Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

From Resilience to Antifragility: A Frontier Thinking Framework for Regenerative Urban Hospitality Ecosystems

Liudmyla Bovsh

l.bovsh@knute.edu.ua

State University of Trade and Economics

Alla Rasulova

State University of Trade and Economics

Iryna Tonkonoh

State University of Trade and Economics

Research Article

Keywords: Complex Adaptive Systems, Design Thinking, Sustainable Urban Regeneration, Post-war Recovery, Ukraine

Posted Date: August 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10397744/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Urban hospitality ecosystems are increasingly exposed to complex and ongoing disruptions, including climate change, technological transformations, and regional and national crises. While resilience has become the dominant paradigm for understanding the adaptive capacity of urban hospitality systems and organizations, its primary focus on recovery and stability may be insufficient in the face of ongoing uncertainty. The aim of the article is to develop a theoretical framework for the transition from resilience to antifragility in urban hospitality ecosystems by integrating approaches from frontier thinking, design thinking, regenerative development, and complex adaptive systems theory. The research methodology combines conceptual analysis of current theoretical approaches with qualitative empirical research conducted through semi-structured interviews with 28 hospitality experts and representatives of municipal administrations in Kyiv, Kharkiv, Lviv, and Odessa. Based on the results obtained, the paper justifies the conceptual transition from resilience to antifragility and introduces the concept of Regenerative Urban Hospitality Ecosystems (RUHE). The proposed framework model of frontier thinking explains the mechanisms of transformation of hospitality ecosystems from adaptation to regeneration through experimentation, learning, value co-creation and the development of adaptive management competencies. Antifragility is considered as a key mechanism that combines resilience with the regenerative development of urban systems. The paper contributes to the study of sustainable development by offering a new theoretical perspective on the role of hospitality ecosystems in urban restoration and regeneration, as well as practical guidelines for the formation of more adaptive and future-oriented urban systems.

1 Introduction

Modern cities operate in an increasingly turbulent environment characterized by interconnected economic, environmental, technological, geopolitical, and social upheavals. Climate change, resource scarcity, digital transformation, pandemics, cyber threats, demographic shifts, and regional conflicts all combine to create conditions of constant uncertainty that challenge traditional approaches to urban development and governance. In particular, for cities experiencing physical destruction or post-disaster reconstruction, these threats become particularly acute, requiring not only mechanisms for recovery, but also the capacity for continuous adaptation, transformation, and development.

Urban hospitality ecosystems occupy a unique place in these processes. On the one hand, as complex accumulative networks of accommodation, food, cultural events, mobility systems, public authorities, local communities, etc., they significantly contribute to economic viability, social cohesion, attractiveness of locations and recovery processes. On the other hand, as part of critical urban infrastructure, hospitality ecosystems are very sensitive to external shocks. Global threats in recent years, in particular the COVID-19 pandemic, energy crises, climate disasters, geopolitical aggravations, have demonstrated the vulnerability of hospitality systems and revealed the limitations of traditional crisis management approaches focused mainly on the restoration of work. Therefore, the urban hospitality ecosystem is not just a service component that shapes the adaptive capacity of cities. It

ensures the integrity of the urban system and is conceptualized as the Regenerative Urban Hospitality Ecosystem (RUHE).

Given this, it is logical that over the past decade, resilience has become a scholarly focus for understanding how tourism destinations, hospitality organizations, and urban systems respond to disruptions. Existing resilience-based approaches (Keeler, 2018; Shimizu & Clark, 2019) emphasize the ability of systems to absorb shocks, maintain essential functions, and recover from damage. Their dominant logic is largely focused on stability and the restoration of previous system states. However, in environments with constant volatility, uncertainty, complexity, and multi-risk, simply returning to pre-crisis conditions may no longer be an adequate development goal. Therefore, future urban systems must not only withstand disruptions, but also thrive through them.

This perspective has stimulated growing interest in the concept of antifragility *(*Taleb, 2012*)*, which describes the ability of systems to benefit despite shocks, uncertainty, variability, and disruption. Unlike resilient systems that seek to withstand or recover from disruptions, antifragile systems enhance their capabilities, create new capabilities, and strengthen their adaptive potential through the impact of stressors. Despite growing academic attention, the application of antifragility to hospitality and urban ecosystem research remains limited and fragmented, particularly with regard to the mechanisms by which such transformations occur.

At the same time, new approaches in design thinking *(*Goldschmidt, 2021; Sonowal, 2025*)*, regenerative development *(*Leary & McCarthy, 2013; Gurran & Phibbs, 2018; Tallon, 2020*)*, and complex adaptive systems theory *(Holloman, 2008;* Johnson, 2018; Sapir, 2019*)* have shifted the focus from adaptation to systemic renewal, coevolution, and co-creation of value. These perspectives emphasize experimentation, learning, stakeholder collaboration, and the capacity of social-ecological systems to generate regenerative outcomes. However, existing research has not sufficiently integrated these theoretical streams into a coherent framework capable of explaining how urban hospitality ecosystems can move from resilience to regenerative development.

The identified theoretical gap gives rise to the following main research question: How can urban hospitality ecosystems evolve from resilience-oriented adaptation to antifragile and regenerative development in the face of ongoing uncertainty and systemic disruption? To answer this question, the study puts forward the following central research proposition: RP. Antifragility functions as a central transformative mechanism through which the capabilities of frontier thinking are translated into regenerative outcomes within urban hospitality ecosystems. Accordingly, the paper seeks to explain not only why resilience is no longer sufficient for contemporary urban hospitality systems, but also how frontier thinking enables ecosystems to transform uncertainty into regenerative capacity through antifragility.

This study therefore argues that frontier thinking provides such an integrative mechanism. It is positioned as a dynamic capacity that allows individuals, organizations, and ecosystems to navigate uncertainty, discover new possibilities, experiment with alternative futures, and organize collaborative

transformation processes in the face of constant change. From this perspective, antifragility becomes not simply a system characteristic but a developmental mechanism that links adaptive capabilities with regenerative outcomes. Thus, in this study, antifragility is defined as the capacity of urban hospitality ecosystems to improve their functional, social, economic, and regenerative performance through the impact of uncertainty, disruption, and ecological volatility by transforming shocks into opportunities for innovation, learning, and ecosystem renewal.

The novelty of this study lies not only in expanding the discussion of resilience or introducing antifragility into the hospitality literature. Rather, it develops a new explanatory framework for understanding the transformation of urban hospitality ecosystems in the face of constant uncertainty. In particular, the study makes four interrelated theoretical contributions. First, it conceptualizes frontier thinking as a dynamic capability that enables ecosystem-level transformation in the face of volatility and complexity. Second, it reimagines antifragility as a central transformative mechanism that links frontier thinking capabilities to regenerative outcomes. Third, it introduces the concept of Regenerative Urban Hospitality Ecosystems (RUHE) as an analytical framework for understanding urban regeneration through hospitality ecosystems. Finally, it integrates resilience, antifragility, design thinking, regenerative development, and complex adaptive systems theory into a holistic conceptual model that explains how urban hospitality ecosystems evolve from adaptation to regeneration and development under hypercomplex operating conditions.

2 Results

2.1. From Resilience to Regeneration: Emerging Patterns from Expert Interviews

The theoretical framework of the study lies in the plane of three scientific approaches: resilience building, antifragility and regeneration of individual actors and ecosystems. Building on our previous research *(Boiko et al., 2022; Bovsh et al., 2024; Bovsh et al., 2025)*, resilience is conceptualized as a multi-level adaptive capacity that encompasses organizational continuity, strategic security management and adaptive functioning of urban hospitality infrastructure in times of crisis and uncertainty. While these studies have demonstrated the critical role of resilience in ensuring continuity and recovery, they have also revealed its conceptual limitation: resilience primarily explains how systems withstand and recover from disruptions, rather than how they evolve during them. In this perspective, its strategic focuses are the support, restoration and adaptation of economic entities and systems to environmental challenges. At the same time, the emergence of new stressors destabilizes the formed resilience, making it unviable in countering threats. Moreover, the transformational potential created in the partnership of universities and cities *(Keeler, 2018)* is a temporary means of maintaining the resilience of individuals and organizations. While regeneration concerns how they develop through resilience mechanisms *(Leary & McCarthy, 2013*). To renew, co-create, transform are the main priorities of ecosystem regeneration. In

particular, from the perspective of urbanism, regeneration is based on the processes of reconstruction and intensification within established and built-up urban areas *(Gurran & Phibbs, 2018)*.

In turn, antifragility provides a transformational mechanism that combines these two states of development. It characterizes the ability of an ecosystem not only to withstand variability and uncertainty, but also to use them as a source of development, transforming external shocks into opportunities for innovation, learning and the creation of new value. For this purpose, models of future development are created, which are increasingly implemented in conditions of systemic uncertainty, when defined goals and scenarios can quickly lose their relevance *(Chiffi & Curci, 2024)*. Under such conditions, the strategic advantage becomes not the ability to accurately predict the future, but the ability of urban ecosystems to adapt, experiment and transform in accordance with new challenges. It is these features of the above approaches that make it possible to build a model not just of “survival” of urban ecosystems, but of antifragility - a model capable of creating a positive economic and social effect - that is, a regenerative potential.

It is worth noting that antifragility is a property of hospitality entities. The experience of Ukraine provides convincing evidence of this. During periods of military aggression and large-scale destruction, hospitality infrastructure has taken on functions traditionally associated with critical urban infrastructure. Hotels have provided temporary housing for internally displaced persons and residents whose homes have been destroyed by rocket attacks. Hotel and restaurant establishments have supported humanitarian logistics, volunteer coordination, emergency response, and community resilience. At the same time, tourism has demonstrated remarkable adaptive capacity through the emergence of new formats, including memorial, military, and educational tourism, while digital initiatives aimed at documenting cultural, architectural, and natural heritage have contributed to the preservation of collective memory and strengthening the identity of place in the face of destruction. These examples demonstrate that hospitality ecosystems do not simply recover from crises; they evolve, generating new societal functions, institutional relationships, and value creation mechanisms *(Table 1)*.

Table 1 Functional Expansion of Urban Hospitality Ecosystems under Conditions of Crisis

Disruption	Emerging hospitality function	Generated public value	Antifragile outcome
Destruction of residential infrastructure and mass displacement	Hotels provide temporary accommodation for internally displaced persons (IDPs) and residents affected by missile attacks	Social protection, continuity of community life, emergency shelter	Hospitality becomes part of critical urban infrastructure and strengthens community resilience
Humanitarian emergencies and disruption of public services	Hotels and restaurants support humanitarian logistics, volunteer coordination, emergency catering and relief operations	Rapid resource mobilization, cross-sector collaboration, institutional trust	Formation of adaptive ecosystem partnerships and strengthened social capital
Destruction or inaccessibility of cultural and natural heritage	Tourism supports digital preservation of cultural, architectural and natural heritage through virtual museums, digital archives and documentation	Preservation of collective memory and cultural identity	Regenerative value creation through digital innovation and knowledge preservation
Collapse of traditional tourism demand	Emergence of memorial, educational, post-conflict and resilience-oriented tourism products	Diversification of tourism experiences and new destination narratives	Innovation through disruption and creation of new market opportunities
Long-term economic and social uncertainty	Hospitality businesses develop flexible business models, digital services, collaborative platforms and multifunctional spaces	Greater adaptability, local economic continuity and ecosystem learning	Antifragility through continuous experimentation and capability development
Urban reconstruction and post-war recovery	Hospitality acts as a catalyst for place-making, community engagement and regeneration of urban spaces	Revitalization of local economies, strengthened place identity and inclusive urban development	Emergence of Regenerative Urban Hospitality Ecosystems (RUHE)

Source: formed by *Blečić & Cecchini, 2024; Hashmi & Khassawneh, 2024; Rocca & Zielinski, 2024; Subadra, 2024; Bovsh та ін., 2025; Dinga, 2025*.

Table 1 shows that crises do not simply disrupt the functioning of urban hospitality ecosystems, but also stimulate the emergence of new social functions that go far beyond their traditional service role. Rather than restoring pre-crisis conditions, hospitality ecosystems generate new forms of social value through functional expansion, adaptive collaboration, innovation, and community engagement. These transformations provide empirical support for the conceptualization of antifragility as a mechanism by which urban hospitality ecosystems evolve towards regenerative development. At the same time, they require empirical confirmation of the extent to which such transformation is a systemic characteristic of contemporary hospitality ecosystems, rather than a set of individual practices. Therefore, to test the proposed conceptual framework, the results of semi-structured interviews with experts in the field of

hospitality and municipal governance were analyzed, which allowed us to identify dominant patterns of the transition from resilience to regenerative development *(Table 2)*.

Table 2 Functional Transformation of Urban Hospitality Ecosystems: Expert Evidence (n=28)

Transformation dimension	Guiding interview question	Dominant expert responses	Agreement, %
Resilience as the foundation of ecosystem continuity	What factors enable urban hospitality businesses to maintain operations during prolonged crises?	Organizational flexibility, adaptive management, stakeholder cooperation, emergency planning and rapid operational response were identified as key conditions for maintaining business continuity.	96.4 (27/28)
Functional expansion of hospitality ecosystems	How has the role of hospitality changed under conditions of war and prolonged uncertainty?	Hospitality facilities have expanded beyond their traditional service functions by providing temporary accommodation for internally displaced persons, supporting humanitarian logistics, volunteer coordination, community assistance and emergency response.	92.9 (26/28)
Transformation of tourism functions	How has tourism adapted to crisis conditions?	Experts emphasized the emergence of memorial tourism, educational and post-conflict tourism, digital preservation of cultural and natural heritage, and new destination narratives supporting national memory.	89.3 (25/28)
Emergence of frontier thinking capabilities	Which managerial capabilities are becoming strategically important in an unpredictable environment?	Experimentation, opportunity recognition, collaborative governance, ecosystem partnerships, rapid decision-making and continuous learning were consistently identified as critical capabilities.	89.3 (25/28)
Antifragility through innovation and learning	Can crises create opportunities for long-term development? If so, how?	Crises stimulate innovation, digital transformation, new business models, institutional cooperation and organizational learning, enabling systems to improve through disruption rather than merely recover.	85.7 (24/28)
Vision of regenerative urban hospitality ecosystems	What should characterize future urban hospitality ecosystems?	Experts associated future ecosystems with adaptive governance, regenerative urban development, community resilience, circular resource use, strong local partnerships and continuous innovation.	92.9 (26/28)

Source: The complete semi-structured interview guide is provided in Additional file 1 (Research Instrument and Methodological Appendix).

Taken together, the expert evidence in Table 2 demonstrates that urban hospitality ecosystems are increasingly evolving beyond their traditional service functions. Rather than focusing solely on operational continuity and post-crisis recovery, they are taking on expanded humanitarian, social, cultural, and governance roles that create new forms of societal value. However, the high level of expert agreement across the board suggests that this functional transformation is a systemic rather than an episodic phenomenon. These findings also suggest that the observed trend is consistent with the characteristics of antifragility, where uncertainty stimulates learning, innovation, and ecosystem renewal. Thus, the empirical patterns identified provide a solid empirical foundation for further theoretical synthesis and transformation model development. We therefore synthesize the empirical evidence with existing scholarly approaches in Table 2. 3, demonstrating the evolution from Antifragile capability to Regenerative Urban Hospitality Ecosystems (RUHE).

Table 3 Theoretical synthesis: From empirical evidence to the RUHE transformation model

Empirical evidence	Theoretical construct	Underlying theoretical perspective	Contribution to the RUHE transformation model
Operational continuity, adaptive crisis management, organizational flexibility	Resilience	Resilience Theory	Establishes the adaptive capacity necessary for ecosystem survival during disturbances
Expansion of hospitality functions into humanitarian assistance, temporary accommodation, volunteer coordination and community support	Functional expansion of hospitality ecosystems	Urban resilience; Critical infrastructure; Service ecosystems	Demonstrates that hospitality becomes an integral component of critical urban infrastructure
Emergence of memorial tourism, digital heritage preservation and new destination narratives	Regenerative value creation	Regenerative Development; Place-based regeneration	Expands the societal contribution of hospitality beyond economic performance toward cultural and social regeneration
Experimentation, opportunity recognition, ecosystem collaboration and adaptive governance	Frontier Thinking capabilities	Frontier Thinking; Design Thinking; Dynamic Capabilities	Enables continuous adaptation through exploration, learning and collaborative innovation
Innovation stimulated by disruption, organizational learning and new business models	Antifragility	Taleb's Antifragility Theory	Explains how uncertainty becomes a driver of ecosystem development rather than merely a source of risk
Integration of adaptive governance, ecosystem partnerships, regeneration and continuous innovation	Regenerative Urban Hospitality Ecosystems (RUHE)	Complex Adaptive Systems; Regenerative Development	Represents the evolutionary outcome in which resilience, frontier thinking and antifragility jointly enable regenerative urban transformation

Source: systematized by *Mowll, 2013; Blečić & Cecchini, 2024; Taleb & West, 2023; Chiffi & Curci, 2024; Mangara & Dorasamy, 2026*

The synthesis of scientific approaches presented in Table 3 demonstrates that the empirical results go beyond descriptive observations and together support the development of a new conceptual explanation of the transformation of the urban hospitality ecosystem. Rather than operating as independent phenomena, resilience, functional expansion, frontier thinking, and antifragility represent interconnected stages in a broader evolutionary process that culminates in Regenerative Urban Hospitality Ecosystems (RUHE). The proposed framework therefore conceptualizes antifragility not simply as a systemic attribute but as a central transformational mechanism that links the adaptive capacity of hospitality ecosystems with the regenerative development of cities.

Thus, from the perspective of urban hospitality ecosystems, antifragility should not be understood solely as the ability to survive adverse or catastrophic events. Rather, it manifests itself through the expansion of ecosystem functions in times of crisis. Unlike resilient systems that seek to restore pre-crisis productivity, anti-fragile hospitality ecosystems generate new forms of public, social and economic value precisely because they are exposed to uncertainty.

2.2 The Mechanism of Transformation: Frontier Thinking as a Dynamic Capability

Based on the theoretical conclusions obtained about the transformation from resilience to regeneration, it is worth noting that transformation processes occur with innovative (frontier) thinking. The crisis is no longer perceived as a “dead end”, but as a trigger for rethinking the existing business model or even the strategic development of an economic entity / ecosystem, etc. At the same time, resilience creates such organizational competencies as stress resistance, the ability to effectively use a “financial” or “reputational” “cushion” – a margin of safety that keeps the business system from collapse for a long time. Regenerativity allows us to see new ways for business or directions of diversification, which allow us to restore potentials lost as a result of disruptive events. Frontier thinking provides tools for proactive actions in such adverse situations.

This is confirmed by the results of interviews with experts in the service sector and municipalities of leading cities in Ukraine *(Table 4)*.

Table 4. Expert-Derived Frontier Thinking Capabilities for Transforming Adverse Situations into Regenerative Outcomes

Frontier Thinking Capability	Dominant Empirical Insight from Interviews	Typical Trigger Situation	Proactive Resilience Pathway	Regenerative Pathway
Reframing capability	Experts consistently emphasized that crises should not be managed as temporary disruptions but as opportunities to redefine organizational purpose, markets, and value propositions.	Demand collapse, market disruption, business model failure	Strategic repositioning, adaptive decision-making	Business model innovation and market diversification
Systems exploration capability	Experts highlighted that organizational recovery depends on understanding ecosystem interdependencies rather than optimizing individual organizations.	Infrastructure disruption, fragmented supply chains, ecosystem instability	Resource reconfiguration and ecosystem coordination	Regenerative ecosystem partnerships and network resilience
Future-oriented capability	Experts stressed the importance of preparing for multiple possible futures instead of relying on linear forecasting or a single recovery scenario.	Persistent uncertainty, geopolitical instability, climate-related risks	Scenario planning and strategic flexibility	Antifragile adaptation and long-term transformation
Experimental capability	Experts described continuous experimentation, rapid testing, and iterative learning as essential responses under conditions of uncertainty.	Technological disruption, digital transformation, rapidly changing customer expectations	Agile adaptation and organizational learning	Continuous innovation capability
Collaborative capability	Experts repeatedly identified collaboration among businesses, municipalities, universities, civil society, and local communities as the primary mechanism of overcoming complex crises.	Institutional deadlocks, workforce shortages, governance fragmentation	Cross-sector collaboration and collective problem-solving	Shared value creation and collaborative governance
Regenerative capability	Experts viewed recovery as an opportunity to improve the social, environmental, and economic quality of	Environmental degradation, social decline, destination deterioration	Adaptive regeneration and sustainable resource management	Regenerative urban hospitality ecosystems

	urban ecosystems rather than restore previous conditions.

Source**:** The complete semi-structured interview guide is provided in Additional file 1 (Research Instrument and Methodological Appendix).

The propositions summarized in Table 4 demonstrate that frontier thinking is not a set of isolated management techniques, but rather an integrated system of organizational capabilities that are activated by adverse or disruptive situations. Throughout the interviews, experts consistently emphasized that crises, uncertainty, and ecosystem disruption should not be interpreted solely as threats that require the restoration of a previous equilibrium. Instead, they should be viewed as catalysts for strategic rethinking, experimentation, collaboration, and long-term transformation.

It is important to note that the empirical results show a consistent, rather than static, relationship between resilience and regeneration. The identified capabilities initially strengthen organizational resilience by improving adaptive decision-making, resource reconfiguration, strategic flexibility, and collaborative problem solving. However, their strategic value goes beyond short-term adaptation. Through continuous learning, ecosystem coordination, and opportunity-driven innovation (experiments), these opportunities gradually generate regenerative outcomes that enable organizations and urban hospitality ecosystems to evolve beyond their pre-disruption state.

The results also indicate that frontier thinking functions as a cognitive and strategic mechanism that links adverse events with regenerative transformation. Rather than reacting quickly to environmental turbulence, organizations that exhibit frontier thinking actively reframe disruptions as a source of innovation, capacity development, and ecosystem renewal. Thus, resilience emerges as an intermediate adaptive state, while regeneration represents a longer-term developmental trajectory.

Let us take a closer look at the frontier thinking tools that enable hospitality ecosystems to move from resilience to regeneration *(Fig. 1)*. Presented in Fig. 1 empirical connections form the basis for a conceptual model that integrates the identified frontier thinking opportunities into a single transformation framework that explains the transition from resilience to regenerative urban hospitality ecosystems.

The framework proposed in Fig. 1 integrates knowledge from complex adaptive systems theories and design thinking. This explains the mechanisms by which frontier thinking enables organizational transformation. Thus, from the perspective of complex adaptive systems, urban hospitality ecosystems are understood as nonlinear, self-organizing systems characterized by uncertainty, emergence, and constant adaptation. Therefore, organizational transformation cannot be achieved through linear planning alone, but requires dynamic capabilities that are able to sense, interpret, and respond to changes in systemic conditions. Rather than functioning as isolated management practices, frontier thinking tools operate at three interconnected levels—cognitive, strategic, and transformational—forming an integrated system of capabilities that supports adaptation in the face of constant uncertainty. At the

cognitive level, reframing and future thinking change the interpretation of disruptive events, challenging established assumptions and expanding the range of possible responses. This shift allows hospitality ecosystems to perceive crises not only as threats but also as opportunities for strategic renewal. At the strategic level, systems exploration and experimentation facilitate adaptive decision-making through ecosystem analysis, resource reconfiguration, and iterative learning. Finally, at the transformational level, collaboration and regenerative design extend organizational adaptation beyond survival, facilitating collective action, ecosystem renewal, and the creation of long-term shared value.

The framework also illustrates that different frontier thinking capabilities are activated by specific triggers and stalemates, including market disruptions, technological change, institutional deadlocks, environmental degradation, and ongoing uncertainty. While each capability addresses different organizational challenges, their combined application creates a cumulative process of transformation. Initially, organizations strengthen resilience by improving adaptive capacity and strategic flexibility; subsequently, continuous experimentation, ecosystem collaboration, and regenerative design promote antifragility, allowing organizations to benefit from volatility rather than simply resist it. Ultimately, this process contributes to the emergence of regenerative urban hospitality ecosystems capable of generating sustainable social, economic, and environmental value. This ecosystem perspective is consistent with previous research that has emphasized multi-stakeholder governance as the foundation for tourism system development. This is supported by the study by Okhrimenko A. et al. *(2019)*, where effective tourism governance (where the hospitality sector is implemented as a separate sector) results from coordinated interactions between public authorities, private businesses, communities, and consumers, which creates synergistic effects through constructive inter-stakeholder communication. Such interaction is not only a governance mechanism, but also a dynamic frontier thinking capability that enables regenerative transformation in the face of constant uncertainty.

Accordingly, the possibility of moving from resilience to regenerative urban hospitality ecosystems conceptualizes frontier thinking as a dynamic capability that links disruptive events with regenerative outcomes, thereby providing a theoretical basis for the Regenerative Urban Hospitality Ecosystem (RUHE) model.

2.3 The Mechanism of Transformation: Frontier Thinking as a Dynamic Capability

The generalization of the results of the thematic analysis and the identified capabilities of frontier thinking shows that urban hospitality ecosystems have formed not only the ability to withstand shocks in conditions of crises and disasters, but also the ability to become better thanks to them. At the same time, it is appropriate to state that resilience, antifragility and regenerative development should be considered not as independent concepts, but as successive stages of the evolution of organizations and ecosystems. After all, resilience ensures the ability of the system to maintain functionality during shocks, antifragility turns the experience of interaction with uncertainty into a source of accumulation of new competencies, while regeneration reflects a qualitatively new state of development, in which the system not only recovers, but also creates new social, economic and ecological value. Therefore, based

on these statements, the theoretical architecture of Frontier Thinking as an Integrative Mechanism *(Fig. 2)* was formed. The proposed architecture reflects two interconnected logics of transformation. The vertical axis shows the evolution of the system: from environmental complexity (Complex Adaptive Systems) through the accumulation of anti-fragile capabilities to regenerative outcomes. The horizontal axis reflects the mechanism of this transition, where frontier thinking integrates the principles of design thinking and dynamic capabilities into a single strategic decision-making process.

Figure 2 demonstrates the theoretical architecture of frontier thinking as a central integrative mechanism for the transformation of urban hospitality ecosystems. In contrast to traditional models that view resilience as the end result of adaptation to crisis phenomena *(Mowll, 2013; Keeler, 2018; Shimizu & Clark, 2019; Saikanth et al., 2025; Mangara & Dorasamy, 2026)*, the proposed approach shows that resilience is only the initial stage of the evolutionary process. Frontier thinking itself provides the transition from adaptive response to the formation of antifragile capabilities that create the prerequisites for the regenerative development of the ecosystem. Conceptually, the framework integrates four complementary theoretical approaches, each of which explains a separate aspect of the transformation process. The theory of complex adaptive systems (Complex Adaptive Systems) defines the nature of urban hospitality ecosystems as nonlinear, interdependent and self-organizing systems, the development of which occurs as a result of the constant interaction of many actors. Design Thinking provides a toolkit for rethinking problems, generating alternative solutions, experimentation and rapid learning. The concept of Dynamic Capabilities explains the ability of organizations to timely detect changes in the external environment, mobilize resources and transform their own competencies in accordance with new conditions. The concept of antifragility, in turn, demonstrates that interaction with uncertainty can become a source of accumulation of new capabilities and values, and not only a risk factor.

Therefore, all concepts do not function in isolation, but are combined through frontier thinking, which plays the role of integrative dynamic capability and provides a relationship between systemic understanding of complexity, creative search for alternatives, organizational adaptation and the ability to transform crisis events into a source of development. It is this that ensures the transition from reactive response to crisis phenomena to proactive construction of new trajectories of development of urban hospitality ecosystems. As a result, a logical chain of transformation is formed, in which interaction with the environment does not end with the restoration of the functioning of the system, but leads to the emergence of a new quality of development - Regenerative outcomes, capable of creating long-term economic, social and environmental value.

Therefore, there is a need to integrate the above provisions into a holistic conceptual framework of the Regenerative Urban Hospitality Ecosystem (RUHE), which explains the mechanism of transition from resilience to regenerative development *(Fig. 3)*.

The proposed Regenerative Urban Hospitality Ecosystem (RUHE) model conceptualizes the mechanism of transformation of urban hospitality ecosystems under the influence of crisis and other destabilizing events. Unlike traditional models that consider resilience as the final result of crisis management, RUHE

demonstrates that adaptation is only one of the possible stages of system evolution. The starting point of the model is disruptive events that activate frontier thinking as an integrative cognitive-strategic mechanism. Through the sequence of processes sense disruption, reframe assumptions, explore alternatives, reconfigure resources, create future value, organizations form different response trajectories. Depending on the strategic priorities and maturity of management, they can focus on ensuring resilience, developing antifragility, or directly on regenerative transformation. At the same time, the model assumes that the long-term strategic goal of the development of urban hospitality ecosystems is precisely the regenerative state.

At the same time, regenerative transformation is realized through the interaction of five key components of the ecosystem: People, Business, Community, Environment and Governance. Their interconnection is ensured by a set of regenerative processes, in particular, cross-sectoral cooperation, adaptive leadership, joint knowledge creation, resource regeneration, business ecosystem development and continuous innovation, etc. As a result, transformational results are formed, covering economic renewal, social cohesion, ecological regeneration and adaptive governance.

It is worth noting that from the perspective of Complex Adaptive Systems, the proposed model reflects the nonlinear nature of ecosystem development. The interaction of its components generates new system properties (emergent system qualities), including regenerativity, inclusiveness, sustainable development and innovation. Thus, regeneration is considered not as a separate result of recovery from the crisis, but as a new qualitative state of development of the urban hospitality ecosystem.

3 Methods

3.1. Research Design

The study is based on a qualitative research design aimed at conceptualizing the mechanism of transformation of urban hospitality ecosystems from resilience to regenerative development. Given the limited level of theoretical elaboration of the phenomenon of Frontier Thinking in the field of hospitality, a qualitative approach was chosen, which allows to investigate the complex relationships between management practices, organizational capabilities and processes of regenerative transformation. The methodological basis of the study was thematic interpretation of expert interviews with subsequent conceptual synthesis of the results obtained.

3.2. Participants and Data Collection

28 experts representing hospitality institutions, local governments, tourism destination management organizations and academia were involved in the participation *(Table 5)*.

Table 5. Stakeholder Profile of the Expert Sample (n = 28)

Characteristic	Category	n
Stakeholder group	Hospitality industry	11
	Local municipalities	9
	Destination Management Organizations	3
	Academia	5
Professional experience	5–10 years	9
	11–20 years	11
	More than 20 years	8

The expert sample covered the main stakeholder groups that shape urban hospitality ecosystems. The selection was carried out using the purposive sampling method, taking into account the professional experience of the participants in the field of development of urban hospitality ecosystems, crisis management and strategic development of territories. Such a structure provided the opportunity to compare managerial, entrepreneurial and academic views on transformation processes, which increased the analytical depth of the thematic analysis.

The collection of empirical data was carried out through semi-structured expert interviews in the period from May to July 2026. The interviews were conducted in online and offline formats depending on the capabilities and location of the respondents. The duration of each interview was 30-40 minutes. With the consent of the participants, all interviews were audio-recorded, after which they were transcribed verbatim and further anonymized coding was carried out. This ensured the confidentiality of personal data and created a single text base for further thematic analysis.

The complete semi-structured interview guide is available in Additional file 1 (Research Instrument and Methodological Appendix).

3.3. Data Analysis

The analysis of empirical data was carried out in stages according to the principles of abductive thematic analysis, which combined inductive coding of empirical materials with subsequent conceptual synthesis of the results (Table 6). This approach allowed not only to identify recurring themes in expert interviews, but also to build a conceptual model of the transformation of urban hospitality ecosystems.

Table 6. Stages of qualitative data analysis

Stage	Procedure	Outcome
Stage 1	Verbatim transcription of interviews	Unified textual dataset
Stage 2	Open coding	Initial concepts and codes
Stage 3	Axial coding	Thematic categories
Stage 4	Selective coding	Core dimensions of Frontier Thinking
Stage 5	Conceptual synthesis	RUHE Framework

At the first stage, all interviews were transcribed verbatim and checked for completeness of the content of the experts' statements. After anonymization, the materials were prepared for further coding.

At the second stage, open coding was used, during which individual expert statements were broken down into semantic units and marked with primary codes without pre-defined categories.

Next, related codes were combined into thematic categories by axial coding, which allowed establishing relationships between individual aspects of the transformation of urban hospitality ecosystems.

At the selective coding stage, central conceptual categories were identified that explained the mechanism of transformation from resilience to regenerative development. It was at this stage that the generalized structure of Frontier Thinking as an integrative dynamic capability was formed.

The final stage involved a conceptual synthesis of the obtained empirical results with the provisions of the theory of Complex Adaptive Systems, Design Thinking, the concept of Dynamic Capabilities and antifragility. The result of this stage was the formation of the author's framework Regenerative Urban Hospitality Ecosystem (RUHE).

Thus, the data analysis process was iterative: the results of each stage were refined by constantly comparing codes, categories and conceptual constructs until the internal logical consistency of the model was achieved.

3.4. Trustworthiness

To assess the quality of the study, the trustworthiness criteria proposed by Lincoln & Guba *(1985)* and adapted for thematic analysis in modern qualitative research by Nowell et al. *(2017)* were used. Credibility was ensured by involving experts from different groups of stakeholders of urban hospitality ecosystems, using semi-structured interviews and multi-stage thematic analysis, which allowed comparing different professional views on the transformation processes. Dependability was achieved by consistently documenting all stages of the study: from participant selection and interviewing to transcribing, coding and conceptual synthesis of results, which ensures the reproducibility of the research procedure. Confirmability was ensured by systematically comparing empirical data with the generated codes and categories, as well as by multiple revisions of interpretations during the

construction of the Regenerative Urban Hospitality Ecosystem (RUHE) conceptual model. Transferability was supported by a detailed description of the research context, characteristics of the expert sample, and the data analysis procedure, which creates opportunities for adapting the proposed approach to other urban hospitality ecosystems and related service sectors.

The use of these procedures ensured methodological transparency of the study and increased the validity of the proposed conceptual model (RUHE).

3.5. Ethical approval declarations

All potential participants were informed about the purpose of the study, the voluntary nature of participation, the right to withdraw from participation at any stage, and guarantees of confidentiality and anonymity of the data obtained. Informed consent was obtained from all participants before the start of the interview. The study was conducted in accordance with generally accepted ethical principles for research involving human subjects, including voluntary participation, informed consent, confidentiality, and respect for the rights of participants, consistent with the principles of the Declaration of Helsinki of the World Medical Association *(World Medical Association, 2013)*. Separate ethics committee approval was not obtained because the study involved anonymous expert interviews with adult participants, did not involve medical, biomedical, or psychological interventions, and did not involve the collection of sensitive personal data.

4 Discussion

This study shows that urban hospitality ecosystems differ not only in the ways they respond to threats and disruptive events, but also in the maturity of their adaptive mechanisms. Some ecosystems focus on building resilience as the ability to sustain functioning in the face of shocks. Others develop antifragility, using crisis phenomena as a source of learning, innovation, and repurposing resources. The most mature ecosystems move towards a regenerative logic of development, in which crisis becomes not only a challenge but also a prerequisite for the creation of new economic, social, environmental, and managerial value. Thus, regenerative hospitality ecosystems function as catalysts for proactive transformation, stimulating not only the adaptive behavior of individual organizations, but also the joint formation of new models of collaboration, governance, innovation, and value creation at the ecosystem level.

Therefore, the results provide a conceptual answer to the research question of how urban hospitality ecosystems can evolve from resilience-oriented adaptation to antifragile and regenerative development. In contrast to existing approaches *(*Keeler, 2018; Shimizu & Clark, 2019; Hashmi & Khassawneh, 2024; Rocca & Zielinski, 2024; *Khan et al., 2025;* Saikanth et al., 2025*)*, which mostly consider resilience as the final characteristic of an effective system, the results of this study indicate that it is only the initial stage of a broader transformational process. In this process, resilience ensures the ability of the system to absorb shocks and maintain critical functions, but does not in itself create the prerequisites for the emergence of new development opportunities.

Expert assessments confirmed the differences in approaches to responding to crises and disruptive events in urban hospitality ecosystems. Respondents (n = 28) consistently described three different logics of response: maintaining functional resilience, using crises as a source of organizational learning and innovation, and shaping regenerative development models focused on long-term creation of economic, social, and environmental value. At the same time, regardless of the sector represented by the respondents, the dominant view was the need to move from reactive management to proactive ecosystem transformation. This interpretation is consistent with contemporary resilience research *(*Gurran & Phibbs, 2018; Sapir, 2019; Tallon, 2020; Subadra, 2024*)*, which emphasizes the importance of the adaptive capacity of complex systems, but goes beyond the traditional understanding of recovery from crises. In addition, during the interviews, experts clarified that stakeholder cooperation is a necessary but insufficient condition for regenerative transformation. A similar emphasis on the role of partnership can be traced in modern literature. In particular, Okhrimenko A. et al. (2019) showed the importance of multisubject governance, and Shimizu M. & Clark A. *(2019)* showed the importance of government-stakeholder interaction in implementing resilience-based public policy. Our study does not deny these approaches, but develops them, explaining how such a multisubject system can not only function, but also become antifragile and regenerative in conditions of deep uncertainty. The decisive factor is the quality of this interaction, which acquires the characteristics of frontier thinking - joint rethinking, experimentation and coevolution. Unlike some theoretical approaches, such as design thinking *(*Goldschmidt, 2021; Sonowal, 2025*)*, which focus mainly on innovative problem solving or the concept of dynamic capabilities and explain the adaptation of organizations to change, frontier thinking integrates these approaches into a single mechanism for ecosystem transformation. It combines strategic rethinking, systems vision, experimentation and stakeholder co-evolution, ensuring the transformation of individual adaptive actions into regenerative changes at the level of the entire ecosystem.

Thus, the proposed conceptual framework allows us to formulate four interrelated propositions: (1) resilience serves as the basic adaptive capacity of urban hospitality ecosystems, ensuring their ability to absorb shocks and maintain critical functions; (2) antifragility acts as a central transformation mechanism that allows the system not only to adapt to change, but also to strengthen its own potential through learning, experimentation and resource reconfiguration; (3) frontier thinking functions as an integrative dynamic capability that combines the principles of design thinking, complex adaptive systems and dynamic capabilities into a single transformation process; and (4) the result of this evolution is the formation of a Regenerative Urban Hospitality Ecosystem (RUHE), within which regeneration encompasses economic, social, environmental and management processes. The proposed RUHE model develops the idea of antifragility, formulated by Taleb (2012), as the properties of systems to benefit from uncertainty and stressors. It explains how this process occurs: through the development of frontier thinking capabilities that transform crisis experiences into regenerative outcomes.

5 Conclusion

Existing theoretical approaches offer valuable but incomplete explanations of the transformation of urban hospitality ecosystems under conditions of prolonged uncertainty. Specifically, Complex Adaptive Systems explains the nonlinear dynamics of such ecosystems; Design Thinking provides mechanisms for problem reframing and solution generation; Dynamic Capabilities explain how organizations develop adaptive capabilities; and the concept of antifragility demonstrates how uncertainty can become a source of development rather than merely a source of risk. However, these approaches do not explain how these mechanisms interact to form a coherent trajectory from adaptive resilience to regenerative development. Addressing this theoretical gap led to the development of Frontier Thinking as an integrative mechanism and the Regenerative Urban Hospitality Ecosystem (RUHE) conceptual framework.

The principal theoretical contribution of this study lies not only in integrating several complementary theoretical perspectives but also in explaining the mechanism through which they collectively explain transformational processes. Within the proposed conceptual architecture, Frontier Thinking is positioned not as an additional theoretical perspective but as an integrative mechanism that connects Complex Adaptive Systems, Design Thinking, Dynamic Capabilities, and the concept of antifragility into a coherent evolutionary logic. This integration demonstrates how strategic experimentation, adaptive capabilities, ecosystem collaboration, and regenerative design collectively enable the transition from adaptive resilience to regenerative development under conditions of persistent uncertainty.

The conceptual analysis supports the proposed research proposition that antifragility functions as the central transformational mechanism through which Frontier Thinking enables the transition from adaptive resilience to regenerative development. Accordingly, the study achieved its objective by developing the conceptual architecture of the Regenerative Urban Hospitality Ecosystem (RUHE) framework and demonstrating the integrative role of Frontier Thinking in explaining this transformation.

Accordingly, the study achieved its objective by developing the conceptual architecture of the Regenerative Urban Hospitality Ecosystem (RUHE) framework and demonstrating the integrative role of Frontier Thinking in explaining the transition from adaptive resilience to regenerative development.

From a practical perspective, the RUHE framework may support policymakers, municipal authorities, destination management organizations, and hospitality practitioners in designing long-term urban recovery strategies that extend beyond infrastructure reconstruction toward regenerative ecosystem development. Consequently, urban recovery strategies should move beyond infrastructure restoration and incorporate mechanisms that foster experimentation, cross-sector collaboration, adaptive governance, and regenerative value creation as integral components of long-term urban development.

At the same time, this study has several limitations that should be acknowledged. First, the proposed RUHE framework is conceptual in nature and has not yet been empirically validated across different urban hospitality contexts. Second, although the framework integrates complementary theoretical perspectives into a coherent conceptual architecture, the operationalization of its key constructs and the development of standardized measurement indicators remain beyond the scope of the present study.

These limitations do not diminish the conceptual contribution of the framework but indicate the need for further empirical refinement and validation. In doing so, the study addresses the research questions concerning the mechanisms through which urban hospitality ecosystems can evolve from adaptive resilience toward regenerative development under conditions of persistent uncertainty.

The outlined research findings and identified limitations shape the perspectives of future research, which should focus on operationalizing the proposed constructs and developing reliable indicators for assessing regenerative urban hospitality ecosystems. Empirical validation of the RUHE framework using quantitative, qualitative, and mixed-methods research across different geographical, institutional, and post-crisis contexts will enable researchers to assess its explanatory power and practical applicability. Comparative studies can further refine the proposed framework by identifying context-specific ways in which Frontier Thinking contributes to regenerative urban development and long-term ecosystem transformation.

Ultimately, continued theoretical development and empirical validation of the RUHE framework have the potential to advance both scholarly understanding and practical approaches to regenerative transformation in urban hospitality ecosystems facing persistent uncertainty.

Abbreviations

RUHE – Regenerative Urban Hospitality Ecosystems

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Participation in the semi-structured expert interviews was voluntary, and written informed consent was obtained from all participants prior to data collection. Participants were informed about the purpose of the study, the voluntary nature of participation, their right to withdraw at any time without consequence, and the measures implemented to ensure confidentiality and anonymity. No personally identifiable information was collected, stored, or reported.

According to the research policies of the State University of Trade and Economics (Kyiv, Ukraine) and applicable national regulations, formal approval by an Institutional Review Board (IRB) or Ethics Committee was not required because the study involved voluntary anonymous interviews with competent adult participants and did not include medical, clinical, psychological, or other interventions requiring ethical review.

Further details regarding the interview protocol, ethical procedures, and data management are provided in the publicly available Research Instrument and Methodological Appendix (Bovsh et al., 2026)..

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request. Interview transcripts are not publicly available because they contain information that could compromise participant confidentiality and anonymity.

The complete semi-structured interview guide is provided as Additional file 1 (Research Instrument and Methodological Appendix), which accompanies this article as supplementary material. The same material is also publicly available via ResearchGate (DOI: 10.13140/RG.2.2.30998.10565), thereby supporting methodological transparency and facilitating the reproducibility and adaptation of the research approach.

No custom code was generated or analysed during this study.

Funding

This research received no external funding.

Conflict of interest / Competing interests

The authors declare no competing interests.

Author contributions

L.B.: Conceptualization, Methodology, Formal analysis, Visualization, Writing – original draft. A.R.: Investigation, Validation, Writing – review & editing. I.T.: Investigation, Validation, Supervision, Writing – review & editing. All authors contributed to the study conception and manuscript revision and approved the final version of the manuscript.

Use of AI tools

Generative artificial intelligence was used exclusively to assist in the development of one conceptual figure included in the manuscript. The authors reviewed, verified, and take full responsibility for the accuracy and interpretation of all content. No AI tools were used for data analysis, interpretation of findings, or the generation of the scientific conclusions.

Acknowledgements

The authors gratefully acknowledge the 28 experts who participated in the semi-structured interviews and generously shared their professional knowledge, practical experience, and valuable insights. Their contributions provided the empirical foundation for this study and were instrumental in the development of the Regenerative Urban Hospitality Ecosystem (RUHE) framework. Participants were informed that all

interview data would be anonymized and reported only in aggregated form to ensure confidentiality. A summary of the study findings will be made available to participants upon request following publication.

References

1. Blečić, I., & Cecchini, A. (2024). Urban policy design for antifragility. Fragility and Antifragility in Cities and Regions, 71–90. https://doi.org/10.4337/9781035312559.00013
2. Boiko, M., Bovsh, L., & Okhrimenko, A. (2022). Crisis resilience of the tourism business in martial law. *The International Scientific-Practical Journal "Commodities And Markets,"* 42(2), 31–47. https://doi.org/10.31617/2.2022(42)03
3. Bovsh, L. A., Tkachuk T., Zikii, N., Mouloudj, K., &Chemseddine Bouarar A. (2024). Strategic Management of Hospitality Security Under the Influence of Macro Trends. *Cases on Security, Safety, and Risk Management*. Chapter 9. IGI Global, 228-257. doi: https://doi.org/10.4018/979-8-3693-2675-6.ch009
4. Bovsh, L., Rasulova, A., & Hopkalo, L. (2025). Anti-crisis urban design and hotel infrastructure: A new paradigm of post-war urban development. *Urban Planning and Construction, 3*(2), 40–62. https://doi.org/10.55121/upc.v3i2.1102
5. Bovsh, L., Rasulova, A., & Tonkonog, I. (2026). *Research instrument and methodological appendix for "From Resilience to Antifragility: A Frontier Thinking Framework for Regenerative Urban Hospitality Ecosystems"* [Method]. ResearchGate. https://doi.org/10.13140/RG.2.2.30998.10565
6. Chiffi, D., & Curci, F. (2024). Disentangling antifragility from resilience. Fragility and Antifragility in Cities and Regions, 6–24. https://doi.org/10.4337/9781035312559.00008
7. Dinga, E. (2025). Facing Crises: Antifragility, Sustainability, Autopoieticity. Economic Resilience during Overlapped Crises, 403–442. https://doi.org/10.1007/978-3-031-80224-9_8
8. Ecosystem-based Approaches for Resilience Building in Himalayan Landscapes. (2025). In Y. D. I. Khan, M. Goswami, & S. Nautiyal (Editors), Disaster Resilience and Green Growth. Springer Nature Singapore. https://doi.org/10.1007/978-981-95-2007-7
9. Goldschmidt, G. (2021). Critical Design and Design Thinking vs. critical design and design thinking. Different Perspectives in Design Thinking, 6–20. https://doi.org/10.1201/9780429289378-2
10. Gurran, N., & Phibbs, P. (2018). Urban regeneration and planning regulations. Urban Regeneration in Australia, 51–73. https://doi.org/10.4324/9781315548722-3
11. Hashmi, G., & Khassawneh, O. (2024). Contextualizing the interplay of community resilience and digital technologies to create sustainable destinations. Tourism Safety, Security and Resilience, 263–275. https://doi.org/10.4324/9781003479673-23
12. Johnson B., "Towards a theory of engineered complex adaptive systems of systems," *2018 Annual IEEE International Systems Conference (SysCon)*, Vancouver, BC, Canada, 2018, pp. 1-5, doi: 10.1109/SYSCON.2018.8369514.

Holloman, K. (2008). Complex Adaptive Systems Theory and Military Transformation. Applications of Complex Adaptive Systems, 278–305. https://doi.org/10.4018/978-1-59904-962-5.ch011

13. Keeler, L. (2018). Urban resilience as learning: Building transformative capacity through game-based approaches in Tempe, Arizona, in Proceedings of the IFoU 2018: Reframing Urban Resilience Implementation: Aligning Sustainability and Resilience, Barcelona, 10–12 December 2018, MDPI: Basel, Switzerland, doi:10.3390/IFOU2018-05986
14. Leary, M.E., & McCarthy, J. (Eds.). (2013). The Routledge Companion to Urban Regeneration (1st ed.). Routledge. https://doi.org/10.4324/9780203108581
15. Lincoln, Y.S. and Guba, E.G. (1985) Naturalistic Inquiry. SAGE, Thousand Oaks, 289-331. http://dx.doi.org/10.1016/0147-1767(85)90062-8
16. Mangara, F., & Dorasamy, N. (2026). Community-Based Approaches to Urban Resilience in Southern Africa. Sustainable Urban Development in Southern Africa, 249–268. https://doi.org/10.1007/978-3-032-08286-2_10
17. Mowll, R. (2013). Infrastructure Resilience in the Samoas: Policy Approaches. Thesis. https://doi.org/10.26686/wgtn.17004772.v1
18. Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J. (2017) Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, 16, 1-13. https://doi.org/10.1177/1609406917733847
19. Okhrimenko, A., Boiko, M., Bosovska, M., Melnychenko, S., & Poltavska, O. (2019). *Multisubject governance of the national tourism system*. *Problems and Perspectives in Management, 17*(2), 165–176. https://doi.org/10.21511/ppm.17(2).2019.13
20. Rocca, L. H. D., & Zielinski, S. (2024). The role of governance and social capital in building resilience in post-conflict tourism destinations. Tourism Safety, Security and Resilience, 109–124. https://doi.org/10.4324/9781003479673-11
21. Saikanth, D.R.K. *et al.* (2025). Advancing Ecosystem Recovery: Cutting-Edge Research in Restoration Science. In: Khan, Y.I., Goswami, M., Nautiyal, S. (eds) Ecosystem-based Approaches for Resilience Building in Himalayan Landscapes. Disaster Resilience and Green Growth. Springer, Singapore. https://doi.org/10.1007/978-981-95-2007-7_21
22. Sapir, J. (2019). Complex Adaptive Systems (CAS) Theory. Thriving at the Edge of Chaos, 49–74. https://doi.org/10.4324/9780429356582-5
23. Shimizu, M., & L. Clark, A. (2019). Resilience-Based Public Policy. Approaches Assessment Framework. Nexus of Resilience and Public Policy in a Modern Risk Society, 115–126. https://doi.org/10.1007/978-981-10-7362-5_7
24. Sonowal, G. (2025). Design-Thinking to Futures-Thinking. Design Thinking, 146–161. https://doi.org/10.1201/9781003509950-7
25. Subadra, I. N. (2024). Pecalang and tourism resilience in Bali. Tourism Safety, Security and Resilience, 232–246. https://doi.org/10.4324/9781003479673-20
26. Taleb, N. N. (2012). *Antifragile: Things That Gain from Disorder*. Random House. New York, 519 pp.

27. Taleb, N. N., & West, J. (2023). Working with Convex Responses: Antifragility from Finance to Oncology. *Entropy*, *25*(2), 343. https://doi.org/10.3390/e25020343
28. Tallon, A. (2020). Urban regeneration and sustainability. Urban Regeneration in the UK, 173–190. https://doi.org/10.4324/9781351030304-10
29. *World Medical Association [WMA]* (2013) Declaration of Helsinki—Ethical Principles for Medical Research Involving Human Subjects. World Medical Association, Ferney-Voltaire. https://www.wma.net//policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Figures

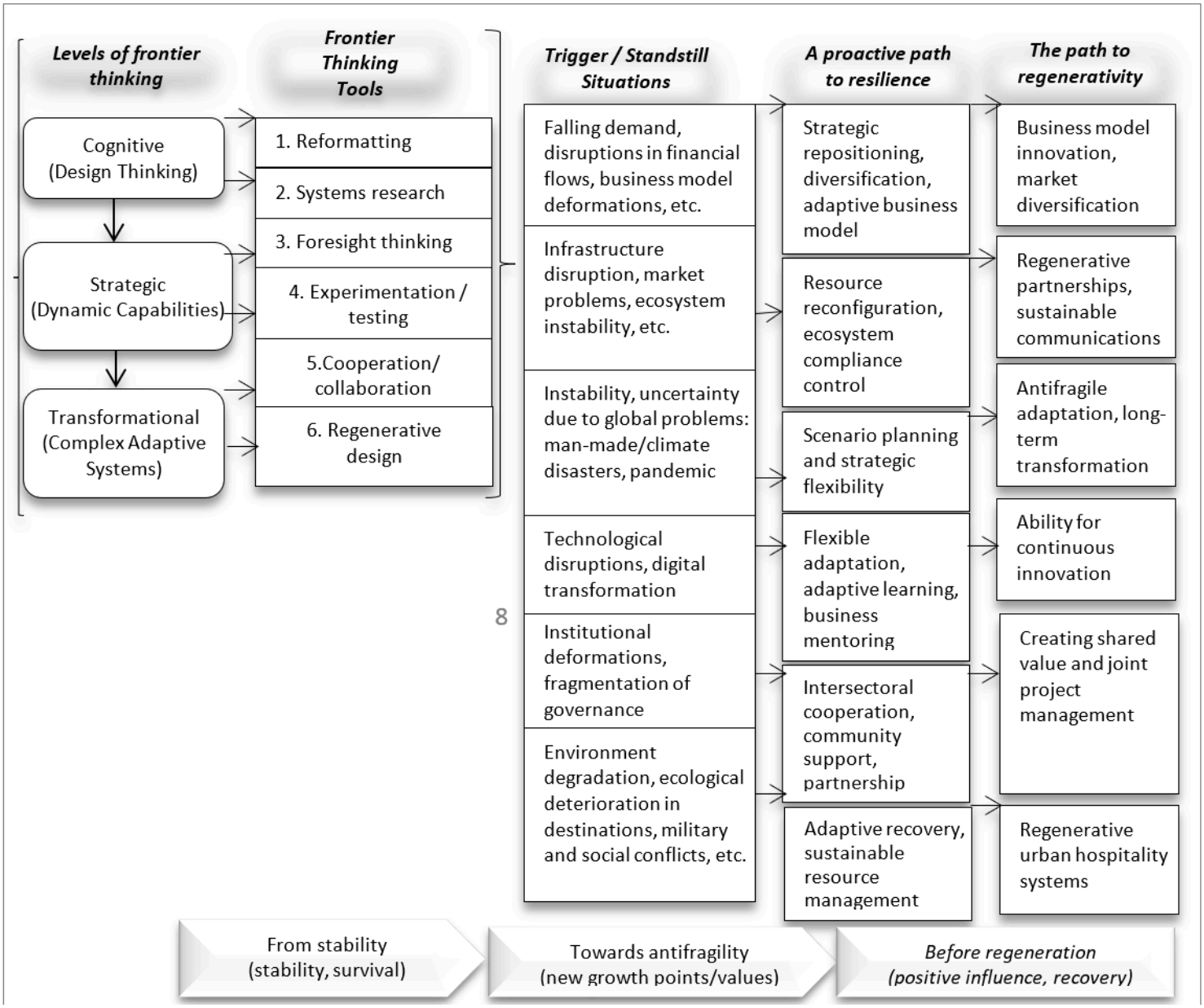


Figure 1

Frontier Thinking as a Multi-Level Capability System Enabling the Transition from Resilience to Regenerative Urban Hospitality Ecosystems

Source: Developed by the authors

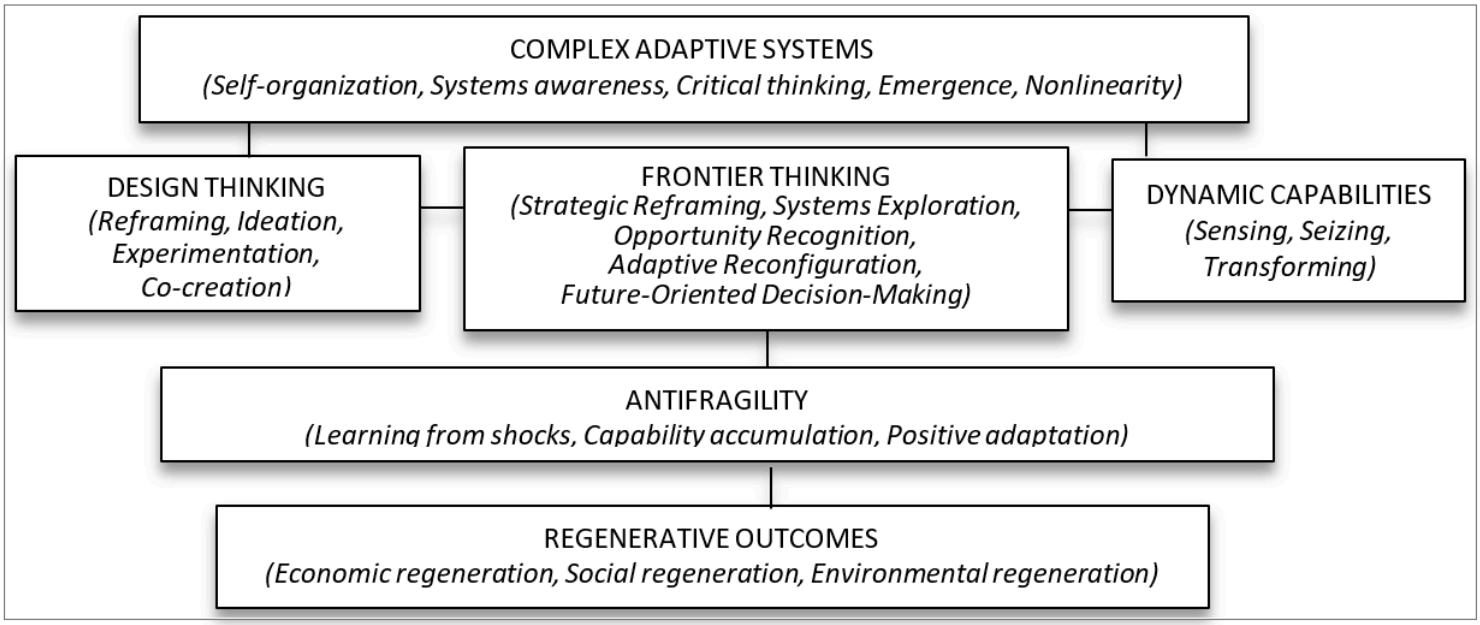


Figure 2

Theoretical Architecture of Frontier Thinking as an Integrative Mechanism for Regenerative Urban Hospitality Ecosystems

Source: Developed by the authors

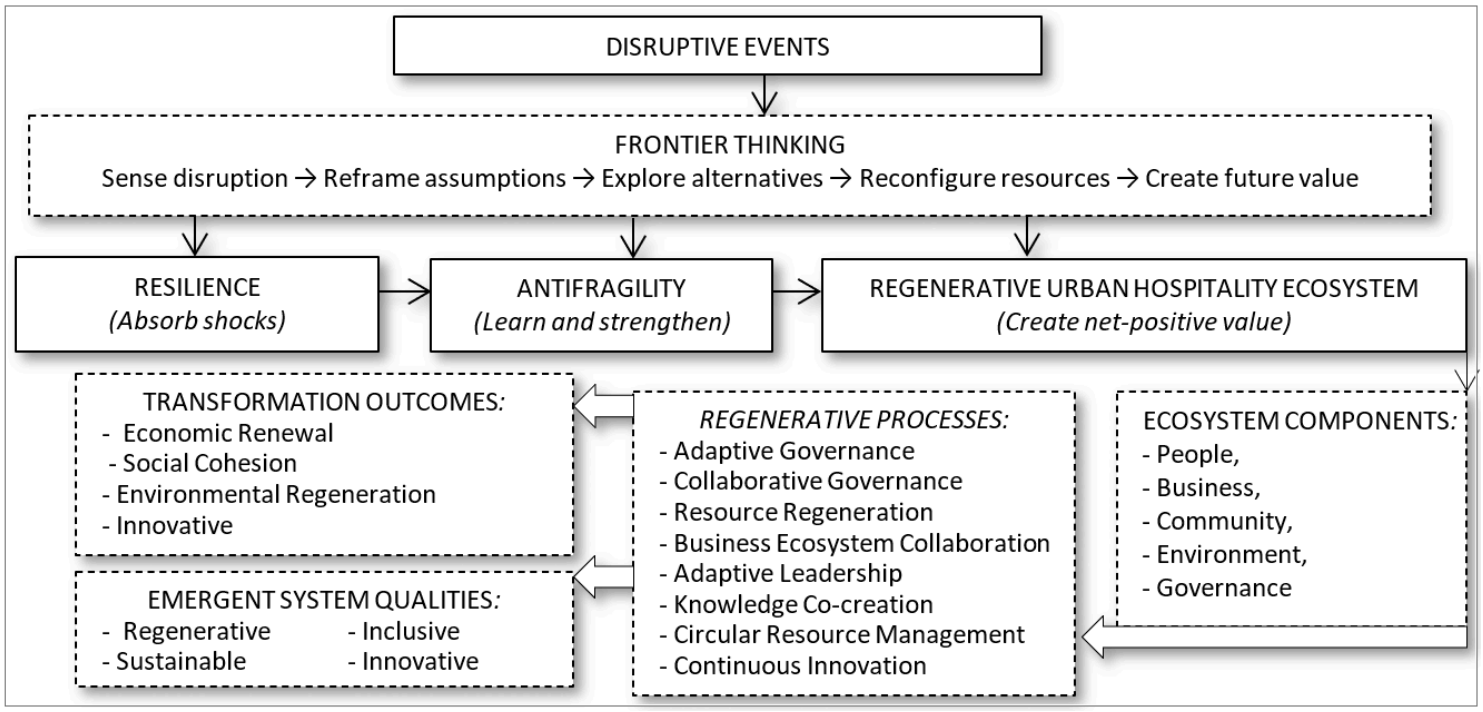


Figure 3

The Regenerative Urban Hospitality Ecosystem (RUHE) Model

Source**:** Developed by the authors

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile1ResearchInstrumentandMethodologicalAppendix.docx