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Strategic Improvisation Under Supply-Chain Volatility

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Abstract

Persistent supply-chain volatility challenges managerial systems designed around relatively stable forecasts, predictable supplier performance, fixed routing arrangements, and sequential planning. When disruptions develop faster than formal contingency processes can respond, organizations may need to combine available knowledge, relationships, resources, and managerial judgment while action is already underway. This study examines strategic improvisation as a capability for maintaining operational continuity under volatile supply conditions. Strategic improvisation is conceptualized not as unstructured reaction but as the purposeful convergence of planning and execution when conventional responses are insufficient or too slow. Drawing on organizational improvisation, supply-chain resilience, agility, resource reconfiguration, and relational-capability research, the study develops a simulation-based explanatory framework linking improvisational capability with decision responsiveness, supplier coordination, resource reconfiguration, disruption recovery, and operational continuity. Because no primary organizational dataset was supplied, five synthetic scenarios representing increasing levels of strategic improvisation capability were constructed.

The simulated results indicate that disruption-response effectiveness rises from 47 to 88 and operational-continuity performance rises from 54 to 89 as strategic improvisation capability increases from 20% to 100%. Simulated recovery time simultaneously declines from 11.8 to 4.2 days. The findings should not be interpreted as empirical estimates; rather, they demonstrate theoretically coherent relationships suitable for future organizational validation. The study argues that strategic improvisation is most valuable when it is supported by supply visibility, decentralized but bounded decision rights, trusted supplier relationships, accessible resource alternatives, and organizational memory. Excessive improvisation without governance may create inconsistency and uncontrolled risk, whereas excessive procedural dependence may delay action during rapidly developing disruptions. Sustainable supply-chain resilience therefore requires a balance between preparedness and improvisational adaptability.

Keywords: strategic improvisation, supply-chain volatility, supply-chain resilience, resource reconfiguration, operational continuity, supplier coordination, disruption management, organizational agility

1. Introduction

Supply chains operate through networks of suppliers, manufacturers, logistics providers, distributors, service partners, information systems, financial arrangements, and customers whose interdependence

creates both efficiency and vulnerability. Disturbance in one part of the network can alter material availability, transportation reliability, lead times, production schedules, inventory positions, or customer fulfillment elsewhere. Christopher and Peck's influential work positioned resilience as an important response to supply-chain vulnerability, while Ponomarov and Holcomb subsequently emphasized the adaptive capacity required to prepare for, respond to, and recover from disruptive events. The strategic challenge is therefore not limited to preventing every disruption, which is rarely possible, but also includes maintaining sufficient adaptive capability when planned assumptions become unreliable.

Volatility places particular pressure on traditional planning systems because the time available for analysis may contract as disruption severity increases. Established sourcing procedures, approval sequences, transportation contracts, production rules, and inventory policies may remain useful under expected variability but become restrictive when suppliers fail unexpectedly or when multiple constraints occur simultaneously. Lee's Triple-A supply-chain perspective emphasized agility, adaptability, and alignment as important characteristics of effective supply chains, reinforcing the broader argument that efficiency alone is an insufficient design principle under changing conditions. Resilience research similarly identifies capabilities such as flexibility, visibility, collaboration, resource availability, and responsiveness as important to disruption management.

Organizational improvisation offers a complementary theoretical perspective. Moorman and Miner defined organizational improvisation in terms of the convergence of the composition and execution of action, thereby distinguishing improvisation from conventional processes in which plans are completed substantially before implementation begins. Baker, Miner, and Eesley's study further connected improvisation with bricolage and strategic action, demonstrating how organizations may construct responses by recombining available resources, relationships, and competencies when predefined solutions are unavailable. Improvisation therefore need not imply managerial disorder. Under appropriate conditions, it can represent a purposeful response to circumstances in which planning and acting must partially occur at the same time.

This distinction is particularly relevant to supply-chain management. A disrupted firm may need to qualify an alternative supplier, substitute an input, reroute transportation, temporarily revise production priorities, share scarce inventory across markets, redesign packaging, negotiate revised delivery windows, or alter customer-allocation rules before complete information becomes available. Such actions involve more than operational flexibility because they may alter priorities, partner relationships, resource deployment, and short-term competitive commitments. Pavlou and El Sawy's work on improvisational capabilities under turbulent environments reinforces the idea that improvisation can complement more deliberate capabilities when rapid reconfiguration becomes necessary.

The present study therefore examines Strategic Improvisation Under Supply-Chain Volatility. It proposes that strategically useful improvisation depends upon the ability to interpret disruption signals quickly, coordinate with supply-chain partners, recombine existing resources, and authorize contextually appropriate deviations without abandoning governance. Because no real organizational dataset was provided, the article uses a transparent simulation rather than presenting fictional field findings. The study evaluates five levels of strategic improvisation capability and examines their theoretical relationship with response speed, supplier coordination, resource reconfiguration, recovery time, and operational continuity. Its central contribution is to connect organizational improvisation research with

supply-chain resilience in a framework that treats improvisation as a bounded adaptive capability rather than an alternative to preparedness.

2. Objectives of the Study

2.1 To Conceptualize Strategic Improvisation in Supply-Chain Management

The first objective is to establish a precise distinction between strategic improvisation and unmanaged reaction. Within the present study, strategic improvisation refers to the purposeful design and execution of adaptive actions under compressed decision time when existing plans do not adequately address emerging supply conditions. This definition incorporates the convergence of planning and action identified in organizational improvisation research while retaining explicit attention to organizational purpose, accountability, and operational consequences.

The concept therefore differs from routine flexibility. A firm that activates a previously contracted backup supplier is executing a contingency arrangement; a firm that rapidly combines partial capacity from several previously unconnected suppliers, redesigns a production sequence, negotiates revised quality controls, and reallocates inventory while the disruption is unfolding demonstrates a greater degree of improvisational action. Strategic improvisation becomes particularly relevant when disruption conditions exceed the assumptions embedded in existing contingency plans.

2.2 To Examine Improvisation as a Mechanism of Supply-Chain Resilience

The second objective is to examine whether stronger improvisational capability can theoretically improve disruption response, resource reconfiguration, supplier coordination, and operational continuity. Supply-chain resilience scholarship consistently emphasizes that firms require capabilities capable of absorbing disturbance and restoring or adapting operations after disruption. Christopher and Peck, Ponomarov and Holcomb, and Pettit, Fiksel, and Croxton provide complementary foundations for viewing resilience as an interaction between vulnerabilities and adaptive capabilities.

The study does not assume that improvisation independently creates resilience. Effective improvisation requires informational, relational, and resource foundations. Visibility can help managers determine where disruption is occurring; relationships can enable rapid coordination; resource slack or substitutability can create feasible alternatives; and delegated authority can reduce response delay. Improvisation is therefore conceptualized as an integrating capability that activates and recombines available resources when ordinary routines become insufficient.

2.3 To Develop a Framework for Future Empirical Testing

The third objective is to develop measurable propositions suitable for future validation with actual supply-chain evidence. The framework identifies strategic improvisation capability, decision responsiveness, supplier coordination, resource reconfiguration, recovery time, and operational continuity as variables that can be operationalized through future organizational surveys, disruption-event records, procurement data, supply-network case studies, or mixed-method research.

Future studies could compare organizations across disruption events, industries, geographic regions, or degrees of supply-network complexity. Such research could also investigate boundary conditions, including disruption severity, digital visibility, supply-base concentration, regulatory

requirements, organizational centralization, inventory slack, and the degree of product substitutability. The present simulation provides conceptual structure for that later empirical work without claiming that synthetic results constitute external validation.

3. Review of Literature

3.1 Organizational Improvisation and Strategic Action

Moorman and Miner's foundational contribution conceptualizes organizational improvisation as the degree to which the design and execution of action converge in time. This interpretation is important because it separates improvisation from spontaneous behavior without organizational grounding. Improvisation can draw upon prior knowledge, routines, organizational memory, and existing competencies even when the resulting action was not completely specified beforehand. Organizational memory can therefore support rather than eliminate improvisation by providing materials that actors can recombine under unfamiliar conditions.

Baker, Miner, and Eesley extend this perspective through their analysis of bricolage and improvisational competencies in emerging firms. Their work suggests that actors may construct strategic responses from available resources and relationships when ideal resources are inaccessible. The relevance to supply-chain disruption is substantial. Procurement teams facing shortages may not be able to wait for an optimal supplier network to be designed; they may instead need to recombine current supplier contacts, logistics options, technical specifications, production capacities, and contractual mechanisms into a workable temporary arrangement.

Hadida, Tarvainen, and Rose's consolidating review further demonstrates that organizational improvisation can occur at different degrees and organizational levels rather than constituting a single uniform phenomenon. This insight supports a graduated view of strategic supply-chain improvisation. Minor improvisation might involve adjusting shipment sequence, whereas structural improvisation might involve temporary redesign of sourcing architecture or production allocation. The appropriate degree of improvisation should therefore depend upon the nature and severity of the disruption.

3.2 Supply-Chain Volatility, Resilience, and Resource Reconfiguration

Supply-chain resilience research provides the second theoretical pillar of the study. Christopher and Peck argue that turbulent markets and increasing network vulnerability require supply chains capable of moving toward a stable or more desirable state after disturbance. Ponomarov and Holcomb subsequently integrate multiple disciplinary perspectives and characterize supply-chain resilience in terms of adaptive capability surrounding unexpected events. Pettit, Fiksel, and Croxton complement this perspective through a framework that balances supply-chain vulnerabilities against capabilities, emphasizing that resilience requires an appropriate fit rather than unlimited redundancy.

Empirical research reinforces the importance of reconfiguration and visibility. Blackhurst, Dunn, and Craighead developed an empirically informed framework of global supply resiliency, while Brandon-Jones, Squire, Autry, and Petersen connected supply-chain visibility-related resources with resilience and robustness. Ambulkar, Blackhurst, and Grawe further examined firm resilience to supply-chain disruptions and identified resource reconfiguration and risk-management infrastructure as important elements associated with resilience. These contributions indicate that rapid response depends

upon organizational resources that can be redirected rather than merely upon awareness that disruption exists.

Strategic improvisation can be positioned within this resilience architecture as a mechanism connecting available resources with unexpected operational requirements. A firm may possess alternate suppliers, logistics contacts, technical expertise, inventory information, and cross-functional decision makers but still respond slowly if these resources remain trapped in disconnected procedures. Improvisational capability concerns the organization's ability to combine such resources quickly enough to remain useful during a developing disruption.

3.3 Relational Coordination, Agility, and Adaptive Supply Networks

Supply chains cross organizational boundaries, making interorganizational relationships important to any improvisational response. Wieland and Wallenburg's research shows that relational competencies are relevant to supply-chain resilience and customer value. This finding is critical because an organization rarely improvises an alternative supply arrangement entirely by itself. Suppliers, carriers, contract manufacturers, distributors, technical specialists, and customers may need to accept revised commitments, share information, or coordinate temporary changes.

Lee's Triple-A framework provides a complementary perspective by identifying agility, adaptability, and alignment as characteristics of high-performing supply chains. Strategic improvisation is particularly connected with agility—the capacity to respond rapidly—while also relying upon adaptability because disruptions may require temporary or permanent changes to network configuration. Alignment remains necessary because unilateral improvisation can shift excessive cost or risk onto partners, reducing willingness to cooperate during subsequent disturbances.

Dynamic-capability-oriented resilience research further reinforces the role of adaptation. Chowdhury and Quaddus conceptualize supply-chain resilience using dynamic capability theory, supporting a view of resilience in which sensing, responding, and reconfiguring capabilities become central to adaptation. The research gap addressed here lies in explaining how those capabilities may be enacted when the time required for formal planning exceeds the time available for response. Strategic improvisation provides a theoretically useful bridge by describing how reconfiguration can occur through bounded action while uncertainty is still being resolved.

4. Research Methodology

4.1 Research Design and Simulation Structure

The study adopts a simulation-based explanatory design. No actual supplier records, procurement transactions, logistics data, disruption histories, inventory records, survey responses, or confidential company information were supplied. Accordingly, the numerical analysis represents author-generated hypothetical scenarios and must not be interpreted as observed performance in any real supply chain. Simulation was selected because it permits the proposed theoretical relationships to be operationalized transparently without fabricating empirical participants or organizational results.

Five scenario conditions were constructed corresponding to strategic improvisation capability levels of 20%, 40%, 60%, 80%, and 100%. These values represent increasing organizational capacity to develop and execute adaptive responses under compressed decision time. They should not be interpreted

as percentage improvements in actual firms. Each scenario was assessed through four positive operational dimensions—decision responsiveness, supplier coordination, resource reconfiguration, and operational continuity—together with disruption recovery time expressed in simulated days.

4.2 Construct Operationalization and Measurement Logic

Strategic improvisation capability represents the organizational capacity to combine planning and action when existing contingency procedures are inadequate. Decision responsiveness captures the speed and usefulness of managerial decisions after disruption detection. Supplier coordination represents the ability to negotiate and implement adaptive arrangements across organizational boundaries. Resource reconfiguration reflects the capacity to redirect materials, capacity, suppliers, inventory, transportation, personnel, or process arrangements toward emerging requirements.

Operational continuity represents the degree to which critical output and customer-service obligations can be sustained during disruption. Recovery time captures the simulated number of days required to reach an acceptable operational state following the hypothetical disruption. The framework is theoretically consistent with improvisation research emphasizing simultaneous formulation and execution, and with resilience research emphasizing reconfiguration, visibility, responsiveness, and adaptive recovery.

Table 1: Operationalization of the Strategic Improvisation Framework

Construct	Operational Meaning	Measurement Format	Expected Direction
Strategic Improvisation Capability	Capacity to formulate and implement adaptive actions under compressed decision time	Scenario level: 20%–100%	Independent condition
Decision Responsiveness	Speed and contextual quality of decisions following disruption detection	Index: 0–100	Increase
Supplier Coordination	Ability to mobilize suppliers and logistics partners around revised arrangements	Index: 0–100	Increase
Resource Reconfiguration	Ability to redeploy sourcing, inventory, capacity, routing, and operational resources	Index: 0–100	Increase
Operational Continuity	Capacity to sustain critical operations and customer commitments during disruption	Index: 0–100	Increase
Disruption Recovery Time	Simulated elapsed time required to restore an acceptable operating state	Days	Decrease

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4.3 Scenario Generation and Evaluation Procedure

The simulated scenarios were designed to represent progressively stronger combinations of decision autonomy, available alternatives, cross-functional coordination, supplier engagement, and rapid resource redeployment. Under the 20% condition, improvisation is restricted and managers rely heavily on existing procedures. The 40% and 60% conditions introduce progressively greater discretion and coordination, while the 80% and 100% conditions represent increasingly mature improvisational capability supported by better information, stronger partner relationships, and accessible resource alternatives.

Evaluation focuses on directional coherence rather than statistical significance. No inferential tests, confidence intervals, probability values, or population-level causal estimates are reported. Using conventional statistical inference on deliberately constructed values would create a misleading appearance of empirical validation. Instead, the study examines whether the simulated trajectories are theoretically consistent with established research indicating that agility, relational capability, visibility, reconfiguration, and resilience can support stronger disruption response.

5. Analysis

5.1 Strategic Improvisation and Disruption-Response Capability

The simulated results show progressive improvement across the positive operational indicators as strategic improvisation capability increases. At the 20% level, decision responsiveness is 47, supplier coordination is 50, resource reconfiguration is 45, and operational continuity is 54. Recovery time is 11.8 simulated days. This scenario represents a firm whose established procedures provide some stability but whose managers possess limited ability to redesign action while disruption is unfolding.

At the 60% condition, decision responsiveness increases to 70, supplier coordination reaches 72, resource reconfiguration reaches 69, and operational continuity increases to 73. Recovery time declines to 7.4 days. At the 100% condition, the corresponding indices reach 92, 88, 90, and 89, while recovery time falls to 4.2 days. The model therefore depicts improvisational capability as increasingly important when organizations must convert incomplete disruption information into coordinated operational action.

Table 2: Simulated Outcomes Across Strategic Improvisation Conditions

Strategic Improvisation Capability	Decision Responsiveness	Supplier Coordination	Resource Reconfiguration	Operational Continuity	Recovery Time
20%	47	50	45	54	11.8 days
40%	59	61	57	63	9.6 days
60%	70	72	69	73	7.4 days
80%	82	81	81	82	5.6 days
100%	92	88	90	89	4.2 days

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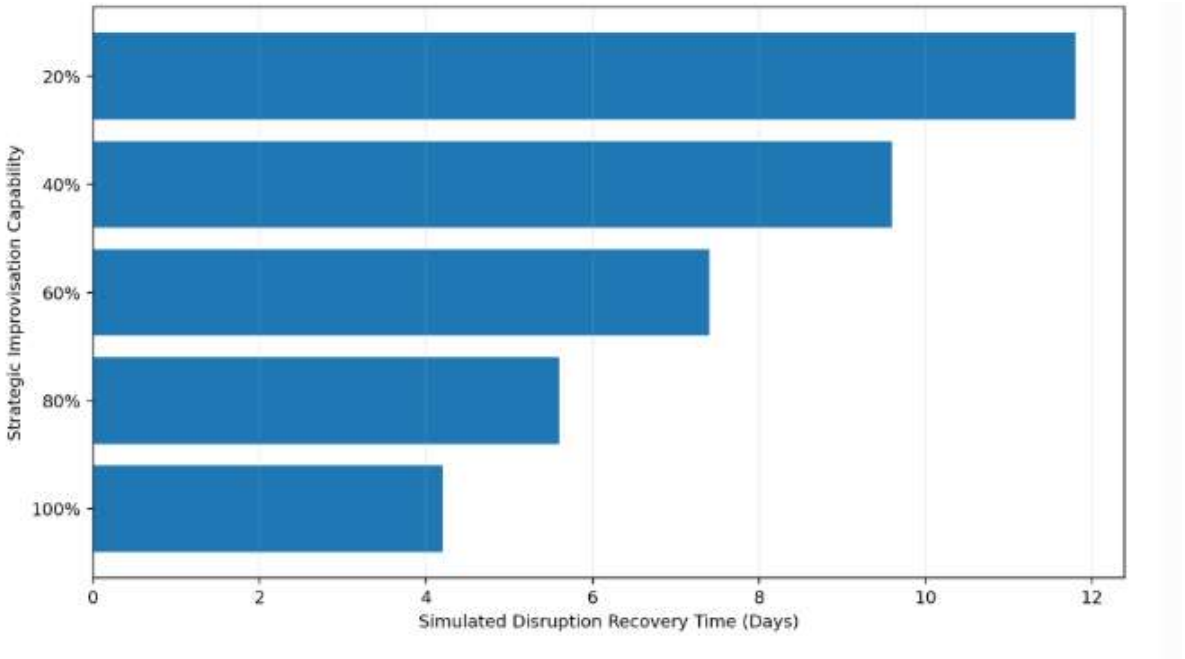
Note: All values are synthetic and used exclusively to demonstrate the proposed analytical framework.

5.2 Improvisation Capability and Disruption Recovery Time

The graph illustrates a declining recovery-time trajectory as strategic improvisation capability increases. Simulated recovery time decreases from 11.8 days at the 20% capability level to 9.6 days at 40%, 7.4 days at 60%, 5.6 days at 80%, and 4.2 days at the 100% condition. The difference between the lowest and highest scenarios is 7.6 simulated days, corresponding to a reduction of approximately 64.4% relative to the initial scenario.

Graph 1: Simulated Recovery Time Across Strategic Improvisation Levels



This pattern should not be read as evidence that a real organization increasing improvisation by a specific percentage would reduce recovery time by the same amount. The analytical value lies instead in showing a theoretically plausible mechanism: when decision authority, supplier interaction, and resource reconfiguration are activated more rapidly, less disruption time is consumed waiting for a fully predetermined response. This interpretation is consistent with work by Pavlou and El Sawy on improvisational capabilities in turbulence and with supply-chain resilience research highlighting reconfiguration and adaptive response.

5.3 Operational Continuity and the Limits of Improvisation

Operational continuity rises from 54 to 89 across the five simulation conditions, representing the strongest overall performance at the highest improvisational capability level. This pattern reflects the proposition that a supply chain does not need to return immediately to its original configuration to preserve value. Temporary substitution, altered fulfillment priorities, alternative transport, revised production sequences, and negotiated customer commitments may sustain essential operations while the permanent recovery strategy is still being developed.

Nevertheless, the simulation should not be interpreted as implying that unlimited improvisation is always preferable. Pettit, Fiksel, and Croxton emphasize the need to balance supply-chain vulnerabilities with appropriate capabilities rather than maximizing every resilience capability irrespective of cost. Strategic improvisation likewise requires boundaries. Uncontrolled supplier substitution, undocumented specification changes, unauthorized expenditure, bypassed safety procedures, or unassessed regulatory risks may preserve short-term flow while creating larger downstream failures. The strongest conceptual model therefore combines improvisational freedom with predefined limits concerning safety, legality, quality, financial exposure, and escalation.

6. Discussion

6.1 Strategic Improvisation as a Complement to Preparedness

The principal implication of this study is that strategic improvisation should be treated as a complement to supply-chain preparedness rather than as evidence that planning has failed. Formal contingency planning remains valuable because it creates predefined alternatives, decision rights, risk thresholds, contact networks, and information structures. However, no contingency portfolio can anticipate every combination of supplier failure, transportation constraint, demand fluctuation, quality problem, infrastructure interruption, or resource scarcity. Organizational improvisation becomes valuable in the residual space where actual disruption differs materially from the planned scenario.

Moorman and Miner's conceptualization helps explain why this does not amount to managerial randomness. Improvisation can use organizational memory as material for new action even when execution begins before planning has been fully completed. In supply-chain terms, prior supplier evaluations, transportation contracts, product specifications, inventory rules, historical disruptions, technical knowledge, and relationship experience can all become resources for improvisation. Preparedness therefore increases the quality of what managers have available to recombine.

This perspective leads to an important managerial principle: organizations should plan for improvisation without attempting to predefine the improvisation itself. They can establish decision boundaries, emergency authority, cross-functional teams, supplier-information protocols, alternative-material approval rules, and rapid financial controls before disruption occurs. Such architecture preserves governance while reducing the amount of organizational friction that managers encounter when circumstances require an unplanned response.

6.2 Supplier Relationships and Distributed Improvisational Capacity

The second implication concerns the interorganizational nature of supply-chain improvisation. A focal firm may decide quickly, but its response will remain ineffective when suppliers, carriers, technical partners, or customers cannot coordinate corresponding changes. Wieland and Wallenburg's empirical work highlights the relationship between relational competencies and supply-chain resilience, supporting the importance of collaboration in adaptive supply systems. Strategic improvisation is therefore better understood as a distributed capability than as an exclusively internal managerial skill.

Strong supplier relationships can reduce the time required to exchange information, negotiate temporary concessions, share capacity, or modify delivery arrangements. Yet relationships must be accompanied by sufficient visibility. Brandon-Jones and colleagues demonstrate the relevance of

connectivity and information-sharing resources for resilience and robustness. Managers cannot improvise intelligently when they lack visibility regarding inventory, supplier exposure, lead-time changes, transportation capacity, or downstream customer priorities.

The governance challenge is to combine speed with reciprocal fairness. A focal firm that consistently transfers disruption costs to weaker suppliers may receive short-term concessions but weaken the relationships needed for future resilience. Strategic improvisation should therefore preserve alignment as well as agility. Lee's Triple-A framework is relevant here because rapid adaptation remains more sustainable when supply-chain participants' interests are sufficiently aligned to support cooperation.

6.3 From Reactive Improvisation to Organizational Capability

The third implication is that improvisation can become more reliable through learning. An improvised response initially emerges because existing routines are insufficient, but successful solutions can subsequently be evaluated, documented, standardized, or incorporated into future contingency plans. Organizational improvisation and organizational memory are therefore mutually reinforcing rather than mutually exclusive. A temporary rerouting arrangement, emergency supplier-qualification protocol, substitute-material process, or revised inventory-sharing mechanism may eventually become part of the firm's formal resilience architecture.

This process distinguishes mature improvisation from repetitive firefighting. If an organization repeatedly encounters the same disruption and responds through the same unstructured emergency behavior without modifying its systems, improvisation has not produced organizational learning. Hadida, Tarvainen, and Rose's consolidating treatment of organizational improvisation supports a more nuanced view in which improvisation varies by degree and organizational level. Organizations should therefore determine which improvised practices deserve formalization and which should remain exceptional.

A strategically mature supply chain would consequently maintain three complementary layers of capability. The first is preparedness, which includes risk assessment, redundancy, visibility, contingency planning, and contractual arrangements. The second is bounded improvisation, which enables rapid adaptive action when predefined responses are inadequate. The third is post-disruption learning, through which useful improvised solutions are assessed and selectively absorbed into organizational memory. This three-layer structure offers a more sustainable response to volatility than either rigid planning or unrestricted improvisation alone.

7. Conclusion

Supply-chain volatility creates conditions in which organizations cannot rely exclusively on optimization for stable environments. Disruption may invalidate supplier assumptions, alter transportation availability, create shortages, change customer priorities, or expose hidden network dependencies within a period shorter than conventional strategic planning cycles. The present study has examined strategic improvisation as an adaptive capability that becomes relevant precisely when the organization must formulate and execute parts of its response concurrently.

The simulation indicates a theoretically coherent association between stronger improvisational capability and improved disruption outcomes. Across the five synthetic scenarios, decision responsiveness increases from 47 to 92, resource reconfiguration from 45 to 90, supplier coordination from 50 to 88, and operational continuity from 54 to 89. Simulated recovery time decreases from 11.8 to 4.2 days. These numerical values are methodological illustrations and must not be represented as evidence obtained from real companies, suppliers, or supply-chain events.

The broader conclusion is that strategic improvisation should neither replace formal risk management nor be suppressed by it. Preparedness provides the information, resources, relationships, and governance boundaries from which effective improvisation can emerge. Improvisation provides adaptive movement when prepared responses no longer fit the actual disruption. Organizational learning then converts selected improvisational discoveries into future preparedness. Resilience is therefore strengthened by the interaction among anticipation, adaptive action, and institutional learning rather than by any single mechanism in isolation.

Future empirical studies should evaluate this framework using verified disruption episodes and longitudinal supply-chain data. Particularly valuable research could compare firms with centralized and decentralized decision structures, examine how digital supply visibility changes improvisational effectiveness, and investigate whether supplier trust moderates the relationship between strategic improvisation and recovery performance. Researchers should also examine potential negative outcomes such as inconsistent decisions, cost escalation, quality deterioration, regulatory exposure, or excessive reliance on heroic managerial intervention. Such validation would clarify when strategic improvisation becomes a genuine organizational capability and when it merely conceals weaknesses in supply-chain design.

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