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Reserve–Interruption Management: An Epistemological Framework for Operational Diagnosis and Continuity Preservation

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Abstract

Livestock systems increasingly operate under conditions of recurring disasters, climate variability, market instability, and logistical disruption, where maintaining operational continuity depends not only on resource availability but also on the timely diagnosis of operational conditions. Existing continuity-oriented approaches have advanced preparedness, recovery planning, and resilience; however, they generally emphasize hazards, resources, or post-disruption recovery rather than the diagnostic reasoning through which operational interventions are formulated under temporal constraint.

This study proposes Reserve–Interruption Management (RIM) as a field-embedded diagnostic methodology for preserving operational continuity in livestock systems. Using a

qualitative conceptual methodology integrating strategic discourse analysis, epistemological analysis, and systems interpretation, the study develops a continuity-oriented diagnostic framework in which diagnosis begins with the first diagnostic question, which determines the object of preservation before empirical evidence is interpreted. The methodology subsequently identifies the operational object, diagnoses its conditions of existence, determines its operational position, and guides configuration adjustment and operational synchronization within the remaining temporal window.

The study introduces several interrelated concepts, including conditions of existence, operational position, configuration adjustment, operational synchronization, and the first diagnostic question as the epistemological foundation of diagnosis. Within this framework, empirical evidence does not constitute diagnosis itself; rather, evidence acquires diagnostic meaning only after the operational object and its operational context have been identified. Diagnosis therefore functions not merely as an assessment of existing conditions, but as a mechanism for preserving meaningful intervention capability before critical temporal windows close.

By repositioning diagnosis as the primary mechanism of continuity management, RIM shifts analytical attention from resource preservation toward diagnostic intervention. Operational continuity is consequently understood as the capability of operational systems to sustain intended developmental trajectories across successive production cycles through timely diagnosis, configuration adjustment, and operational synchronization. The proposed methodology integrates

epistemological reasoning, operational interpretation, and field-based decision-making into a coherent framework for preserving operational continuity.

Keywords: Reserve–Interruption Management; Operational Diagnosis; Operational Continuity; Livestock Systems; Configuration Adjustment; Operational Synchronization.

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1. Introduction

Contemporary operational systems increasingly function under conditions characterized by uncertainty, recurrent disruption, and severe temporal constraint. Climate change, supply chain disruption, animal disease outbreaks, geopolitical instability, and infrastructure failures have collectively increased the frequency with which operational decisions must be made before complete information becomes available (IPCC, 2023; UNDRR, 2023; FAO, 2025). As a consequence, the effectiveness of continuity management depends not only on the availability of resources or recovery plans, but also on the capability to make appropriate operational interventions while meaningful opportunities for action still remain (ISO, 2019; Christopher & Peck, 2004; Sheffi & Rice, 2005).

Over the past several decades, substantial advances have been achieved in business continuity management, disaster risk reduction, resilience, and operational preparedness Holling,

1973; ISO, 2019; UNDRR, 2023). These approaches have significantly improved planning procedures, recovery strategies, resource allocation, organizational coordination, and adaptive capacity (Walker et al., 2004; Sheffi & Rice, 2005). Nevertheless, operational failures continue to occur even in systems possessing extensive plans, institutional support, and empirical information. In many cases, disruptions become visible only after opportunities for effective intervention have already diminished. This observation suggests that the principal limitation may not lie solely in the availability of resources or information, but in the process through which operational situations are diagnosed before intervention is selected (Klein, 1998; Weick & Sutcliffe, 2015).

This study argues that the limitation is fundamentally epistemological rather than empirical. Existing continuity research has generated increasingly sophisticated empirical evidence concerning disruption, recovery, preparedness, and resilience (ISO, 2019; UNDRR, 2023; Sheffi & Rice, 2005). However, comparatively little attention has been devoted to the epistemological question that precedes empirical investigation itself: What should diagnosis seek to preserve under conditions of temporal constraint? Before evidence is collected, interpreted, or operational decisions are formulated, an initial diagnostic question has already established the object of preservation. Whether diagnosis is directed toward recovery, growth, or operational continuity subsequently determines the selection of evidence, the interpretation of operational conditions, and the interventions regarded as appropriate.

Accordingly, the first diagnostic question functions as more than the starting point of investigation. It establishes the epistemological foundation from which diagnostic methodology

subsequently develops. When the same foundational question is repeatedly reproduced, empirical evidence, analytical methods, operational indicators, and decision-support tools are likely to evolve within the same epistemological trajectory. Methodological innovation therefore becomes difficult not because empirical evidence is insufficient, but because the underlying diagnostic question remains unchanged. This epistemological constraint helps explain why advances in empirical knowledge do not necessarily translate into corresponding advances in operational diagnostic capability (Kuhn, 1962/2012; Bhaskar, 1975).

From this perspective, the present study proposes Reserve–Interruption Management (RIM) as a continuity-centered diagnostic methodology. Rather than beginning with hazards, disruption events, or resource inventories (ISO, 2019; UNDRR, 2023), RIM begins by identifying the operational object, the conditions necessary for its continued existence, and the foundational diagnostic question through which operational continuity is defined. The resulting diagnosis then informs assessments of operational position, guides configuration adjustments, and prioritizes interventions before critical temporal windows close. In this study, an epistemological limitation refers to a constraint arising from the foundational diagnostic question that determines what is recognized as the primary object of preservation. Unlike methodological limitations, which concern techniques for collecting or analyzing evidence, epistemological limitations shape the conceptual boundaries within which evidence is selected, interpreted, and operationalized.

The contribution of this study therefore extends beyond proposing another framework for continuity management. It introduces an epistemological foundation for operational diagnosis

under temporal constraint and develops a diagnostic methodology capable of supporting operational intervention before opportunities for meaningful action are lost. In doing so, the study seeks to strengthen the methodological ecosystem of continuity research by addressing a diagnostic gap that precedes continuity planning, reserve management, resilience building, and operational recovery.

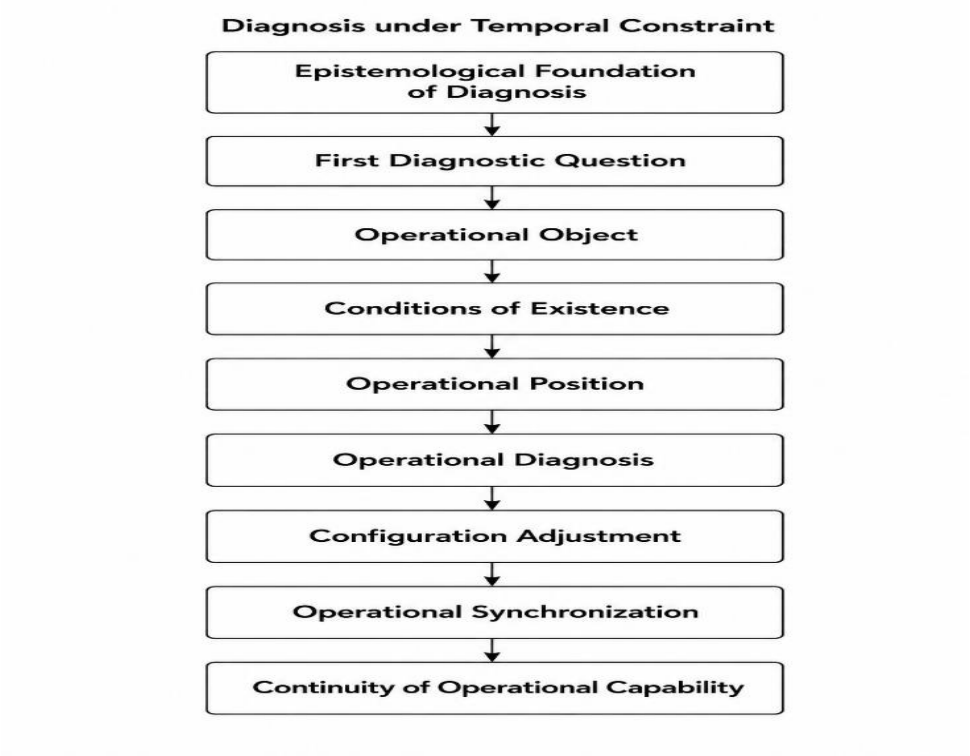

Figure 1. The Conceptual Architecture of Reserve–Interruption Management (RIM)

Note. Developed by the authors.

As illustrated in Figure 1, the proposed methodology begins with the epistemological foundation of diagnosis and proceeds through the first diagnostic question before identifying the operational object and its conditions of existence.

The present study is guided by the following research questions:

RQ1. *What should operational diagnosis seek to preserve under conditions of temporal constraint?*

RQ2. *How should operational systems be diagnosed before configuration adjustments and operational interventions are selected?*

RQ3. *How do conditions of existence and operational position influence diagnostic interpretation under changing operational environments?*

RQ4. *How can continuity-oriented diagnosis be translated into an operational methodology capable of supporting timely intervention before critical temporal windows close?*

2. Existing Continuity Approaches and the Diagnostic Gap

Existing approaches to operational continuity have evolved through several complementary traditions, including business continuity management, resilience theory, and resource-based preparedness. While these approaches have substantially advanced understanding of disruption management and continuity planning, they differ in their analytical starting points. This section reviews these perspectives to identify a methodological gap that motivates the development of Reserve–Interruption Management (RIM) (Holling, 1973; Christopher & Peck, 2004; Sheffi & Rice, 2005; ISO, 2019).

2.1 Business Continuity and Disaster Management

Business continuity and disaster management have become central components of contemporary organizational resilience under conditions of increasing uncertainty, climate-related disasters, and

systemic disruptions. International standards and continuity frameworks emphasize preparedness, business impact analysis, emergency response, recovery planning, and organizational coordination to minimize operational interruption and accelerate the restoration of critical functions (ISO 22301, 2019; UNDRR, 2023). Within this perspective, continuity is primarily understood as the capacity of organizations to maintain or rapidly recover essential operations following disruptive events.

The business continuity literature has substantially improved practical understanding of disruption management by introducing systematic approaches to contingency planning, critical process identification, resource allocation, communication protocols, and organizational recovery. These contributions have strengthened institutional preparedness and provided valuable guidance for maintaining organizational functions under emergency conditions. Similarly, disaster management research has emphasized risk reduction, preparedness, response, recovery, and adaptation across multiple sectors, contributing significantly to disaster governance and operational coordination (Christopher & Peck, 2004; Sheffi & Rice, 2005; Boin & van Eeten, 2013; ISO, 2019).

Despite these important contributions, existing continuity-oriented approaches generally initiate analysis from disruption events, organizational functions, recovery processes, or business resources. Diagnosis is therefore frequently organized around identifying hazards, estimating impacts, prioritizing critical activities, and restoring interrupted operations. Although these perspectives provide effective guidance for continuity planning and emergency response, they

offer comparatively limited explanation of how the operational object itself changes throughout disruption and how its developmental trajectory can be preserved before interruption produces irreversible operational consequences (ISO, 2019; UNDRR, 2023; Christopher & Peck, 2004; Sheffi & Rice, 2005).

From the perspective adopted in this study, the principal analytical question extends beyond how organizations recover after disruption. It also asks whether the operational object remains capable of sustaining progress toward its intended mission under continuously evolving conditions of existence. Consequently, operational continuity requires not only organizational preparedness but also systematic diagnosis of the operational object before appropriate configuration adjustments can be designed and implemented.

2.2 Resilience and Adaptive Capacity

Resilience has become one of the most influential concepts for understanding how complex systems respond to disturbance, uncertainty, and environmental change. Originating from ecological systems theory (Holling, 1973) and subsequently extended to social–ecological systems (Walker et al., 2004; Folke, 2006), resilience emphasizes the capacity of systems to absorb disturbances, adapt to changing conditions, reorganize, and continue functioning without losing their essential identity. These ideas have been widely applied to supply chains, food systems, disaster governance, and organizational management.

Within operations and supply chain research, resilience has further evolved to encompass preparedness, flexibility, redundancy, adaptability, collaboration, and recovery capability

(Christopher & Peck, 2004; Sheffi & Rice, 2005; Ponomarov & Holcomb, 2009). This literature has substantially advanced understanding of how organizations withstand disruption and restore operational performance under conditions of uncertainty. Consequently, resilience has become an essential framework for strengthening long-term adaptive capacity across interconnected operational systems.

Despite these significant contributions, resilience-oriented approaches generally evaluate systems in terms of their capacity to absorb, adapt, recover, or transform following disruption. The primary analytical emphasis therefore remains on system-level properties and adaptive capabilities. Comparatively less attention has been devoted to the diagnostic process through which the position of specific operational objects is identified before selecting appropriate interventions. As a result, systems exhibiting similar levels of resilience may nevertheless require fundamentally different responses because the objects within those systems occupy different positions under different conditions of existence (Holling, 1973; Walker et al., 2004; Folke, 2006; Christopher & Peck, 2004; Sheffi & Rice, 2005).

From the perspective developed in this study, resilience represents an important outcome of effective operational management rather than the starting point of diagnosis. Before resilience can be strengthened, it is first necessary to identify the operational object, determine its current conditions of existence, and diagnose its operational position relative to the intended mission. Only after these diagnostic steps have been completed can appropriate configuration adjustments be

designed to strengthen adaptive capacity while preserving continuity toward the intended operational mission.

2.3 Resource-Based and Reserve-Oriented Approaches

Resource availability and reserve accumulation have long been recognized as fundamental components of disaster preparedness, food security, supply chain continuity, and organizational resilience. Across agriculture, livestock production, logistics, and emergency management, reserves are commonly conceptualized as strategic assets that enable operational systems to withstand temporary disruption, compensate for shortages, and reduce the immediate impacts of external shocks. Consequently, reserve planning has become a central element of preparedness strategies in both public policy and operational management (FAO, 2025; Sheffi & Rice, 2005; ISO, 2019).

Within livestock systems, reserve-oriented approaches have traditionally emphasized feed storage, fodder banks, emergency inventories, alternative supply arrangements, and logistical preparedness as mechanisms for reducing production interruptions during floods, droughts, disease outbreaks, and market disruptions. These approaches have substantially strengthened preparedness by increasing resource availability and improving operational flexibility under emergency conditions. Similar resource-based perspectives are widely applied in supply chain management through safety stocks, buffer inventories, redundant capacity, and contingency resources designed to reduce operational vulnerability (FAO, 2025; Christopher & Peck, 2004; Sheffi & Rice, 2005).

Despite these important contributions, reserve-oriented approaches generally evaluate preparedness in terms of the quantity, availability, or accessibility of resources. Analytical attention is therefore directed primarily toward determining whether sufficient reserves exist before disruption occurs. Comparatively less attention has been devoted to the diagnostic process through which reserve requirements are determined according to the operational position of the object under its current operating conditions. Consequently, operational objects possessing similar reserve levels may nevertheless require fundamentally different reserve configurations because they occupy different operational positions and face different operational constraints.

From the perspective developed in this study, reserves do not constitute the primary object of analysis. Rather, they represent one component of a broader operational configuration whose strategic value depends upon its contribution to mission continuity. Reserve requirements cannot therefore be established independently of diagnosis. They emerge through systematic assessment of the operational object, its conditions of existence, and its operational position relative to the intended developmental trajectory. Accordingly, reserve becomes a diagnostic outcome rather than the analytical starting point of continuity management.

2.4 The Diagnostic Gap

The preceding review demonstrates that business continuity, resilience, and resource-based approaches have substantially advanced understanding of disruption management, adaptive capacity, preparedness, and operational continuity. Collectively, these perspectives provide

valuable guidance for reducing operational interruption and strengthening the capacity of organizations and production systems to withstand uncertainty. Their contributions have significantly improved planning, coordination, resource allocation, and recovery across diverse operational contexts.

Despite these advances, the analytical starting point adopted by existing approaches differs in important ways. Business continuity approaches typically begin with disruption events, critical business functions, and recovery planning. Resilience research focuses primarily on adaptive capacity and system persistence under disturbance. Resource-based approaches emphasize reserve availability, redundancy, and preparedness. While each perspective addresses important dimensions of operational continuity, comparatively limited attention has been devoted to the diagnostic sequence through which operational interventions are determined.

Consequently, diagnosis frequently begins with hazards, resources, performance indicators, or organizational functions rather than with the operational object whose continuity must ultimately be preserved. Analytical uncertainty is therefore often interpreted, within existing analytical frameworks, as a consequence of incomplete information, limited data availability, or imperfect knowledge. Although these remain important challenges, they do not fully explain why operational systems possessing similar resources, preparedness, or resilience capacities frequently produce substantially different operational outcomes under comparable disruption conditions.

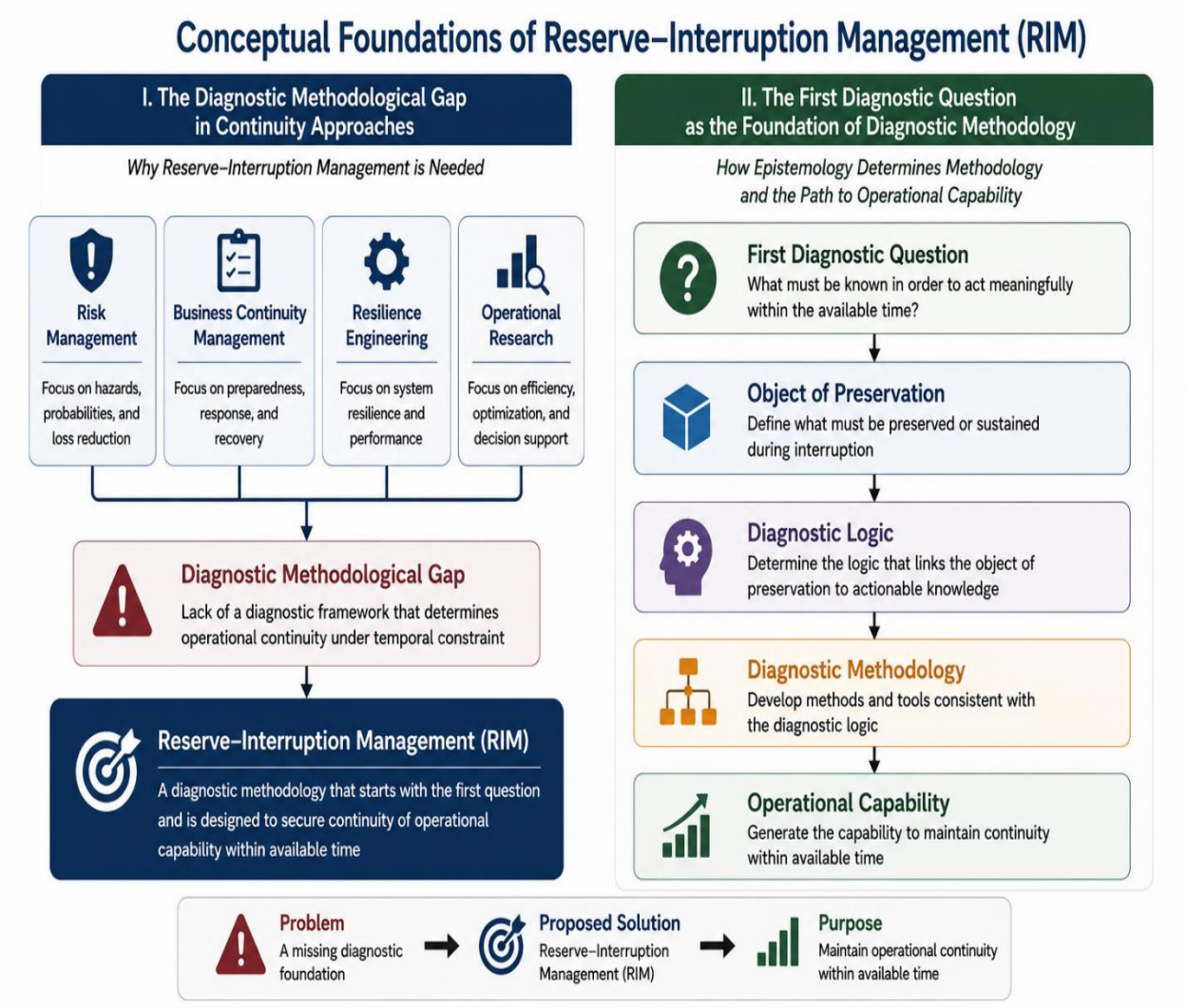

Figure 2. Conceptual Foundations of Reserve–Interruption Management (RIM)

Note. Developed by the authors.

This study argues that an additional source of diagnostic uncertainty exists at the epistemological level that precedes empirical assessment. Even when information is sufficient, diagnosis may remain inadequate if the operational object, the conditions of existence under which it operates, and its operational position have not first been systematically identified. Under these circumstances, measurements, indicators, and resource inventories cannot be interpreted

consistently because identical empirical observations may correspond to fundamentally different operational realities depending on the operational position of the object being diagnosed.

Accordingly, this study proposes Reserve–Interruption Management (RIM) as a field-embedded diagnostic methodology that repositions diagnosis as the starting point of continuity management. Rather than beginning with disruption events or resource inventories, RIM begins by identifying the operational object, diagnosing its conditions of existence, determining its operational position relative to the intended mission, and designing appropriate configuration adjustments to preserve mission continuity under changing operational conditions.

Collectively, the reviewed literature demonstrates substantial progress in continuity planning, resilience, and reserve management. However, it also reveals that the diagnostic sequence through which operational interventions are determined remains comparatively underdeveloped. The following section therefore develops the methodological foundations of Reserve–Interruption Management by proposing a diagnostic sequence centered on the operational object, its conditions of existence, operational position, and configuration adjustment.

Table 1

Comparative Analytical Starting Points and Diagnostic Gaps Across Continuity Approaches

Approach	**Analytical Starting Point**	**Primary Focus**	**Remaining Gap**
Business Continuity	Disruption	Recovery	Operational Object
Resilience	Adaptive Capacity	System Persistence	Operational Position
Resource-Based	Resources	Preparedness	Diagnostic Sequence
Reserve - Interruption Management (RIM)	Operational Object	Diagnosis	Configuration Adjustment

Note. Developed by the authors.

This study therefore asks how operational continuity can be systematically diagnosed before appropriate interventions are selected under changing conditions of existence. Rather than replacing existing continuity approaches, it seeks to strengthen the methodological ecosystem of continuity research by addressing a diagnostic gap that precedes continuity planning, resilience building, and reserve management. In doing so, the proposed methodology complements existing theories by introducing a systematic diagnostic stage through which operational objects, their conditions of existence, operational positions, and appropriate configuration adjustments can be identified before critical opportunities for intervention are lost.

3. Methodology

3.1 Continuity-Centered Research Design

This study develops a continuity-centered diagnostic methodology for understanding how operational continuity can be preserved under changing conditions of existence. Rather than beginning with variables, hazards, resource inventories, or disruption events, the proposed research design begins by identifying the operational object whose continuity is to be preserved. Diagnostic knowledge is subsequently generated through a systematic diagnostic process that identifies the conditions of existence under which the operational object currently functions, determines its operational position relative to the intended mission, and evaluates the configuration adjustments required to sustain mission continuity within the remaining temporal capacity.

Accordingly, the objective of the research design is not merely to describe operational conditions or explain relationships among variables. Instead, it seeks to identify operational bottlenecks, structural gaps, synchronization failures, and emerging vulnerabilities before they develop into mission interruption. Diagnosis therefore constitutes the central analytical process through which empirical evidence is interpreted and operational interventions are formulated. In this study, *field-embedded* refers to diagnosis conducted within the operational environment where objects, resources, expertise, infrastructure, institutional arrangements, and decision processes interact under real temporal constraints, and where operational decisions are made directly by system actors. Rather than treating evidence as isolated observations, the methodology

interprets evidence according to its contribution to operational continuity and the capability of the system to sustain successive production cycles. Consequently, empirical evidence supports diagnostic judgment rather than constituting diagnosis itself.

This research design therefore positions Reserve–Interruption Management (RIM) as a diagnostic methodology that complements existing continuity approaches by strengthening the methodological ecosystem at the stage where operational diagnosis precedes intervention. The defining characteristic of the proposed methodology lies not in the type of evidence employed, but in its diagnostic capability to identify where operational synchronization is breaking down while sufficient temporal capacity remains for effective intervention. The following sections develop the analytical procedure through which diagnostic evidence is systematically collected, interpreted, and translated into configuration adjustments for preserving mission continuity.

3.2 Operational Diagnostic Procedure

The proposed diagnostic procedure follows a continuity-centered sequence designed to support operational decision-making under changing conditions of existence. Unlike conventional analytical procedures that begin with variables, hazards, performance indicators, or resource inventories, the diagnostic process begins by identifying the operational object whose continuity is to be preserved. This establishes the primary diagnostic reference point from which all subsequent evidence is interpreted.

Following the identification of the operational object, diagnosis proceeds by determining the conditions of existence under which the object currently operates. These conditions include the

accessibility of resources, infrastructure availability, institutional arrangements, environmental constraints, operational preparedness, coordination mechanisms, and the remaining temporal capacity available before critical operational windows close. Rather than serving as contextual information alone, these conditions constitute the operational environment within which continuity must be preserved.

The third stage establishes the operational position of the object relative to its intended mission. Operational position is defined as the current capability of the operational object to continue progressing toward its intended developmental trajectory under existing conditions of existence. At this stage, empirical evidence—including observations, operational records, field information, interviews, and documentary sources—is interpreted diagnostically rather than descriptively. Evidence therefore supports diagnostic judgment regarding operational position rather than constituting diagnosis itself.

Once the operational position has been determined, the diagnostic procedure identifies operational bottlenecks, synchronization failures, structural gaps, accessibility constraints, and emerging vulnerabilities that may prevent mission continuity from being sustained within the remaining temporal capacity. These diagnostic findings provide the basis for designing configuration adjustments intended to preserve operational continuity before critical temporal thresholds are exceeded.

The diagnostic procedure therefore follows a cumulative analytical sequence:

1. Identification of the operational object.
2. Diagnosis of the conditions of existence.
3. Determination of operational position.
4. Identification of operational bottlenecks, synchronization failures, and constraints.
5. Design of configuration adjustments.
6. Assessment of mission continuity across the current and subsequent operational cycles.

Rather than treating diagnosis as a one-time analytical activity, the procedure is iterative. As operational conditions evolve, diagnostic interpretation and configuration adjustments are continuously revised to preserve operational synchronization and sustain mission continuity throughout changing operational environments.

3.3 Sources of Diagnostic Evidence

The proposed methodology distinguishes between diagnostic evidence and diagnosis itself. Diagnosis does not arise directly from measurements, observations, or individual data sources (Schön, 1983). Instead, evidence acquires analytical meaning only after the operational object, its conditions of existence, and its operational position have been identified through the diagnostic procedure developed in this study. Consequently, empirical evidence supports diagnostic reasoning rather than constituting diagnosis itself.

Diagnostic evidence was assembled from multiple operational sources to capture the conditions under which continuity is maintained or interrupted. These sources included field observations, operational records, interviews with livestock producers and relevant stakeholders, governmental reports, technical documents, and published literature concerning livestock production, disaster management, climate-related disruptions, and continuity management. Each source contributed evidence regarding different aspects of operational conditions, resource accessibility, institutional arrangements, infrastructure availability, operational synchronization, and temporal constraints.

Rather than being analyzed independently, these sources were interpreted collectively within the proposed diagnostic sequence. Evidence was therefore evaluated according to its contribution to identifying operational bottlenecks, synchronization failures, structural gaps, accessibility constraints, and remaining temporal capacity affecting mission continuity. This interpretive process enabled apparently independent observations to be understood as interconnected components of a single operational system.

Accordingly, the analytical value of diagnostic evidence does not depend primarily upon its quantity or source but upon its capability to support judgments regarding operational position and the configuration adjustments required to preserve continuity across the current and subsequent production cycles.

The strength of diagnostic evidence therefore lies not in the volume of information collected, but in its capacity to reveal where operational intervention remains possible before critical temporal windows close.

3.4 Diagnostic Interpretation and Decision Formation

The final stage of the proposed methodology transforms diagnostic findings into operational decision-making. Rather than interpreting empirical evidence as isolated observations, the methodology evaluates evidence according to its implications for mission continuity under the identified conditions of existence. Diagnostic interpretation therefore seeks to determine not only what operational conditions currently exist, but also which interventions remain feasible within the remaining temporal capacity.

Diagnostic interpretation follows the continuity-centered sequence established in the preceding stages. Judgments are formulated by integrating information concerning the operational object, its conditions of existence, operational position, synchronization status, and remaining temporal capacity. The objective is to determine whether the current operational configuration remains capable of sustaining mission continuity across successive operational cycles.

Where diagnosis reveals operational bottlenecks, synchronization failures, structural gaps, accessibility constraints, or emerging vulnerabilities, context-specific configuration adjustments are designed to restore operational synchronization before critical temporal thresholds are exceeded. Such adjustments may include resource reallocation, reorganization of operational activities, modification of logistical arrangements, strengthened institutional coordination, introduction of alternative operational pathways, or revision of implementation priorities according to the remaining temporal capacity.

Accordingly, diagnostic interpretation is regarded as an iterative decision-making process rather than a terminal stage of analysis (Schön, 1983). As operational conditions evolve, diagnostic judgments and configuration adjustments are continuously revised to preserve synchronization and preserve mission continuity throughout changing operational environments. The value of the methodology therefore lies not simply in generating accurate diagnoses, but in supporting timely operational decisions before mission continuity becomes unattainable.

The proposed methodology is therefore evaluated not by the amount of information it collects, but by its capability to support timely interventions that preserve operational synchronization and continuity before critical temporal windows close.

4. Methodological Foundations of Reserve–Interruption Management

4.1 The Operational Object as the Starting Point of Diagnosis

Effective operational diagnosis cannot begin with measurements, resources, or disruption events alone. It must first identify the operational object whose continuity is to be preserved. Conventional approaches to business continuity, disaster risk management, and resilience have substantially advanced understanding of disruption, recovery, resource allocation, and adaptive capacity (ISO 22301, 2019; UNDRR, 2015; Sheffi & Rice, 2005; Holling, 1973).

However, these approaches generally initiate analysis from hazards, organizational resources, recovery planning, or organizational performance rather than from the operational object situated within specific conditions of existence. Although these perspectives provide valuable guidance for managing disruption and recovery, they offer comparatively limited support

for diagnosing why operational systems frequently fail to accomplish their intended missions despite the availability of plans, resources, and institutional support.

This study adopts a different methodological starting point. Rather than beginning with hazards, disruptions, or reserves, diagnosis begins with the operational object itself. Every operational object exists under specific conditions of existence and continuously evolves through time. Its temporal state is dynamic rather than static, changing continuously as a consequence of biological processes, operational activities, environmental conditions, institutional arrangements, and resource accessibility. Consequently, effective diagnosis requires identifying not merely the observable characteristics of the object but its current temporal state relative to its intended developmental trajectory.

From this perspective, operational continuity should not be understood merely as survival following disruption. Rather, it refers to the capability of an operational object to maintain its intended developmental trajectory until its mission can be accomplished within the available temporal window under real operating conditions. A cattle production system, for example, achieves continuity not merely because cattle survive flooding but because they continue to develop toward their intended market weight and planned marketing period despite environmental interruption. Diagnosis therefore focuses on whether the intended developmental trajectory of the operational object remains achievable rather than on the disruptive event itself.

Accordingly, diagnosis is reconceptualized as a field-embedded process that begins by identifying the operational object, the conditions of existence under which it operates, and its

current operational position. It then evaluates deviations from the intended developmental trajectory and determines the configuration adjustments required to preserve mission continuity.

The identification of the operational object constitutes only the first stage of diagnosis. The subsequent analytical task is to determine the conditions of existence under which the object currently operates, as these conditions shape its operational position and provide the analytical foundation for the configuration adjustments required to preserve mission continuity.

4.2 Conditions of Existence and Operational Position

The proposed methodology recognizes that operational objects do not exist under identical conditions. Although they may exhibit similar measurable characteristics, they frequently operate under substantially different conditions of existence that shape their capability to accomplish intended missions (Bhaskar, 1975).

Accordingly, diagnosis begins not with the collection of evidence, but with the formulation of the first diagnostic question, which determines what must be preserved within the available temporal window. This epistemological choice establishes the operational object to be diagnosed and directs subsequent analytical attention toward the conditions of existence under which the object currently operates.

The identification of the operational object therefore constitutes only the first stage of diagnosis. The subsequent analytical task is to diagnose the conditions of existence under which the object operates, because these conditions determine its operational position and define the remaining capability for meaningful intervention. Building upon this diagnosis, the methodology

evaluates deviations from the intended developmental trajectory and identifies the configuration adjustments required to preserve operational continuity before critical temporal windows close.

This study therefore introduces the concept of operational position, defined as the current capability of an operational object to progress toward its intended mission under its existing conditions of existence. Operational position is not determined by measurements alone. Rather, it reflects the combined influence of the conditions of existence, operational capability, resource accessibility, institutional arrangements, and remaining temporal capacity. Consequently, two operational objects exhibiting similar measurable characteristics may occupy fundamentally different operational positions and therefore require different configuration adjustments to preserve operational continuity.

Diagnosis is therefore understood as the process of determining whether the operational object remains capable of progressing along its intended developmental trajectory within the available temporal window. Measurements—including livestock weight, feed availability, transportation capacity, financial resources, and production output—constitute empirical evidence that informs this assessment rather than the diagnosis itself. Their diagnostic significance emerges only after the operational object has been identified, the conditions of existence have been diagnosed, and the operational position has been determined.

From this perspective, Reserve–Interruption Management shifts analytical attention from measuring available resources toward diagnosing the operational position of operational objects under their existing conditions of existence. Configuration adjustments are subsequently designed

to improve the diagnosed operational position by strengthening preparedness, reducing operational friction, improving accessibility, and preserving operational continuity before critical temporal windows close.

The distinction between measurement and diagnosis may be illustrated through agricultural production. Harvesting mangoes generates measurements of quantity, weight, and production volume. However, these measurements alone cannot determine the operational position of individual fruits relative to their intended market mission. Diagnostic interpretation is required to determine whether individual fruits are suitable for export, premium retail markets, domestic wholesale markets, processing industries, or rejection. Operational decisions therefore depend not on measurements alone, but on diagnosing the operational position of each product relative to its intended mission under existing market conditions.

Similarly, livestock production cannot be adequately diagnosed through aggregate production indicators alone because identical production outcomes may conceal fundamentally different operational positions under different conditions of existence. Determining the operational position therefore does not conclude the diagnostic process. Rather, it establishes the analytical foundation upon which appropriate configuration adjustments can be designed to preserve operational continuity.

Diagnosis thus transforms empirical measurements into operational knowledge by interpreting evidence within their temporal, institutional, and operational context.

4.3 Configuration Adjustment as a Diagnostic Response

Diagnosis alone does not preserve operational continuity. Its practical value lies in guiding configuration adjustments that enable operational objects to maintain or restore their intended developmental trajectory under existing conditions of existence. Configuration adjustment is therefore understood as the operational response generated by diagnosis rather than as an independent management activity. Once the operational position of an object has been determined, the principal analytical task becomes identifying which elements of the operational configuration require modification to preserve operational continuity within the available temporal window.

From this perspective, configuration refers not merely to the availability of resources but to the operational arrangement through which resources, infrastructure, institutional support, accessibility, coordination mechanisms, technological capabilities, and preparedness are organized to support mission accomplishment. Because operational objects exist under unequal conditions of existence, identical resource endowments may generate substantially different operational capabilities. Effective configuration therefore depends not only on what resources are available, but also on how these elements are organized and synchronized within their existing operational environment.

Accordingly, configuration adjustment is guided by the diagnosed operational position rather than by standardized resource allocation. Different operational positions require different configuration responses even when observable resource conditions appear similar. Configuration adjustment is therefore designed to reposition the operational object by reorganizing operational

relationships rather than merely increasing resource availability. Depending on the diagnosed operational position, adjustments may involve strengthening feed reserves, improving transportation accessibility, reorganizing labour, expanding institutional coordination, introducing alternative feed sources, reallocating financial resources, or modifying operational schedules. These interventions are selected not because they maximize resource accumulation, but because they improve the capability of the operational object to continue progressing toward its intended developmental trajectory before critical temporal windows close.

Within livestock systems, for example, the introduction of processed feed should not be interpreted solely as an increase in feed reserves. Its operational significance lies in extending the temporal capacity of the production system, reducing operational friction associated with feed shortages, preserving livestock growth trajectories, and enabling animals to reach target market windows despite disruption. Configuration adjustment therefore functions as a mechanism for preserving developmental continuity rather than merely compensating for resource deficits.

Accordingly, Reserve–Interruption Management conceptualizes **reserve** as one component of a broader operational configuration rather than the central object of analysis. Reserve possesses strategic value only insofar as it improves the operational position of the operational object and strengthens its capability to accomplish the intended mission under existing conditions of existence. **Diagnosis identifies what must change; configuration adjustment determines how those changes are implemented to preserve operational continuity.**

The subsequent section explains how Reserve–Interruption Management integrates diagnosis and configuration adjustment into a continuous field-based methodology for sustaining operational continuity under changing conditions of existence.

4.4 Reserve–Interruption Management as a Field-Embedded Diagnostic Methodology

The preceding sections establish a diagnostic sequence through which operational continuity can be systematically understood and managed. Diagnosis begins with the first diagnostic question, which determines the object of preservation under temporal constraint. It subsequently identifies the operational object, diagnoses the conditions of existence under which the object currently functions, and determines its operational position relative to the intended mission. Only after these diagnostic stages have been completed can appropriate configuration adjustments be identified and implemented.

Reserve–Interruption Management (RIM) is therefore conceptualized as a field-embedded diagnostic methodology that supports operational decision-making under real temporal constraints. Rather than treating reserves as the primary analytical focus, RIM employs diagnosis to determine which configuration adjustments are required to preserve the developmental trajectory of operational objects until their intended missions can be accomplished. Reserve consequently represents one possible operational response identified through diagnosis rather than the central object of management itself.

The methodology integrates diagnosis and configuration adjustment into a continuous field-based process through which operational objects are interpreted, repositioned, and supported under changing conditions of existence. Operational decisions are guided not by standardized resource allocation or generalized recovery procedures, but by the diagnosed operational position of the operational object and its remaining capability to influence mission outcomes within the available temporal window.

Within this methodology, diagnosis is understood as a continuous operational process rather than a one-time assessment. As conditions of existence evolve, the operational position of the operational object also changes. Configuration adjustment must therefore be continuously re-evaluated to ensure that operational capability remains aligned with the intended developmental trajectory despite changing environmental, institutional, logistical, and temporal conditions. RIM consequently emphasizes adaptive diagnosis rather than static planning.

This perspective also explains why identical disruption events frequently produce different operational outcomes. Operational performance is shaped not only by the severity of interruption but also by differences in preparedness, accessibility, coordination, institutional arrangements, reserve architecture, and remaining temporal capacity before and during disruption. Operational continuity therefore depends upon the capability to diagnose changing operational positions and implement appropriate configuration adjustments before critical temporal windows close.

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Accordingly, RIM extends conventional continuity-oriented approaches by introducing diagnosis as the primary mechanism through which operational configurations are continuously aligned with evolving conditions of existence. Rather than focusing primarily on preserving resources, the methodology seeks to preserve the operational capability required for mission accomplishment under temporal constraint.

Diagnosis establishes what must change; configuration adjustment determines how operational systems should respond to preserve operational continuity before opportunities for meaningful intervention are lost.

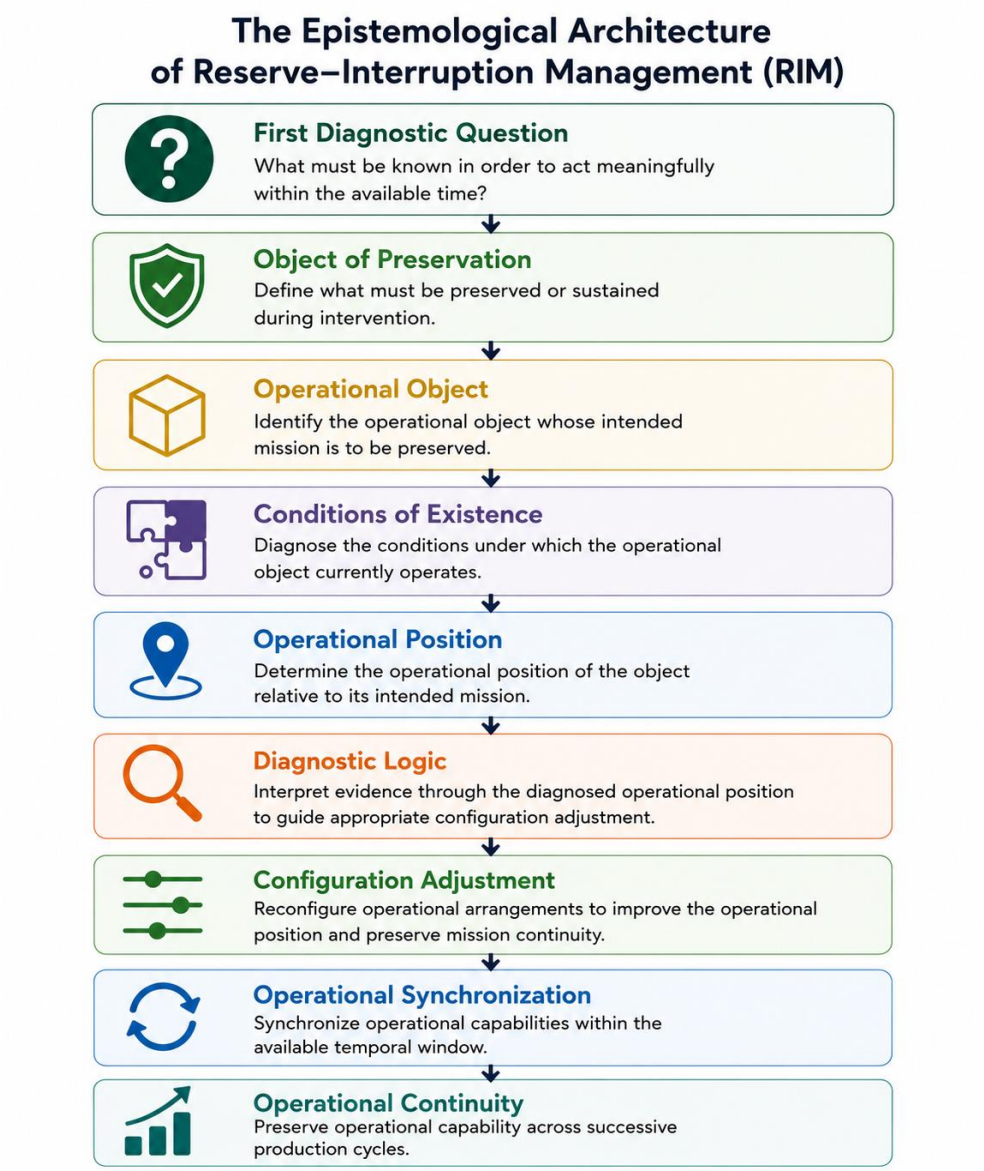

Figure 3. The Epistemological Architecture of Reserve–Interruption Management (RIM)

Note. Developed by the authors.

The figure summarizes the epistemological and operational sequence underlying the proposed methodology. The diagnostic process begins with the first diagnostic question, which determines the object of preservation and guides the identification of the operational object, diagnosis of

conditions of existence, determination of operational position, interpretation of evidence, configuration adjustment, operational synchronization, and ultimately the preservation of operational continuity across successive production cycles.

5. Discussion

The methodological framework developed in the preceding sections suggests that diagnostic outcomes are shaped not only by the availability of evidence but also by the nature of the first diagnostic question. This question constitutes an epistemological choice because it determines what the diagnostician seeks to preserve under temporal constraint. Whether diagnosis is directed toward recovery, growth, or operational continuity fundamentally shapes the interpretation of evidence, the selection of interventions, and the subsequent developmental trajectory (Checkland, 1999; Schön, 1983).

Consequently, practitioners, policy-makers, and researchers may construct different diagnostic logics even when examining the same operational system because they begin from different assumptions regarding the primary object of preservation. From the perspective of Reserve–Interruption Management (RIM), the first diagnostic question is therefore not simply **what has failed**, but **what operational capability must be preserved while meaningful intervention remains possible**. The answer to this question establishes the epistemological foundation upon which the entire diagnostic process—including the interpretation of evidence,

identification of operational position, configuration adjustment, and operational decision-making—is subsequently constructed.

5.1 Rethinking Operational Continuity Through Diagnostic Intervention

Building upon the methodological framework developed in the preceding section, the proposed methodology invites a reconsideration of what continuity management is fundamentally intended to preserve. Conventional continuity-oriented approaches have substantially improved planning, preparedness, resource allocation, and recovery (ISO 22301, 2019; UNDRR, 2015; Sheffi & Rice, 2005). Nevertheless, operational continuity is frequently evaluated only after observable shortages, operational failures, or disruption events have already occurred. As a consequence, significant operational losses associated with the timing of intervention often remain analytically invisible.

Reserve–Interruption Management (RIM) proposes that continuity should be understood not merely as the preservation of resources or the recovery of disrupted functions, but as the preservation of the system's capability to influence operational outcomes while meaningful intervention remains possible. From this perspective, the central diagnostic question is not simply whether resources are available, but whether sufficient temporal capacity remains for configuration adjustments to alter the developmental trajectory of the operational object before critical operational windows close.

However, the capability to preserve meaningful intervention depends fundamentally upon the diagnostic objective itself. Systems operating under severe temporal constraint may require

fundamentally different diagnostic questions from those oriented toward long-term growth or post-disruption recovery. The appropriateness of the first diagnostic question therefore becomes a precondition for effective diagnosis rather than a consequence of diagnostic analysis (Schön, 1983; Checkland, 1999). Preserving intervention capability is not achieved simply through earlier action, but through formulating a diagnostic question that corresponds to the system's most immediate operational condition. Otherwise, operational effort may become highly coordinated and efficiently executed while remaining insufficiently responsive to the constraint that most fundamentally threatens continuity.

This perspective reveals a form of operational loss that is rarely recognized within existing continuity-oriented approaches. Operational capability may deteriorate even when physical resources remain available because intervention occurs before the appropriate diagnostic conditions emerge or after the opportunity for effective intervention has already passed. In both situations, resources may still exist, yet the capability to influence mission outcomes has already been diminished. The primary loss is therefore not merely material, but the irreversible reduction of operational capability resulting from the loss of meaningful intervention opportunities under temporal constraint (ISO 22301, 2019; Sheffi & Rice, 2005).

Accordingly, RIM makes these previously overlooked losses diagnostically visible by identifying the operational state in which meaningful intervention remains possible. Rather than waiting for shortages, failures, or interruptions to become observable, diagnosis evaluates operational objects, their conditions of existence, operational position, and remaining temporal

capacity to determine whether configuration adjustment can still influence mission outcomes. Diagnosis therefore functions as the mechanism through which operational capability is preserved before irreversible losses emerge.

This reconceptualization shifts continuity management from reactive resource preservation toward proactive diagnostic intervention. The objective is not simply to maintain operational activity, but to preserve the capability of operational systems to accomplish intended missions through timely configuration adjustment under changing conditions of existence. Achieving this objective requires not only appropriate intervention, but also an appropriate first diagnostic question capable of identifying the operational condition that most fundamentally constrains continuity before critical temporal windows close. In this sense, operational continuity depends not only on the availability of resources or the effectiveness of intervention, but also on the epistemological appropriateness of the question that initiates the diagnostic process (Schön, 1983; Simon, 1996).

5.2 From Resource Coordination to Operational Synchronization

A second implication of the proposed methodology concerns the distinction between coordination and operational synchronization. Existing continuity-oriented approaches frequently emphasize coordination among organizations, agencies, infrastructure, and resource providers as a prerequisite for effective response (Malone & Crowston, 1994; ISO 22301, 2019; UNDRR, 2015; Sheffi & Rice, 2005).While coordination remains essential, coordinated action alone does not necessarily ensure that operational objectives can be achieved.

Reserve-Interruption Management (RIM) argues that operational continuity depends not merely on whether actors coordinate their activities, but on whether operational objects, resources, expertise, infrastructure, and decisions become synchronized within the temporal conditions required for mission accomplishment. Coordination may therefore exist without effective synchronization. Organizations may communicate efficiently, resources may be mobilized, and operational plans may be executed according to schedule, yet the intended mission may still fail if critical operational elements arrive outside the appropriate intervention window.

From this perspective, synchronization represents a higher operational requirement than coordination. It refers to the temporal alignment of operational capabilities with the developmental trajectory of the operational object under its existing conditions of existence. Effective synchronization therefore requires that operational actions occur neither prematurely nor belatedly, but within the diagnostic window during which intervention remains capable of influencing mission outcomes.

However, synchronization alone does not guarantee effective operational outcomes. Operational activities may become well synchronized while remaining directed toward objectives that no longer correspond to the system's most immediate operational condition. In such situations, operational coordination and synchronization may be successfully achieved, yet the intervention itself fails because the underlying diagnostic objective is inappropriate. Effective synchronization therefore depends not only on temporal alignment, but also on the

appropriateness of the first diagnostic question that determines what operational capability must be preserved and which operational objective should be synchronized.

This perspective also changes how operational losses are interpreted. Conventional continuity-oriented approaches generally recognize losses only after physical damage, resource depletion, or service interruption has become observable (ISO 22301, 2019; Sheffi & Rice, 2005). RIM suggests that significant losses may occur much earlier through synchronization directed toward an inappropriate operational objective, mistimed mobilization, delayed deployment, premature intervention, ineffective configuration adjustment, or the ineffective use of operational capability. Such losses frequently remain analytically invisible because physical resources may still exist even though the opportunity to influence operational outcomes has already been diminished.

Consequently, the principal contribution of synchronization is not simply to improve operational efficiency. Rather, it preserves the capability of operational systems to influence mission outcomes before critical temporal windows close. Synchronization therefore functions as the operational mechanism through which diagnostic reasoning is translated into operational action. Diagnosis determines what should be synchronized; synchronization determines whether operational capability can be effectively mobilized to preserve operational continuity while meaningful intervention remains possible.

5.3 From Mission Accomplishment to Continuity Across Successive Production Cycles

Conventional continuity-oriented approaches frequently evaluate operational success by examining whether a planned mission has been completed or disrupted operations have been restored. Such an evaluation is appropriate in many operational contexts where individual missions constitute the primary unit of analysis (ISO 22301, 2019; Sheffi & Rice, 2005). However, livestock production and many other productive systems operate as continuous processes rather than isolated operational events. Mission accomplishment therefore represents only one stage within a broader sequence of successive production cycles.

From the perspective of Reserve–Interruption Management (RIM), successful mission accomplishment does not necessarily indicate that operational continuity has been preserved. A livestock producer may successfully transport cattle to market, yet delayed marketing or reduced access to production resources may impair the capability to sustain the following production cycle. In this situation, the immediate mission has been accomplished, while the continuity of the production system has already begun to deteriorate.

This distinction extends diagnostic attention beyond the completion of individual operational tasks toward the capability of the operational system to sustain successive production cycles under changing conditions of existence. Diagnostic intervention therefore seeks not only to accomplish current objectives, but also to preserve the operational capability required for future production cycles.

From this perspective, the first diagnostic question also changes. Rather than asking only whether the current mission can be completed, diagnosis asks whether the operational system will remain capable of sustaining subsequent production cycles after the present mission has been accomplished. Operational success is therefore evaluated not solely by mission completion, but by its contribution to future operational continuity.

This perspective also explains why the timing of intervention becomes strategically important. Interventions undertaken within the appropriate diagnostic window preserve not only current operational performance but also the continuity of subsequent production cycles. Conversely, interventions undertaken too early or too late may accomplish immediate objectives while simultaneously weakening the system's longer-term capability. Mission accomplishment therefore contributes to continuity only when achieved within the temporal conditions required to sustain subsequent production cycles.

Effective operational intervention depends not only on execution but also on the appropriateness of the first diagnostic question that guides intervention from the outset. Missions may be successfully completed according to operational plans while failing to preserve long-term continuity if diagnosis has been directed toward objectives that do not correspond to the system's most immediate operational condition. Consequently, continuity depends not only on accomplishing missions, but also on ensuring that diagnostic reasoning remains responsive to progressively narrowing temporal windows.

Accordingly, RIM extends the analytical focus of continuity management beyond individual disruption events toward the cumulative preservation of productive capability across successive production cycles. Operational continuity is therefore understood as preserving the conditions under which future missions remain operationally achievable through appropriate diagnosis, configuration adjustment, and timely intervention.

5.4 The Epistemological Foundation of the First Diagnostic Question

The preceding discussion suggests that diagnostic outcomes are shaped not only by the availability of evidence but also by the nature of the first diagnostic question. This question constitutes an epistemological choice because it determines what the diagnostician seeks to preserve under temporal constraint. Whether diagnosis is directed toward recovery, growth, or operational continuity fundamentally shapes the interpretation of evidence, the selection of interventions, and the operational trajectory that follows (Schön, 1983; Checkland, 1999).

Accordingly, different diagnostic communities—including practitioners, policy-makers, and researchers—may construct different diagnostic logics even when examining the same operational system. These differences arise not necessarily from unequal access to information, but from different assumptions regarding the primary object of preservation. A diagnostic approach oriented toward recovery emphasizes restoring disrupted functions, whereas one oriented toward growth focuses on expanding productive capability. By contrast, a continuity-oriented diagnosis seeks to preserve the capability of the operational system to accomplish its

intended mission while meaningful intervention remains possible under changing conditions of existence.

The appropriateness of the first diagnostic question depends upon the operational condition confronting the system rather than the analytical preference of the diagnostician. Questions concerning recovery or growth may be theoretically valid, yet fail to support operational action when the immediate challenge lies in preserving continuity under severe temporal constraint. In such situations, additional empirical evidence may improve analytical precision without improving operational responsiveness because the diagnostic process has already been organized around a question that does not correspond to the system's most immediate operational need (Simon, 1996).

From this perspective, diagnosis is not a neutral process of collecting and interpreting evidence, but a purposive process directed by the object of preservation established through the first diagnostic question. As critical temporal windows progressively narrow, diagnostic reasoning must evolve from descriptive observation toward operational judgment capable of preserving mission continuity. Failure to elevate the first diagnostic question widens the gap between diagnostic reasoning and operational reality, allowing instability to accumulate even while additional evidence continues to be collected.

Within Reserve–Interruption Management (RIM), the first diagnostic question is therefore not simply *what has failed* or *what resources are lacking*. Rather, it asks whether the operational system remains in a condition where intervention is still capable of influencing mission outcomes

before critical temporal windows close. The answer to this question establishes the analytical foundation for subsequent diagnosis by determining which operational objects require attention, which conditions of existence become diagnostically relevant, how operational position is interpreted, and which configuration adjustments should be prioritized. Evidence acquires diagnostic meaning only after the object of preservation has been established and interpreted within this diagnostic context.

Accordingly, the principal contribution of RIM extends beyond proposing a new continuity-oriented methodology. It establishes an epistemological foundation in which the first diagnostic question determines the diagnostic logic that governs the interpretation of evidence, the identification of operational position, the selection of configuration adjustments, and ultimately the capability of operational systems to preserve continuity under temporal constraint.

In this sense, the first diagnostic question is not merely the beginning of diagnosis; it is the epistemological foundation upon which the entire diagnostic methodology is constructed.

6.Theoretical Summary of Reserve-Interruption Management (RIM)

Reserve-Interruption Management (RIM) suggests that the central challenge of continuity management is not primarily the availability of resources, the occurrence of disruption, or the efficiency of recovery, but whether operational systems remain capable of meaningfully influencing mission outcomes through timely intervention under changing conditions of existence.

From this perspective, operational continuity depends not simply on resource accumulation, but on the capability to diagnose operational conditions before critical temporal

windows close. Reserve, coordination, synchronization, and recovery are therefore understood as operational responses generated through diagnosis rather than as primary objects of management.

Accordingly, the proposed methodology argues that the quality of diagnosis depends not only on the quantity or precision of empirical evidence, but on the appropriateness of the first diagnostic question. This epistemological choice establishes what the system seeks to preserve—whether recovery, growth, or operational continuity—and subsequently guides diagnostic reasoning, evidence interpretation, the identification of operational position, configuration adjustment, and ultimately the system's developmental trajectory.

Accordingly, RIM reconceptualizes diagnosis as a field-embedded, continuity-oriented process through which operational objects are interpreted in relation to their conditions of existence, operational position, and remaining temporal capacity. Diagnosis therefore functions not merely to describe operational conditions, but to determine whether meaningful intervention can still preserve operational continuity before opportunities for effective action are lost.

The principal theoretical contribution of RIM extends beyond reserve management and continuity planning by establishing an integrated diagnostic methodology in which the first diagnostic question determines the operational meaning of empirical evidence. Diagnosis thus becomes the primary mechanism linking operational interpretation, configuration adjustment, operational synchronization, and continuity preservation within a coherent analytical framework.

Operational instability should therefore not be understood as beginning only when disruption becomes observable. Rather, it emerges progressively when diagnostic reasoning fails

to remain aligned with the operational condition that most fundamentally constrains timely intervention. RIM consequently argues that the fundamental challenge of continuity management is not whether disruption has occurred or resources remain available, but whether diagnostic reasoning can still identify and support meaningful intervention before critical temporal windows close.

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