A said, ‘We no longer rummage through separate systems; now one interface shows everything’ (personal communication, January 2024). This improved situational awareness directly contributes to the second key mechanism: Accelerated Decision Cycles.

Accelerated Decision Cycles. All four cases saw a 35–40% decrease in the time from crisis detection to actual intervention. Automated alerts and system-generated tasks have replaced multiple manual steps. A regional manager at Case Company D noted, “We can act within hours rather than days because the system suggests the next steps as soon as it detects anomalies’ (personal communication, December 2024).

Predictive Capacity. Predictive analytics has emerged as a crucial driver of proactive management. Case Company C combined sensor data and advanced algorithms to detect system irregularities early, whereas Case Company A used simpler weather and infrastructure logs to forecast disruptions. Regardless of sophistication, anticipatory measures facilitate faster resource reallocation. These observations align with studies emphasizing the value of predictive insights for agile crisis responses [6].

Decentralized Execution with Central Oversight. In geographically dispersed environments (B, D), local managers need autonomy to address urgent issues, whereas executives require a consolidated overview. The ERP-BPMS permitted decentralized but interconnected workflow. A team lead in Case Company B explained, 'Local crews solve immediate problems on-site, but headquarters sees the full picture and can step in if needed' (personal communication, February 2024). This balance aligns with models in which decentralized decisions benefit from central data monitoring [8].

Structured Human-System Collaboration (Override). All four organizations identified override protocols as vital for integrating human expertise with system logic. This finding aligns with the research that emphasizes the importance of effective information sharing and decision-making processes in multidisciplinary crisis management teams. Case Company C initially lacked clear guidelines for manual overrides, causing user frustration when the system outputs clashed under frontline conditions. Company A instituted formal override processes from the start, improving staff acceptance. In general, 10–15% of system recommendations were overridden to address unanticipated variables, measured as the proportion of automated decisions that managers actively changed during crisis events. A senior manager in Company A noted, "We trust the automated suggestions, but we still override them if local information contradicts them. Recording why we override helps future system tuning" (personal communication, March 2024).

Despite common resilience mechanisms, each firm has adopted a distinct approach to ERP-BPMS deployment. Table III compares the rollout strategies, automation levels, user training, and multi-criteria weighting parameters (α, β, γ) that reflect the cost, continuity, and reputation priorities.

Case Companies A and D each selected a phased or hybrid rollout with moderate automation, minimizing initial disruptions. Case Company B deployed a phased, geography-focused approach while maintaining relatively low automation to reduce cost overruns. Case Company C adopted a single-step "big bang" approach with high automation, facilitating the largest immediate gains, but creating early friction over override usage. All firms recalibrated the α, β, and γ parameters after periodic crisis simulations, confirming that ERP-BPMS deployments often require iterative adjustments [11].

User acceptance metrics revealed a direct correlation between system adoption rates and performance outcomes. In Cases A and B, where user acceptance increased from approximately 62% to 85% over nine months, we observed an attributable 20-25% improvement in overall crisis response metrics beyond the baseline technical improvements. This rapid adoption has been enabled by intensive change management practices, including executive sponsorship, targeted peer champions, continuous feedback loops, and contextualized training alongside formal override protocols. This "acceptance dividend" was most pronounced in reallocation time (approximately 30% of the total improvement) and resource utilization (approximately 25% of the total improvement). Case C, despite higher technical gains, showed a smaller acceptance-related boost (15-20%) due to initial resistance following its "big bang" implementation approach. These findings suggest that sociotechnical alignment, not just technical capability, significantly influences ERP-BPMS effectiveness in crisis situations.

*Table 3 – **Cross-Case Comparison of ERP-BPMS Deployment. Data from internal project documents, stakeholder interviews, and workshop summaries***

Dimension	Case A (Utility)	Case B (Construction)	Case C (Water Tech)	Case D (Energy)
Primary Crisis Focus	Infrastructure, workforce	Cross-border supply chain	Rapid scaling, cybersecurity	Extreme weather, regulations
Implementation Approach	Phased by department	Phased by geography	Single-step "big bang"	Hybrid (core fast, extended phase)
Degree of Process Automation	Moderate	Low	High	Moderate
Predictive vs. Reactive Focus	Balanced (60/40)	Primarily reactive (30/70)	Primarily predictive (80/20)	Balanced (50/50)
External Integration Scope	Limited	Extensive	Moderate	Extensive
Local vs. Central Decision Authority	High decentralization	Moderate decentralization	Low decentralization	Moderate decentralization
Multi-Criteria Weights (α, β, γ)*	α=0.4, β=0.3, γ=0.3	α=0.5, β=0.3, γ=0.2	α=0.3, β=0.3, γ=0.4	α=0.35, β=0.35, γ=0.3
Average Training per User	~16 hours	~12 hours	~24 hours	~20 hours

* Weights reflect each firm's respective crisis management emphasis on cost (α), operational continuity (β), and brand reputation (γ).

Key implementation challenges included poor data quality in Cases A and B, where organizations spent months cleansing legacy records. Staff in all four firms sometimes resisted algorithmic outputs, especially when the ERP-BPMS replaced manual routines. Over-automation risks emerged in Case Company C, where an attempt to automate 85–90% of the processes at once led to frequent overrides and user pushback.

Phased and hybrid implementations (A, B, and D) reduce operational shocks. Cross-functional teams that include IT, operations, and field personnel ensure that the system designs match real workflows [5]. Formal override protocols foster trust by empowering local managers to refine system recommendations. Training sessions of 15 h or more per user correlated with a higher acceptance of predictive features. Monthly or quarterly crisis simulations help to recalibrate predictive models, thereby enhancing system relevance over time [6, 14]. These success factors also have direct implications on the financial aspects of implementation.

The financial analysis of the implementation costs revealed scale-dependent investment requirements across the four cases. Case Company C (water technology startup) and Case Company B (construction firm) operate at the lower end of the investment spectrum, with implementation costs of approximately $50,000-$80,000 and $120,000-$150,000, respectively. Case Company A (utility) required a mid-range investment of approximately $350,000-$400,000, while Case Company D (energy conglomerate) required a high investment of approximately $800,000-$900,000. Ongoing maintenance costs averaged 5-10% of the initial implementation expenses annually across all four organizations.

The ROI analysis indicated that smaller implementations (Cases B and C) reached financial breakeven in 12-18 months, primarily through labor efficiency and reduced crisis response costs. This is consistent with findings on digital transformation paths for SMEs responding to disruption, where agility and targeted digital investments yield proportionally significant returns [20]. The larger implementations demonstrated varied payback periods—Case A required 18-24 months, while Case D achieved breakeven faster (9-12 months) because of the higher savings-to-investment ratio, but required more extensive process reengineering. Case Company A's annual savings of $150,000-$200,000 represented a 35-45% ROI, whereas Case Company D's $1.2 million in annual savings translated to a 130-150% ROI after the initial payback period. Smaller implementations also demonstrated solid returns—Case B achieved $40,000–$60,000 annual savings (30-50% ROI) and Case C reported $25,000–$35,000 savings (30-45% ROI).

Infrastructure Failure at Case Company A. A warehouse collapse in early 2024 destroyed approximately 30% of vital inventory and displaced 40 staff members. Pre-ERP-BPMS estimates predicted a disruption of five seven days. After system adoption, the ERP-BPMS flagged the missing stock within one hour, assigned backup storage, and recalculated staff schedules in less than four hours. Local managers overrode approximately 10% of the system's suggestions to accommodate safety constraints. Core services were restored within 48 hours, saving an estimated 20–25% of crisis-related costs compared to a similar incident two years earlier. A senior manager said, 'We saved so much time on phone calls because the system showed exactly what we needed' (personal communication, March 2024).

Supply Chain Disruption at Case Company B. In January 2024, a key supplier declared a force majeure and halted materials for 14 active cross-border projects. Historically, such disruptions have caused six- to eight-week delays. The ERP-BPMS aggregates material requirements, identifies secondary suppliers, and recalculates project timelines in hours. Managers override approximately 15% of the recommended solutions, often for local vendor relationship reasons. Delays were cut to two–three weeks, while crisis-related costs decreased by approximately 20%. A regional director observed, "Alternative sourcing lists and route forecasts were ready overnight, which slashed our usual reaction time' (personal communication, February 2024).

In summary, ERP-BPMS adoption yielded consistent reductions in crisis response times (35–55%), facilitated faster resource reallocation (40–70% improvement), and lowered crisis-related costs (a 20–30% decrease). These gains appeared in organizations of different sizes and baseline automation levels, although Case Company C's large percentage gains were partly due to minimal prior digitization. Qualitative data emphasized five main mechanisms—enhanced situational awareness, accelerated decision cycles, predictive capacity, decentralized execution with central oversight, and structured human-system collaboration—that strengthen resilience across diverse contexts. Although the small sample size precludes strong statistical generalizations, directional consistency supports the view that the ERP-BPMS can significantly improve crisis management practices. These results are explored further in the Discussion section, where we interpret their theoretical significance and practical implications for business process management [11; 12].

This section examines how an integrated Enterprise Resource Planning and Business Process Management System (ERP-BPMS) improves crisis resilience in four anonymized organizations: case companies A, B, C, and D. The findings are connected with crisis management theories, socio-technical arguments, and Business Process Management (BPM) principles. This discussion interprets the results, compares them with existing research, and articulates the theoretical contributions. It also addresses practical implications, outlines realistic implementation timelines, acknowledges limitations, and proposes directions for future research. All performance shifts appear as approximate ranges to avoid overstating the benefits and accommodate contextual differences.

The results confirm that ERP-BPMS deployments enhance crisis management metrics across diverse settings, which addresses the central research questions and supports core hypotheses. Three organizations (A, B, and D) reported faster response times of 35–50%, while the fourth (C) documented a 50–55% reduction due to limited prior automation. This larger percentage echoes the "low-base effect," where starting from minimal digital processes yields more pronounced improvements [15]. Resource reallocation times also quickened, often reducing total durations by 60–70%. Crisis-related costs decreased by 20–30%, as exemplified by Case Company A's annual savings of $150,000–$200,000 and Case Company D's $1.2 million. Operational continuity rose by 5–15%, approaching 85–95% at crisis peaks, while resource utilization advanced by 15–25%. These outcomes suggest that ERP-BPMS drives faster threat recognition, reconfigurable workflows, and dynamic redeployments of crucial assets, supporting the crisis management strategies needed to overcome market disruption in the digital age.

Three hypotheses were proposed in this research. First, the data support the idea that ERP-BPMS accelerates vital decisions, consistent with dynamic capabilities theory on swift resource coordination in volatile situations [1]. Second, combining automated insights with staff expertise aligned with higher continuity, averaging 85–95%, is in line with claims that predictive tools and user judgment bolster crisis responses [3]. Third, formal override mechanisms prevent misalignment by allowing users to adjust system outputs as needed, an approach used by all four firms to varying degrees. Staff overrode 10–15% of automated recommendations, reflecting sociotechnical arguments that local knowledge must complement algorithmic outputs [16]. Although the observation window was only 8–12 months and parallel initiatives, such as leadership shifts in Case Company A or cybersecurity upgrades in Case Company C, could have boosted these improvements, the consistency across four distinct environments highlights ERP-BPMS's potential to enhance crisis resilience.

These findings are in accordance with recent work suggesting that digital platforms unify data, accelerate responses, and integrate decision-making, especially under turbulent conditions [9, 11, 21]. Previous research has frequently focused on ERP or BPM as separate interventions or investigated stable contexts [12]. By contrast, this multi-case study shows how merging ERP's data integration with BPM's flexible workflows yields improvements during crises [2], extending dynamic capabilities theory's emphasis on sensing, seizing, and reconfiguring [8].

Beyond specifically extending work on ERP and BPM, this research also aligns with broader findings on how digital transformation enhances organizational resilience through multiple pathways. Browder et al. [16] demonstrated that digital transformation promotes organizational resilience through enhancing adaptation capabilities, while Zhang and Li [22] further elaborated on the specific mechanisms through which resilience formation occurs in digitally transforming organizations. Our findings on ERP-BPMS integration provide empirical support for these theoretical frameworks, particularly in crisis contexts, where resilience is most critically tested.

Sociotechnical scholarship warns that automation alone may ignore frontline nuances [7]. These companies mitigated risk through overriding steps and iterative feedback loops. Case Company B, for instance, documented disagreements with 10–15% of automated suggestions and refined the predictive rules, driving user acceptance from 62% to 85% in nine months. This stands against purely automation-centric claims and emphasizes the centrality of operator insight. Furthermore, some prior studies argued that only large, resource-rich organizations achieve major digital transformation payoffs [23]. However, this research counters that assumption by demonstrating that a smaller entity such as Company C realized robust percentage gains similar to those of Company D, a large conglomerate. This parallels Balić et al. [24], who found that socio-technical alignment matters more than scale alone. Similarly, Balić et al. [24] emphasized in their research on ERP quality that organizational effectiveness depends more on information integration and service quality than on organizational size. Smaller, simpler structures can adapt faster if BPM-based processes are contextualized and user training is prioritized [25].

Some conceptual models suggest that digitalization alone can improve resilience [26]. However, the evidence here underscores the necessity of ongoing BPM-driven recalibrations, as in the refinement of the cost (α), continuity (β), and reputational (γ) weights. Without dynamic tuning guided by management, the system may lock outdated assumptions into the resource-allocation logic, hampering adaptability. This synergy of adaptive processes, user engagement, and predictive analytics aligns with recent calls for more complex scenario-based planning in crisis management [6].

This research extends the BPM, crisis management, and socio-technical theories by detailing how an ERP-BPMS fosters real-time adaptation. While earlier studies have often addressed stable settings or single-case explorations, these findings arise from a multi-case approach spanning different industries.

First, the scope of the BPM is shifted beyond stable state optimization by showing how ERP-BPMS enables the dynamic reconfiguration of processes under high stress. Companies updated tasks and resource assignments within hours, illustrating BPM's potential for immediate crisis response rather than just incremental improvements [5]. Second, it clarifies sociotechnical concepts by describing structured override mechanisms that integrate algorithm outputs with local expertise. While warnings about over-automation abound [16], few studies have detailed how to institutionalize user input at a 10–15% override rate that remains purposeful rather than haphazard [3]. Third, it offers a flexible resource-allocation methodology that recalibrates α, β, and γ to match evolving priorities, surpassing static crisis frameworks [8]. Fourth, the data challenge size-based transformation assumptions. Company C's success indicates that smaller organizations can achieve parallel results if they maintain socio-technical coherence and staff buy-in [24].

These contributions reinforce the dynamic capabilities theory, showing how integrated digital systems can sense threats, seize opportunities, and realign resources efficiently [9, 22]. They also demonstrated how BPM frameworks, enriched by adaptive user overrides and iterative weight updates, can handle disruptions that deviate from planned scenarios. While these theoretical contributions advance academic understanding, they also yield significant practical implications for organizations seeking to enhance crisis resilience.

Managers seeking to reinforce crisis resilience through ERP-BPMS can draw several lessons. Ulusan (2021) [27] emphasizes the importance of optimizing post-disruption response and recovery operations, which our findings confirm through the observed 60-70% improvement in reallocation time across all cases. Therefore, early cross-functional planning is critical. Company A prevented mismatches by involving frontline managers and IT staff in early design discussions, dropping crisis response times by approximately 40–45%. This approach ensures process realism, and supports user acceptance. Formal override protocols have emerged as key success factors. Company B documented and analyzed override decisions, refined predictive rules, and pushed acceptance from 62% to 85% in less than a year. This method merges data-driven automation with contextual expertise and mitigates staff fears of rigid automation [16].

Organizations should weigh both tangible and intangible benefits in a cost-benefit analysis. Typical budget outlays range from $50,000 for smaller setups to above $500,000 for major enterprises, with possible payback in 12–24 months. Company D saved about $1.2 million yearly, while Company A documented $150,000–$200,000 in annual cost reductions, equating to 20–30% cuts in crisis-related spending. Concurrent improvements in staff morale, brand credibility, and integrated workflows underscore the fact that ERP-BPMS yields more than direct ROI gains. Ongoing training and routine crisis simulations, at approximately 5–10% of the initial budget per year, preserve capabilities and guide system refinements [28]. Company C's monthly drills lowered the reallocation times by 15%. Such drills also inform managers of quarterly adjustments to α, β, and γ, tailoring the resource allocation model to current priorities.

Cross-case evidence suggests that implementations generally lasted 12 to 30 months, shaped by organizational scale, existing digitization, and complexity. Smaller entities such as Company C sometimes completed near "big bang" deployments in 12–15 months, facing initial resistance but quickly stabilizing once staff embraced the new platform. Larger or more intricate organizations, such as A, B, and D, typically use a phased or hybrid approach over 24–30 months, consistent with established critical success factors for hybrid-ERP implementations [29]. An early phase spanning two to three months is centered on scoping and stakeholder alignment. Company B identified integration obstacles early through the diagnostic period, before the technical rollout. The second phase of three to four months introduced fundamental dashboards, data repositories, and workflow automation, while pilot tests built confidence. The following six to eight months enhanced advanced capabilities (e.g., predictive analytics and override features) and trained staff. Company A scheduled recurring sessions to improve usage by 20% compared to single-session rollouts. Finally, a six- to eight-month refinement stage examined the crisis simulations, collected feedback, and readjusted weighting parameters. Company D often kept legacy platforms active in parallel until new routines stabilized [11]. This phased model reduces disruption risk, encourages iterative learning, and ensures staff readiness.

This study has several limitations inform these results. First, the sample included four organizations, restricting generalizability. Although the cross-case structure offers qualitative richness, broader studies may reveal industry-specific nuances or contradictory findings [2]. Second, the 8–12-month post-implementation window captures initial benefits, but not sustainability; staff might revert to older methods over time, or unique disruptions could test the system differently. Third, concurrent reforms such as leadership changes in A or cybersecurity overhauls in C might have inflated the outcomes attributed to ERP-BPMS alone. Fourth, partial reliance on retrospective baseline data poses a risk of recall bias, although log files have validated many details. Finally, heightened global volatility may have accelerated digital adoption, influencing staff attitudes and acceptance. Although these factors temper claims about universal applicability, cross-case consistency suggests that the ERP-BPMS can substantially enhance crisis responses.

Further work could broaden the sample, extend observations to two or more years, and consider other sectors and cultural settings. Larger longitudinal designs can clarify whether initial gains endure, flatten, or diminish and show how organizations adapt across repeated crises [9]. Researchers may also run controlled experiments modulating α, β, and γ to identify ideal configurations for distinct crisis scenarios, refining the flexible resource model introduced here. Additional qualitative research could explore how management culture, user perceptions, and team dynamics shape override use. Machine learning methods can automate parameter recalibrations or detect anomalies, particularly in unpredictable contexts [6]. Comparative analysis across crisis types, such as weather extremes, cyberattacks, or supply chain collapses, might confirm which ERP-BPMS elements are broadly advantageous and require specialized adjustments. Future scholars could also examine intangible benefits such as brand trust or workforce morale to reinforce the broader value proposition for ERP-BPMS in crisis settings [24].

In summary, this study demonstrates that ERP-BPMS integration, buttressed by BPM-based design and socio-technical alignment, fosters crisis-ready organizations capable of dynamic workflow adjustments. While the findings reinforce the dynamic capabilities theory and underscore user-driven overrides as pivotal, future research should validate long-term effects and consider how evolving digital tools further optimize these adaptive capabilities.

Conclusion

This study demonstrates how integrating an Enterprise Resource Planning and Business Process Management System (ERP-BPMS) can increase organizational resilience under disruptive conditions. We examined four anonymized organizations: Case Company A (utility-focused engineering), Case Company B (construction), Case Company C (water technology startup), and Case Company D (energy conglomerate), and observed consistent performance gains once they adopted an ERP-BPMS. Crisis response times fell by 35–50%, crisis-related costs declined by 20–30%, and operational continuity improved by 5–15%. Organizations that started from low levels of automation, such as Case Company C, reached up to 55% faster responses, illustrating the “low base effect” [15].

These findings address three research questions: First, the data confirm that ERP-BPMS implementation boosts crisis responses across organizations of different sizes. Smaller firms such as Case Company C achieved proportional benefits similar to larger ones, such as Case Company D, challenging the view that only large-scale enterprises fully capture digital transformation payoffs [11; 24]. Second, the analysis identifies real-time data visualization, predictive analytics, and balanced human–system interaction as key drivers of improved crisis metrics. Third, documented override protocols significantly increased user acceptance, going from approximately 62% to 85% in nine months in Case Companies A and B, resulting in an added 20–25% performance boost [12].

The theoretical contribution lies in showing how adjustable parameters (α, β, and γ) enable real-time adaptation to shifting priorities and transform rigid processes into agile, crisis-ready workflows [5]. Practically, this study outlines a roadmap for managers seeking to strengthen organizational resilience. Allocating approximately 5–10% of the ERP-BPMS budget for simulation-based training, iterative parameter tuning, and formal override evaluations can preserve trust in system outputs and incorporate localized knowledge [2, 6]. This approach not only lowers costs and response times but also sustains critical functions during severe disruptions.

This study has four limitations bound these results. First, the sample included only four organizations, which constrains generalizability. Second, the observation period of 12 months may not capture the long-term dynamics. Third, concurrent changes such as leadership transitions or security upgrades could have influenced the findings. Fourth, retrospective data pose a risk of recall bias despite cross-referencing with archived logs. Future research might include broader samples, longer study windows, and investigation of advanced machine learning or blockchain-based solutions for resource coordination.

In summary, the ERP-BPMS integration reconfigures the crisis response by merging automated workflows, predictive analytics, and structured human oversight. As Verhoef et al. [13] argue in their multidisciplinary reflection on digital transformation, such integration creates value across organizational boundaries and functions, particularly during periods of disruption. This synergy allows organizations to adapt swiftly, reduce costs, and maintain core processes when disruptions occur. Subsequent studies could refine dynamic allocation models and examine how balanced automation and expert judgment evolve during protracted crises, thus deepening our understanding of business process management and crisis resilience.

References

1. Bundy, J., Pfarrer, M. D., Short, C. E., and Coombs, W. T. (2017), "Crises and crisis management: Integration, interpretation, and research development", *Journal of Management*, Vol. 43, No. 6, pp. 1661–1692. DOI: https://doi.org/10.1177/0149206316680030.
2. Duchek, S. (2020). Organizational resilience: a capability-based conceptualization. *Business Research*, 13 (1), 215–246. https://doi.org/10.1007/s40685-019-0085-7.
3. He, Z., Huang, H., Choi, H., & Bilgihan, A. (2022). Building organizational resilience with digital transformation. *Journal of Service Management*, *34*(1), 147–171. https://doi.org/10.1108/josm-06-2021-0216.
4. Houy, C., Fettke, P., and Loos, P. (2010), "Empirical research in business process management – Analysis of an emerging field of research", *Business Process Management Journal*, Vol. 16, No. 4, pp. 619–661. DOI: https://doi.org/10.1108/14637151011065946.
5. Kerpedzhiev, G., König, U., Röglinger, M., & Rosemann, M. (2021). An exploration into future business process management research: results from a Delphi study. *Business & Information Systems Engineering, 63* (2), 83–96. https://doi.org/10.1007/s12599-020-00637-0.
6. Metwally, A. B. M., Ali, H. A. A., Ali, M. A. S., & Aly, S. A. S. (2024). The Interplay between Digital Technologies, Supply Chain Resilience, Robustness and Sustainable Environmental Performance: Does Supply Chain Complexity Matter? *Sustainability*, 16(14), 6175. https://doi.org/10.3390/su16146175.
7. Tian, J., & Dai, Y. (2020). Looking at resilience of socio-technical systems from the view of coordinated control. *Cognition, Technology & Work*, 24(1), 147–160. https://doi.org/10.1007/s10111-020-00650-z.
8. Weber, M. M., Pedell, B., & Rötzel, P. G. (2024). Resilience-oriented management control systems: a systematic review of the relationships between organizational resilience and management control systems. *Journal of Management Control*, 35 (4), 563–620. https://doi.org/10.1007/s00187-024-00385-2.
9. Tworek, K., Maj, J., Bieńkowska, A., & Hawrysz, L. (2023). The Model of Organizational Performance Based on Employees' Dynamic Capabilities–Verification During Crisis Caused by Black Swan Event. *IEEE Access*, 11, 45039–45055. https://doi.org/10.1109/access.2023.3273608.
10. Sahebalzamani, S., Jørgensen, E. J. B., Bertella, G., & Nilsen, E. R. (2022). A Dynamic Capabilities Approach to Business Model Innovation in Times of Crisis. *Tourism Planning & Development*, 20 (2), 138–161. https://doi.org/10.1080/21568316.2022.2107560.
11. Bhattacharya, M., Ramakrishnan, T., & Fosso Wamba, S. (2023). Leveraging ERP systems for improving ERP effectiveness in emergency service organizations: an empirical study. *Business Process Management Journal*, 29 (3), 710–736. https://doi.org/10.1108/bpmj-06-2022-0303.
12. Mendling, J., Pentland, B. T., & Recker, J. (2020). Building a complementary agenda for business process management and digital innovation. *European Journal of Information Systems*, 29 (3), 208–219. https://doi.org/10.1080/0960085x.2020.1755207.
13. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022.
14. Furjan, M. T., Pihir, I., & Tomičić-Pupek, K. (2020). Understanding Digital Transformation Initiatives: Case Studies Analysis. *Business Systems Research Journal*, 11 (1), 125–141. https://doi.org/10.2478/bsrj-2020-0009.
15. Zhang, X. (2024). The Impact of Digital Technologies on Supply Chain Resilience: A Framework Analysis. *Advances in Economics, Management and Political Sciences,* 140 (1), 155–161. https://doi.org/10.54254/2754-1169/2024.ga18772.
16. Browder, R. E., Koch, H., & Dwyer, S. M. (2023). Upgrading adaptation: How digital transformation promotes organizational resilience. *Strategic Entrepreneurship Journal*, *18* (1), 128–164. https://doi.org/10.1002/sej.1483.
17. Postolea, I. D., & Bodea, C.-N. (2022). Building Resilience Through Digital Transformation (pp. 371–381). Springer singapore. https://doi.org/10.1007/978-981-16-8866-9_31.
18. Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). Sage Publications.
19. Eisenhardt, K. M., & Graebner, M. E. (2007). Theory Building From Cases: Opportunities And Challenges. *Academy of Management Journal*, *50* (1), 25–32. https://doi.org/10.5465/amj.2007.24160888.
20. Priyono, A., Moin, A., & Putri, V. N. A. O. (2020). Identifying digital transformation paths in the business model of SMEs during the COVID-19 pandemic. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 104. https://doi.org/10.3390/joitmc6040104
21. Panetto, H., Iung, B., Ivanov, D., Weichhart, G., & Wang, X. (2019). Challenges and trends for the digital transformation of enterprise systems. *Annual Reviews in Control, 47*, 200–213. https://doi.org/10.1016/j.arcontrol.2019.02.002.
22. Zhang, X., & Li, Z. (2025). Research on the Mechanisms of Organizational Resilience Formation in the Context of Digital Transformation. Financial Economics Research, 2(1), 40–47. https://doi.org/10.70267/7ew71h22.
23. Escobar-Rodriguez, T., Escobar-Pérez, B., and Monge-Lozano, P. (2014), "Technical and organisational aspects in enterprise resource planning systems implementation: Lessons from a Spanish public hospital", *Enterprise Information Systems*, Vol. 8, No. 5, pp. 533–562. DOI: https://doi.org/10.1080/17517575.2012.713122.
24. Balić, A., Kuloglija, E., Turulja, L., & Pejić-Bach, M. (2022). ERP Quality and the Organizational Performance: Technical Characteristics vs. Information and Service. *Information*, *13*(10), 474. https://doi.org/10.3390/info13100474.

25. Papadopoulos, T., Baltas, K. N., & Balta, M. E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. *International Journal of Information Management, 55*, 102192. https://doi.org/10.1016/j.ijinfomgt.2020.102192.

26. Brem, A., Nylund, P. A., & Roshani, S. (2023). Unpacking the complexities of crisis innovation: a comprehensive review of ecosystem-level responses to exogenous shocks. *Review of Managerial Science*, *18* (8), 2441–2464. https://doi.org/10.1007/s11846-023-00709-x.

27. Ulusan, A. (2021). Optimizing post-disruption response and recovery operations to improve resilience of critical infrastructure systems [northeastern university library]. https://doi.org/10.17760/d20324048.

28. E.R, M., Astuti, H. M., & Hanggara, B. T. (2018). Model for BPM implementation assessment: evidence from companies in Indonesia. *Business Process Management Journal*, *25* (5), 825–859. https://doi.org/10.1108/bpmj-08-2016-0160.

29. Ploder, C., Bernsteiner, R., Walter, J., & Schlögl, S. (2021). *Critical Success Factors of Hybrid-ERP Implementations* (pp. 305–315). springer. https://doi.org/10.1007/978-3-030-81635-3_25.

The article has been sent to the editorial board 30.07.2025

Черненко Юрій Володимирович
Кандидат технічних наук, докторант, відділ докторантури,
https://orcid.org/0000-0002-7008-7274
Заклад вищої освіти «Міжнародний університет бізнесу і права», Україна
Ткаченко Валентин Федорович
Кандидат технічних наук, доцент, доцент кафедри електротехнічних систем,
https://orcid.org/0000-0001-6290-2286
Черкаський державний технологічний університет, Черкаси, Україна

ПІДВИЩЕННЯ СТІЙКОСТІ ДО КРИЗ ЗА ДОПОМОГОЮ ДИНАМІЧНОЇ МОДЕЛІ РОЗПОДІЛУ РЕСУРСІВ ERP–BPMS: МУЛЬТИКЕЙС ДОСЛІДЖЕННЯ

Анотація. *У цьому дослідженні вивчається, як інтеграція планування ресурсів підприємства (ERP) з системами управління бізнес-процесами (BPMS) підвищує стійкість організації в кризових умовах за допомогою динамічної моделі розподілу ресурсів. Конвергентний паралельний дизайн змішаних методів був застосований у чотирьох анонімних організаціях: комунальних службах, будівництві, водних технологій та енергетиці. Дані були отримані з оперативних журналів, 47 напівструктурованих інтерв'ю та спостережень за моделюванням кризових ситуацій протягом 8-12 місяців до і після впровадження ERP-системи управління підприємством. Емпіричні результати свідчать про скорочення часу реагування на кризові ситуації на 35-50%, зменшення витрат, пов'язаних з кризою, на 20-30% та покращення безперервності роботи на 5-15%. Поєднуючи інформаційні панелі в режимі реального часу, прогнозну аналітику та структуровані протоколи перевизначення, модель поєднує автоматизовану ефективність з людським судженням. Менші фірми досягли результатів, порівнянних з більшими, коли пріоритетом було соціально-технічне узгодження. Ця робота розвиває науку управління бізнес-процесами, ілюструючи, як конфігуровані параметри (α, β, γ), що представляють вартість, безперервність і репутацію, дозволяють гнучко реконфігурувати бізнес-процеси в нестабільних умовах. Наведені приклади ставлять під сумнів припущення, що переваги цифрової трансформації залежать від організаційного масштабу, і підкреслюють, що структурована співпраця між людьми і системами має важливе значення для збереження досягнутих у кризових умовах результатів діяльності.*

Ключові слова: інтеграція ERP-BPMS; антикризова стійкість; управління бізнес-процесами; динамічні можливості; розподіл ресурсів; антикризове управління; соціально-технічні системи; обхідні протоколи; цифрова трансформація; прогнозна аналітика

Link to publication

APA Chernenko, Yu., & Tkachenko, V. (2025). Enhancing crisis resilience via a dynamic ERP-BPMS resource allocation model: a multi-case study. *Management of Development of Complex Systems*, 63, 14–26, dx.doi.org\10.32347/2412-9933.2025.63.14-26.

ДСТУ Черненко Ю. В., Ткаченко В. Ф. Підвищення стійкості до криз за допомогою динамічної моделі розподілу ресурсів ERP–BPMS: мультикейс дослідження. *Управління розвитком складних систем.* Київ, 2025. № 63. С. 14 – 26, dx.doi.org\10.32347/2412-9933.2025.63.14-26.