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CRISIS MANAGEMENT FROM COMPLEXITY SCIENCE PERSPECTIVE: CASE STUDIES ON THE FIRE INCIDENT AT COMPANY A

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Abstract

This study adopts Complexity Science Perspective to examine organizational adaptive processes under major disaster crises. It analyzes how organizational members search for and establish new order amid chaos. Using the case of Company A's warehouse fire incident, this research employs a participatory observation method to document organizational operations and decision-making across three stages: crisis outbreak, aftermath, and resolution. The findings indicate that, in the outbreak phase, the supply chain and operational order collapsed rapidly. The organization sustained basic operations through cross-departmental collaboration, ad hoc decision-making, and external resource inputs. This reflected characteristics of Dissipative Structures, wherein resources and processes were reconfigured to form temporary order under disequilibrium. Self-Organization mechanisms enabled members to restore overall operations through localized actions. From Complex Adaptive Systems perspective, the study further revealed the organization's capacity for dynamic adjustment and learning under conditions of limited information and resources. Moreover, External Energy Input, including supplier support and the intervention of a new management team, played a critical role in generating new order. Overall, under conditions of high uncertainty and cascading crises, organizations must develop capabilities in rapid decision-making, resource reallocation, cross-departmental collaboration, and organizational learning to achieve order out of chaos. This study provides empirical support for crisis management theories grounded in Complexity Science, while deepening the understanding of organizational resilience and dynamic adaptation.

Keywords

Complexity Science, Crisis Management, Participatory Observation

1. Introduction

Sudden crises exert severe shocks on established organizational order, often triggering a chain of unexpected problems that plunge organizations into chaos. Prior studies have mainly focused on the prevention and handling of single crisis events. However, when confronted with multiple crises such as large-scale disasters, the challenges facing organizations extend far beyond conventional responses (Boin, Hart, Stern, & Sundelius, 2017). Such crises are not isolated incidents; rather, they generate cascading effects that sequentially give rise to unprecedented operational difficulties. In conditions of high uncertainty, how to respond swiftly, restore disrupted processes, and achieve the goal of "seeking order out of chaos" poses a stringent test of the wisdom, experience, and decision-making capacity of crisis managers.

A recent large-scale fire destroyed the warehouse of a major hypermarket, severely disrupting its supply chain. As the company's core logistics partner, Company A was directly impacted. This

catastrophic event not only tested its accumulated experience and response capabilities but also revealed a series of challenges emerging in the aftermath of the crisis. Company A had long prided itself on stable and efficient warehousing and logistics operations. However, the devastation of its newly established, state-of-the-art distribution center marked a rapid shift from order to disorder, providing a valuable opportunity for empirical investigation. Despite multiple preventive measures in place, the unpredictability of crises left the organization unprepared at the outset. This study aims to investigate how an organization, through the case of Company A, copes with successive operational problems after a major crisis and how it seeks and establishes new order amid chaos.

The academic literature on crisis management is extensive. Fink (1986) proposed the four-stage theory of crisis development, highlighting the dynamic and continuous nature of crisis management. Mitroff and Pearson (1993) emphasized that the core responsibilities of crisis managers include identifying facts, analyzing and controlling damage, and communicating. These perspectives resonate with the cascading crises and adaptive processes encountered by Company A. This study argues that an organization's adaptive responses during a crisis constitute a dynamic developmental process worth examining. As Anderson (1999) conceptualized, organizations resemble Complex Adaptive Systems, where members must sustain organizational vitality through ongoing interactions, brainstorming, and learning during the convergence of crises. Similarly, Gell-Mann (1994) and Holland (1994) introduced the notion of schema, which refers to the cognitive frameworks that organizational members use to predict, learn, and adapt in uncertain environments. When Company A's original operational routines collapsed during the crisis, how its members reinterpreted the environment, developed new schemas suited to the emergent conditions, and uncovered hidden patterns of order were both academically valuable and practically significant.

The primary objective of this study is to explore how members of Company A, from the perspective of Complexity Science, sought and established new order in the aftermath of a major disaster-induced crisis. It further aims to identify the critical capabilities and influencing factors necessary for organizations during this process. To achieve this, the study adopts a participatory observation method and addresses the following two research questions:

(1) From Complexity Science Perspective, how do organizations reconstruct order from a disordered and chaotic state when confronted with crises?
(2) During crisis management, how do the roles and behaviors of organizational members influence the formation of a new order?

2. Literature Review

2.1 Crisis Management

A crisis is defined as a sudden event that poses a significant threat to an organization's core values and demands immediate response under time pressure (Hermann, 1969). Its main characteristics can be summarized as follows: First, crises are threatening, posing severe challenges to organizational survival, reputation, or assets (Coombs, 2007). Second, crises are urgent and severe, requiring organizations to make rapid decisions and take swift action within a limited timeframe; otherwise, cascading effects may cause devastating consequences (Bundy, Pfarrer, Short, & Coombs, 2017). Third, crises are often unexpected or difficult to predict, carrying a high degree of uncertainty (Weick & Sutcliffe, 2015). Finally, crises exhibit both destructive and constructive potential: while they bring damage, the management process also offers opportunities for resilience, transformation, and image reconstruction (Ulmer, Sellnow, & Seeger, 2018). Mitroff and McWhinney (1990) further classified crises into four types based on internal versus external sources and human versus non-human causes: internal non-human crises (e.g., industrial accidents), internal human-induced crises (e.g., labor disputes), external non-human crises (e.g., natural disasters), and external human-induced crises (e.g., extortion). This framework provides organizations with a more concrete basis for prevention and response.

Crisis management is a systematic process encompassing prevention, response, and recovery. Pearson (1993) outlined a four-stage crisis life cycle: prodromal stage, acute stage, chronic stage, and resolution stage. During the prodromal stage, if organizations can detect warning signals and take action in time, risks can often be mitigated at an early stage. Once the acute stage is reached, however, damage is difficult to reverse, and the priority shifts to containing impact and enabling rapid response. If handled appropriately, organizations enter the chronic stage, where review and correction may turn crises into opportunities. If mismanaged, crises can lead to organizational collapse. The resolution stage marks the

temporary end of a crisis, but it may also generate the seeds of the next crisis, underscoring that crisis management is a continuous, cyclical process. Fink (1986) stressed that crisis management experience must be continuously accumulated and refined to strengthen organizational resilience. Furthermore, crises typically result from the interplay of multiple factors, including organizational design, culture, and stakeholder dynamics, making it essential to integrate these systemic elements in the management process (Shrivastava, Mitroff, Miller, & Miglani, 1988).

Crisis management, with crisis response at its core, emphasizes the communication and adaptive strategies undertaken after the outbreak of a crisis. Mitroff and Pearson (1993) highlighted that key actions in the early stage include fact verification, cause analysis, and immediate communication. These actions form the foundation of crisis response, followed by appropriate measures such as the functioning of crisis management teams, allocation of resources, and monitoring of the evolving situation, with the goal of minimizing harm through timely interventions. In practice, establishing efficient reporting systems, forming dedicated crisis teams, ensuring clear division of responsibilities, managing media relations effectively, employing negotiation skills, and conducting post-crisis reviews and improvements are all core principles of successful crisis resolution (Coombs, 2007).

2.2 Complexity Science Perspective

Complexity Science encompasses a variety of different disciplines, models, and perspectives, including Complexity Theory, Dissipative Structures Theory, Chaos Theory, and Self-Organized Criticality. Lissack and Letiche (2002) pointed out that the research of complex systems is not a science but a collection of concepts, interpretations, and analytical tools. Therefore, it might be more suitable to call it the "Complexity Science Perspective" (Tsai, 2014; Tsai & Lai, 2010).

The concept of Dissipative Structures was developed by the Belgian physicist Ilya Prigogine, the winner of the Nobel Prize in chemistry in 1977. Based on his work in non-equilibrium thermodynamics, he explained why order and development occur in our universe. Dissipative Structures Theory combines the concepts of physics and biochemistry and redefines the second law of thermodynamics in an open system. It describes a system that obtains matter and energy from its surroundings and the nonlinear dynamic processes inside the system would increase internal fluctuation and cause the system to go into an unstable state away from equilibrium. After that, the system will then form a new, complex order at the threshold or bifurcation point (Prigogine & Stengers, 1984).

Dissipative Structures Theory explains the Self-Organization and evolution of an open system. However, it fails to define the final state of a system at the end of the evolution process. Fortunately, Chaos Theory made up for this deficiency. The origin of Chaos Theory was the research on nonlinear dynamic systems. It can be traced back to Henri Poincaré, a French mathematician. While he was studying the deterministic equations of the three-body system, he found a non-periodic pattern. His discovery contradicted the traditional notion that "a deterministic system is completely predictable". With the advancement of computer technology, the American meteorologist Edward Lorenz demonstrated that deterministic systems contain inherent randomness, and that small variations can produce large, unforeseeable long-term effects. This phenomenon is known as "sensitivity to initial conditions," and Lorenz (1963) dubbed it the Butterfly Effect.

Both the Dissipative Structures Theory and Chaos Theory describe the evolution of a nonlinear dynamic system. In other words, with the increase of control variables or the moving away from equilibrium, the system undergoes an irreversible qualitative change of increasing complexity via bifurcation or Self-Organization. However, the focus of the Dissipative Structures Theory and Chaos Theory are not the same. The former attempts to explain a system's convergent evolution from chaos to order and emphasizes the emergence of order or Dissipative Structures. The latter explains the divergent evolution of a system and focuses on the co-existence of randomness and certainties in chaos. Complexity Theory, on the other hand, explores the evolution of a biological system. It combines with Chaos Theory and Dissipative Structures Theory in order to explain the Self-Organization and adaptiveness of a complex system.

Complexity Theory was developed by the Santa Fe Institute, which was established in 1984. The focus of Complexity Theory was on nonlinear systems (or the Complex Adaptive System) at the edge of chaos (Waldrop, 1992). Through Self-Organization, these systems continuously show adaptive or life-like behaviors. The Complex Adaptive System is a system composed of many interacting agents. Every agent in the system only connects with some of the other agents. It behaves according to the behavior of connecting members and innate rules or schemas (Anderson, 1999). It would also use expectation,

feedback and re-organization mechanisms to reach the edge of chaos and show the emergence of life-like behavior of the entire system.

3. Research Methodology

This study adopts a participatory observation method, focusing on the warehouse fire crisis faced by Company A as the primary research subject. Company A, which has been in operation for over 20 years, specializes in warehousing and logistics management for major retail chains, ensuring the daily supply of goods to each store. However, the crisis event destroyed its warehousing facilities and resources, plunging the company into disorder and reconstruction. The researcher fully participated in the crisis management process, thereby gaining an in-depth understanding of the situation. Using descriptive observation (Spradley, 1980; Pan, 2003), the researcher systematically and thoroughly documented phenomena, behaviors, and events.

In terms of research design, this study categorizes crisis management into three stages: crisis outbreak, crisis aftermath, and crisis resolution. At each stage, the adaptive behaviors and decision-making processes of organizational members were observed, with the aim of collecting and constructing detailed case records. Data sources included the crisis event itself and its derivative problems, internal coordination meetings, periodic improvement meetings with clients, and managerial decision-making processes. Furthermore, this study incorporates Complexity Science Perspective to compare the states of disorder, emergent order, and restored order observed during the crisis. Through this analytical lens, the study seeks to clarify the dynamic characteristics of organizational crisis management. Ultimately, it aims to provide an empirical case on organizational adaptability, offering new insights for both crisis management research and practice.

4. Results and Discussion

4.1 Crisis Outbreak Phase

4.1.1 Operational Disruptions Triggered by the Fire Crisis

One of Company A's important clients is a large-scale hypermarket, and the dry goods displayed daily in stores across various regions must pass through this warehouse for inspection, inventory management, sorting, outbound processing, and transportation. When an unexpected fire destroyed all inventory and the goods scheduled for dispatch that day, the existing supply chain order collapsed instantly. This sudden nonlinear disruption exemplifies the essence of Chaos Theory, which emphasizes how minor events can trigger massive chain reactions.

To prevent supply shortages in stores that could harm the client's public image, Company A immediately initiated cross-departmental communication and coordination efforts at the onset of the crisis, striving to maintain normal store operations. In addition to instructing suppliers to prepare inventory, the company also considered how to maintain the functionality of the warehouse logistics center, either by directing suppliers to deliver large shipments to designated warehouses or by arranging direct store deliveries, thereby mitigating the negative impact on the client's competitiveness. This series of interconnected adjustments illustrates the characteristics of a Complex Adaptive System, where multiple actors continuously recalibrate their actions under limited information to cope with a rapidly changing environment.

During decision-making, Company A and its client agreed that, besides the client directly contacting certain suppliers for immediate store deliveries, both parties would jointly determine which warehouses could be activated on short notice. Consequently, Warehouses X and Y were confirmed to undertake emergency operations. This process, in which resources were reallocated to create new operational order while the system had moved away from equilibrium, aligns with the central tenets of Dissipative Structures Theory. The turbulence introduced by the crisis provided an opportunity for the organization to establish new order out of chaos.

In the early crisis stage, Company A convened an emergency management meeting and set up a temporary office in the drivers' lounge, gathering unit managers to jointly monitor the situation. Historical data analysis was mobilized to provide daily averages of inbound and outbound pallets, estimates of temporary warehouse capacities, and even developed staggered delivery proposals aimed at reducing the burden on limited labor and inter-regional transfers. This spontaneous cross-departmental collaboration

was not imposed through central command but emerged organically under crisis pressure, exemplifying the dynamic features of Self-Organization Theory.

When assisting the client in meetings with other suppliers, Company A not only coordinated short-term warehouse support but also actively discussed equipment, manpower, and operational constraints, joining the client in face-to-face negotiations with carriers. By providing data and sharing information, all parties could exchange perspectives and build consensus, leading to swift collaborative solutions. This highlights the role of External Energy Input, as external suppliers and carriers introduced new energy and resources into the crisis-stricken organization, while simultaneously reflecting the Complex Adaptive System mechanism of evolution, where actors continuously adjusted strategies to respond to environmental challenges.

4.1.2 Damage and Restoration of Equipment and Documents

The fire destroyed all machinery and equipment, raising issues of leased equipment verification and subsequent compensation, and forcing Company A to immediately engage in external coordination. The company promptly contacted equipment suppliers to report the situation and requested an inventory of available stock for emergency leasing to meet the needs of temporary warehouses. This reliance on external resources reflects the concept of External Energy Input and aligns with Dissipative Structures Theory, whereby new order is reconstructed through resource reallocation and energy flows following the collapse of existing structures. Nevertheless, uncertainty regarding post-disaster liability caused suppliers to hesitate in renting out equipment, highlighting the Chaos Theory principle of uncertainty and unpredictability in cooperative relations during crises.

Furthermore, the company's mainframe and employee computers were destroyed, erasing nearly 20 years of records. With no backups recoverable, all historical data and control reports were lost. The only retrievable information came from files stored on executives' laptops or in emails, while staff were tasked with gradually reconstructing the necessary documents. This process demonstrated the characteristics of a Complex Adaptive System, as the organization autonomously adapted and reconfigured information and workflows under extreme uncertainty and resource scarcity.

4.1.3 Reorganization and Redeployment of Personnel

Daily operations had to continue despite the destruction of the office and loss of furniture, equipment, and supplies. Leveraging established collaborative ties between warehouses and back-office units, Company A immediately dispatched support personnel to Warehouses X and Y, while reassigning administrative assistants to a temporary office in Warehouse U, where they shared workspaces with staff serving other clients. This adaptability reflected Complex Adaptive System characteristics, where organizational units autonomously adjusted under resource constraints and uncertainty.

Emergency response teams were formed based on members' professional expertise and warehouse needs. Managers were authorized to make autonomous decisions, guiding teams to Warehouses X and Y to assess operational models, identified collaboration methods through communication, and supported colleagues in overcoming operational problems. This bottom-up emergence of operational order illustrates Self-Organization, where localized interactions and real-time decisions generated new structures. However, deploying personnel to different warehouses also introduced challenges due to geographical and operational differences. Staffing decisions required prior confirmation of needs and voluntary agreement from employees, and some resisted last-minute redeployment. These small differences in individual willingness to relocate had significant impacts on operational efficiency, underscoring the Chaos Theory principle of nonlinear effects.

4.2 Crisis Aftermath Phase

4.2.1 Organizational Restructuring Under Client Pressure

Shortly after the fire, the client informed Company A that Warehouse Z had been secured as a temporary storage facility and requested Company A's full support to commence operations once permits were obtained. A site visit by Company A revealed that Warehouse Z required further construction and preparation, making immediate occupancy unfeasible. The client suspected Company A of deliberately obstructing operations, noting that in previous temporary warehouse arrangements, simple space confirmation had sufficed. Now, with the client finding the warehouse on his own, Company A was seen

as raising excessive issues. This exemplified the Chaos Theory notion that minor informational discrepancies in uncertain environments can escalate into serious conflict.

Subsequent evaluations with carriers and suppliers confirmed that Warehouse Z was not ready for occupancy at the client's expected timeline. It would be safer to wait until all planning and setup were completed before moving in. However, the client still insisted that the warehouse problems were caused by Company A, and the relationship between the two parties continued to deteriorate. Daily review meetings became exhausting, entrenched in deadlock, with little consensus achieved beyond immediate operational issues. This illustrated Complex Adaptive System properties, where continuous negotiation and interaction occur without achieving system stability in a highly uncertain environment.

At this juncture, Company A announced a major reorganization, dismissing the Chief Operating Officer and several senior managers. This drastic decision was driven by accountability pressures from the fire and communication breakdowns with the client. Infusing new leadership energy represents an External Energy Input, aimed at restoring order. The client immediately shifted its stance, publicly welcoming the new Chief Operating Officer and reaffirming cooperation, granting Company A management of Warehouse Z. This organizational restructuring created an opportunity for stabilization, aligning with Dissipative Structures Theory, where disruption paves the way for new systemic order.

4.2.2 Commencement of New Temporary Warehouse Operations

When Warehouse Z began receiving goods, manpower shortages and incomplete office facilities hampered operations. Company A urgently allocated necessary materials from other warehouses and temporarily placed tables and chairs in the warehouse to start operations. Employees completed the work in the days preceding the warehouse's formal operations under extremely difficult circumstances. They diligently assisted customers in solving various problems, setting up basic system data, testing the operating system, and even using personal mobile phone networks for connection operations. They worked more than 12 hours a day and did their best to complete various operations that could be tested before going online. This demonstrated the principle of Self-Organization, as employees collaboratively created functional order despite resource limitations.

After Warehouse Z officially started operations, receiving and shipping shared the same dock. It was necessary to coordinate with carriers to complete the pickup before 6:00, but most stores did not start receiving until 8:00, which made it difficult to arrange vehicles. The number of docks was limited and could not accommodate multiple vehicles for loading and unloading at the same time. The only way was to speed up the processes to improve the turnover efficiency of the dock. Continuous adjustments were required, with staff reorganizing warehouse layouts to manage goods flow, albeit at the cost of increased workload. These adaptive practices exemplified a Complex Adaptive System, where employees dynamically adjusted workflows to maintain efficiency and stability amid evolving external pressures.

4.2.3 Client's Partnership with Company B

Although Company C had heard that the client would sign a contract for a second temporary warehouse, it had never received any official confirmation. Company C had assumed it stood by the client and was willing to take on all the responsibilities during this crisis. However, the client decided to partner with Company B to manage the second temporary warehouse. This decision left Company C feeling surprised and disappointed. Furthermore, unfamiliar with the client's processes and system operations, Company B began poaching Company A's managers and staff in the course of deliveries. As a result, the new warehouse was staffed largely with Company A's former employees, causing workforce losses and slower sorting operations. This seemingly minor client decision significantly shifted the competitive landscape, illustrating the Chaos Theory principles of nonlinearity and unpredictability.

To mitigate manpower shortages, Company A redeployed staff from other business units to Warehouse Z, serving as an External Energy Input that replenished capacity and ensured the continuity of warehousing operations. Within three days, sorting efficiency was restored. This process exemplified Complex Adaptive System resilience, as the organization rapidly recovered operational order, learned from disruptions, and enhanced its ability to manage unforeseen challenges.

4.3 Crisis Resolution Phase

4.3.1 Organizational Restructuring Under New Objectives

As peak season approached and logistics intensified, Company A, based on the crisis response and external market information, reassessed its organizational structure during this period instead. In the organization, whether it is a high-level or mid-level meeting, the core topic was future change and development, and further sought suitable candidates for various positions. Structural reorganization under pressure reflects Dissipative Structures Theory, where systems far from equilibrium generate new order through change.

Company A consulted with each member individually and established new objectives. While disagreements arose during this process, such as some members preferring stability over innovation, Company A addressed these differences by adopting a dual-track strategy. Conservative employees remained in the wholesale business, continuing to operate within the existing order, while more innovative staff were transferred to the new logistics warehouse to learn and adapt to the new operating model. This arrangement embodied Complex Adaptive System characteristics, where different groups evolved along diverse adaptive pathways through interaction.

4.3.2 Strategic Adjustments and Resource Reallocation

The crisis prompted Company A to reconsider its over dependence on a single client. In the past, Company A had consistently helped the client resolve problems, embracing the philosophy of collaborative effort to resolve crises. However, this has not been the case. After years of collaboration, the client still has concerns about Company A and was using this crisis as a tool to adjust the relationship. This reflects Chaos Theory, highlighting unpredictability and nonlinearity in crisis-driven dynamics.

In this situation, Company A also viewed the crisis as an opportunity for change. It began to reorganize existing resources, adjust human resources and work arrangements, and rethink future development strategies. During this process, Company A demonstrated the characteristics of Dissipative Structures Theory, breaking away from its previous overreliance on a single client and beginning to strengthen its service to other hypermarket clients, gradually forming a new operating model and strategic direction. Leveraging its years of warehouse management experience, the company established two additional transfer stations within a few months, reducing shipping costs and improving the efficiency of its warehousing and transportation services.

Simultaneously, the company expanded its client base through referrals and its established reputation, and leased a new 20,000 square meter warehouse to undertake premium foreign brand business. These developments illustrate the importance of External Energy Input, which enables Company A to gain additional momentum during the transformation process. By continuously adapting strategies and operations to market conditions, Company A embodied the features of a Complex Adaptive System, evolving and growing amid uncertainty and challenge.

5. Discussion and Conclusions

5.1 Crisis Management through the Lens of Chaos Theory

The crises encountered by Company A exhibited high uncertainty and nonlinear responses, reflecting the Chaos Theory principle that a single event may trigger massive chain reactions. In the outbreak phase, the supply chain collapsed instantly, forcing rapid cross-departmental communication and resource coordination. Simultaneously, equipment damage raised supplier concerns, exposing instability in the cooperative networks. Variations in personnel deployment further amplified nonlinear effects, making the adaptive process highly volatile and unpredictable. In the aftermath phase, the client's declining trust led to demands for a temporary warehouse and cooperation with Company B, disrupting the original operating model and escalating tensions. This demonstrated the cumulative and diffuse nature of crisis events under chaotic conditions.

5.2 Crisis Management through the Lens of Dissipative Structures

The crisis management process reflected characteristics of Dissipative Structures, illustrating how Company A rebuilt new order under conditions far from equilibrium through resource flows and External Energy Input. In the outbreak phase, the collapse of the supply chain and operating order forced the organization to seek alternatives, reallocating warehouses and manpower to establish emergency mechanisms. This temporary order emerging from structural breakdown aligns with the central tenet of Dissipative Structures: new order emerging from chaos. During the aftermath phase, facing strained client

relations, Company A undertook disruptive adjustments by introducing a new management team and initiating organizational restructuring, exemplifying how the destruction of an old order creates opportunities for new order to emerge. In the resolution phase, Company A not only restored functions but also transformed crisis into opportunity, gradually establishing a diversified client base and a new operational model.

5.*3 Crisis Management through the Lens of External Energy Input*

Throughout the crisis, External Energy Input played a critical role in sustaining Company A's operations and fostering new order amid turbulence. In the outbreak phase, with the collapse of the supply chain, the involvement of external suppliers and carriers provided immediate support, highlighting the necessity of external resources to maintain operations. When equipment and documents were destroyed, external resource supplementation allowed the organization to preserve basic operations under uncertainty. In the aftermath phase, External Energy Input was evident in organizational restructuring, as the introduction of a new management team helped alleviate tensions with the client. Cross-unit manpower support also represented a form of external input, enabling the continuation of warehouse operations despite workforce reductions. In the resolution phase, strategic adjustments and resource redeployment offered the necessary momentum for organizational transformation, restoring existing functions while facilitating diversification to respond to market changes.

5.4 Crisis Management through the Lens of Self-Organization

The crisis process demonstrated the relevance of Self-Organization Theory in explaining Company A's organizational resilience and adaptive capacity under conditions of uncertainty. In the outbreak phase, when supply chain and operational order collapsed, the organization did not rely solely on central directives. Instead, cross-departmental managers engaged in spontaneous collaboration and ad hoc decision-making, quickly establishing emergency structures and forming new operational orders. These actions, driven by member interactions grounded in expertise and situational needs, reflect the Self-Organization principle that local actions generate overall order, laying the foundation for subsequent recovery. In the aftermath phase, despite resource shortages and incomplete institutional frameworks, employees voluntarily committed themselves to long working hours, coordinating with one another to launch warehouses, test systems, and rebuild data infrastructure. These initiatives, arising primarily from member interactions and consensus-building, revealed the bottom-up dynamics of emergent order generation.

5.5 Crisis Management through the Lens of Complex Adaptive Systems

Complex Adaptive Systems theory explains how Company A dynamically adjusted under uncertainty and resource constraints. In the outbreak phase, the fire disrupted the supply chain and operational order, prompting internal units and external partners to adapt spontaneously under limited information. Through information sharing and consensus-building, temporary operations were sustained. Equipment and data loss required members to reconstruct information flows and operational procedures, illustrating system-level self-adjustment and learning. Personnel reallocation and cross-warehouse collaboration further emphasized the Complex Adaptive System capacity to rapidly restore operations amidst disorder. In the aftermath phase, the launch of a new temporary warehouse and process reorganization showed how members maintained stability and efficiency through real-time adjustments and resource reallocation. In the resolution phase, dual-track strategies and personnel deployment allowed different groups to evolve according to their orientations, promoting the gradual emergence of new stable orders and strategic directions.

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