

Urban Resilience as a Content-oriented Approach to Urban Design Process

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Abstract

resilience concept defines a practical framework for evaluating and analyzing urban systems. It helps address the vulnerabilities caused by the complex challenges that cities face, and prepare and adapt to them. Urban design process has an important role in facilitating this self-organization and adaptive process to change. Therefore, this article applies both substantive and procedural characteristics of urban resilience and related capacities as a content-oriented approach to urban design process. To do so, we identified a conceptual framework, referring to urban resilience concepts, to navigate the urban design process through the “Strategic Planning Approach for Resilience Keeping” (SPARK) methodology. This conceptual framework guides the problem-finding and problem-solving process, from conceptualization and analysis to implementation and evaluation. This research provides a clear and practical way to identify a physical-technical and participatory urban design process, involving a wide range of stakeholders to develop resilient, flexible, and possible urban design plans. Such a process can cope with changing conditions and reduce the theory-practice gap in urban design knowledge.

Keywords: Urban resilience; Urban design Process; SPARK methodology; Problem-finding, Problem-solving

1. Introduction

Today, in the face of many challenges in cities due to increasing urbanization, climate change, and social complexities, a wide range of concepts and approaches have emerged to challenge purely aesthetic approaches to urban design. This evolution of urban design content has been twofold and encompasses both the substantive and procedural aspects; From a substantive aspect, researchers have identified more and newer urban design qualities with different emphases on visual, spatial, social, and environmental approaches. Along with these, procedural aspect of urban design and consequently urban design process have changed to provide the possibility of achieving urban design goals (Cuthbert, 2007, Carmona and Tiesdell, 2007). These evolutions in urban design process are more focused on how to navigate the process, based on concepts and approaches that affect urban design goals. This is a content-based approach to the urban design process, more than a change in the steps of the process (Alikaei and Amin Zadeh Gohar Rizzi, 2019). Therefore, it is crucial to examine the concepts, approaches, and new theories that affect urban design knowledge to deal with changing and unpredictable conditions of today's cities. These concepts can affect the substantive and procedural aspects of urban design and the expected outcomes of the urban design process.

It provides a way to overcome vulnerability resulting from unforeseen changes and crises, ranging from natural disasters to social and economic disruptions (UNISDR, 2017). Therefore, many experts have introduced urban resilience as an innovative approach to urban design and planning that offers a comprehensive framework to integrate various dimensions of resilience into the urban processes. The framework's goal is to enable cities to cope with, recover from, and adapt to shocks and stresses while keeping essential functions and supporting the well-being of their residents (Dhanani, 2013, Sharifi and Yamagata, 2018, Ribeiro and Pena Jardim Gonçalves, 2019, Masnavi et al., 2019, Kong et al., 2022, Asadzadeh et al., 2022, Amirzadeh et al., 2022, Aelbrecht and Arefi, 2023). It goes beyond the traditional focus on physical-aesthetic approach and incorporates economic, social, and environmental dimensions into the urban design process. So, the urban resilience concept expands the scope of urban design by incorporating the principles of resilience into every step of the design process. It recognizes that cities are dynamic and vulnerable systems that require strategies to anticipate, respond, and bounce back from disturbances. This evolution can change the way of thinking, fundamental assumptions, and criteria for the success or failure of urban design actions.

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This research aims to apply urban resilience as a content-oriented approach to the urban design process, and examines the implications and logic of this concept for the theoretical dimension of the process. It explores substantive and procedural characteristics of urban resilience, and how resilience thinking can be integrated into different stages of the urban design process, from conceptualization and analysis to implementation and evaluation. This vision can help shape more practical, realistic, and problem-based plans by reducing urban design knowledge's theory- practice gap.

2. Research Background

After the emergence and application of resilience concept in engineering and ecological sciences, urban studies embraced this concept in the early 21st century like many other scientific disciplines; at first, this concept was mainly used to analyze of urban systems during natural hazards, and later it encompassed more changes and crises in various social, political and economic domains (Wilkinson, 2011, Lu and Stead, 2013, Sharifi and Yamagata, 2018, Nunes et al., 2019, Masnavi et al., 2019, Bueno et al., 2021, Fallahi et al., 2024). In this situation, resilience is defined as an interdisciplinary approach to help cope with and provide effective solutions to planning challenges for complex socio-ecological systems such as cities.

Among a wide range of existing theoretical literature, resilience is often the ability of a system to resist and cope with major crises and shocks and to stay or quickly go back to normal and natural functions (Holling, 1973, Wardekker, 2021). In other words, resilience means that a System (S) can cope with Disturbances and disorders (D) while keeping its Identifying characteristics (I) (Thorén, 2014, Thorén and Olsson, 2018). This ensures the system's persistence and Stability, and protects it from collapse and destruction due to changes. Based on this, Urban resilience is defined as (1) "preparedness" of urban systems and their dimensions (economic, social, physical, natural, institutional) to plan and prepare for possible or unforeseen disturbances to enable effective decision-making process before crises, (2) to "absorption" the first damage to endure

and cope with a disturbance without being significantly degraded or losing functionality, (3) for "adaptation" and taking advantage of opportunities to initiate informed and deliberate changes in response to changing conditions, and (4) to rapidly "transformation" of urban systems, consciously and intentionally, to make a completely new system that can adapt better to changing conditions when the current system is not viable anymore (Fig. 1) (Davoudi et al., 2013, Meerow et al., 2016, Ribeiro and Pena Jardim Gonçalves, 2019, Zeng et al., 2022, Alikaei et al., 2023). So, a complex system such as a city can have multiple trajectories of resilience across time and space. This means that the city can self-organize and learn and adapt to changing situations. The first step to reaching these goals is to find out the Identifying characteristics of the system and their vulnerability. These characteristics represent a certain function or structure of urban subsystems, in both geographical-spatial and social dimensions, that has a crucial role in increasing and improving urban capacities for coping with crises and disturbances. Therefore, identifying characteristics by considering geographical-spatial as substantive characteristics and social dimensions as procedural characteristics can be a sign or an indication of the presence or absence of resilience:

- **Substantive characteristics** of urban resilience are spatial concepts or qualities that provide the possibility of technical evaluation of urban subsystems and increase the system's ability to respond to various development requirements in different conditions; These characteristics are considered in all geographical-spatial subsystems to reduce harmful and damaging effects through increasing prevention and preparedness capacities, absorption, adaptability and transformability (Table 1).
- **Procedural characteristics** of urban resilience refer to the qualities or attributes of social subsystems associated with the processes and approaches in which resilience strategies are developed, implemented, and managed over time. These characteristics include capacity building, changing the value system, and overcoming unequal power relations (Table 2).

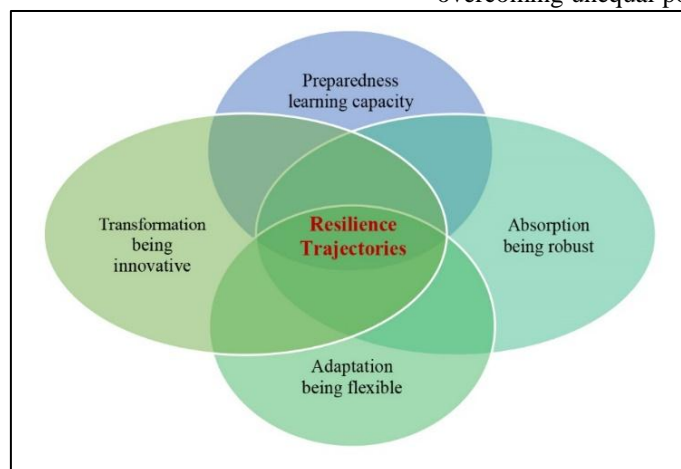


Fig. 1 Multiple trajectories of urban resilience

Table 1
 Substantive Characteristics of Urban Resilience

Redundancy	<ul style="list-style-type: none"> Multiple components with similar functions or backup options that ensure the system can still operate in case of failure.
Diversity	<ul style="list-style-type: none"> Variety or heterogeneity in shapes, elements, or functions to protect and adapt the system's performance against the various circumstances.
Multi-functionality	<ul style="list-style-type: none"> Using some of the urban physical components for multiple purposes.
Efficiency	<ul style="list-style-type: none"> Structural complexity at all scales, with a hierarchical organization of various components.
Robustness	<ul style="list-style-type: none"> Stability and withstanding through disturbances without losing functionality or identity.
Connectivity	<ul style="list-style-type: none"> linkage or interdependence among elements, functions, or actors within a system.
Adaptability	<ul style="list-style-type: none"> learning from experience and being flexible to feedback, adjust or modify behaviors, structures, or processes in response to changing conditions
Resourcefulness	<ul style="list-style-type: none"> mobilizing and managing resources (human, financial, physical, etc.) effectively and efficiently to respond to disruptions and their effects.
Independence	<ul style="list-style-type: none"> operating autonomously or self-reliantly without depending on external support or intervention.
integration	<ul style="list-style-type: none"> integrated and interconnected urban subsystems, to have physical and functional interaction to receive support, information, and feedback from each other.
Modularity	<ul style="list-style-type: none"> modular urban subsystems that work together without interfering and foster adaptability through the interdependence of modules to enable the diffusion of innovation and information.

(Source: Godschalk, 2003, Allan and Bryant, 2011, Thorén, 2014, Feliciotti et al., 2016, Sharifi et al., 2017, Spaans and Waterhout, 2017, Ribeiro and Pena Jardim Gonçalves, 2019, Parizi et al., 2021, Parizi et al., 2022, Zeng et al., 2022)

Table 2
 Procedural Characteristics of Urban Resilience

Inclusion	<ul style="list-style-type: none"> ensuring that all people, especially the vulnerable and marginalized, are involved and benefited from the urban development process. .
Social justice and Equity	<ul style="list-style-type: none"> Empowering local communities to include diverse voices and needs, and ensuring that resilience outcomes are inclusive, sustainable, and provide fair access to rights, resources, and opportunities.
participation	<ul style="list-style-type: none"> local involvement and power delegation for engaging all diverse groups of stakeholders through building partnerships, sharing knowledge, coordinating actions, and aligning visions
Creativity and Innovation	<ul style="list-style-type: none"> generating and implementing innovative ways to transform the crisis into a chance for a better situation that can cope with the evolving types of threats.
mutual learning	<ul style="list-style-type: none"> the exchange and application of knowledge and experiences among different stakeholders involved, to improve the capacity to cope with various risks.
Foresight capacity	<ul style="list-style-type: none"> The ability to anticipate future opportunities and threats, identify their effects, and develop suitable plans and scenarios to respond to potential risks. .
Self-organization	<ul style="list-style-type: none"> emergence of Macro-scale patterns from smaller-scale interactions, empowered by strengthened communities, cross-scale partnerships, and institutional feedback.
Coordination capacity	<ul style="list-style-type: none"> the ability to organize and align actions and decisions across different actors, sectors, or levels by collaboration, communication, trust, and learning together

(Source: Stringer et al., 2006, Jabareen, 2013, van Kerkhoff and Lebel, 2015, Sharifi and Yamagata, 2016, Allen et al., 2017, Sharifi et al., 2017, Normandin et al., 2019, Meerow et al., 2019, Lopez DeAsiain and Díaz-García, 2020, Parizi et al., 2021, Mngumi, 2021, Caughman, 2022, Kong et al., 2022, Nop et al., 2023)

Based on literature review, urban resilience can be explained as the ability of urban systems to cope with various disturbances, by considering substantive and procedural characteristics that affect them. These characteristics define urban resilience as:

- **Systems Thinking Approach:** Urban Resilience adopts a systems thinking approach, recognizing that a community or organization is made up of interconnected and interdependent components. It considers the relationships, feedback loops, and dependencies between different elements of a system. By understanding these dynamics, leverage points and interventions that have the potential to create positive ripple effects throughout the system can be identified.
- **Long-Term and Flexible Approach:** Urban Resilience acknowledges the inherent uncertainty and unpredictability of future events. It recognizes that risks and challenges may emerge in unexpected ways or combine in unforeseen manners. Therefore, Resilience processes incorporate multiple trajectories (preparation, absorption, adaptability, and transformation) to explore a range of possible future scenarios. This helps to anticipate and prepare for different outcomes, making the system or community more flexible and adaptable.
- **Adaptive Approach:** Urban resilience highlights the importance of adaptive capacity, which refers to ability a city to adjust, learn, and innovate in response to changing circumstances. It encourages cities to foster flexibility, diversity, and redundancy in their systems and structures, enabling them to absorb shocks and adapt to new challenges.
- **Multi-Dimensional Approach:** Urban resilience recognizes that resilience is not solely about physical aspect but also encompasses social, economic, and environmental aspects. This holistic approach considers the interconnections and interdependencies between different urban systems.
- **Multi-Scale Approach:** Urban Resilience operates at multiple spatial scales at the local, regional, and global levels. It recognizes that challenges and solutions can vary depending on the geographical context and interdependencies between different scales to ensure consistency, coherence, and alignment of efforts.
- **Short- to Long-Term Approach:** Urban resilience considers the complex and dynamic nature of urban systems, which requires evaluating their changing along temporal scales to manage both sudden and gradual changes.
- **Knowledge-based and Innovative Approach:** Urban Resilience fosters a culture of knowledge sharing, innovation, and continuous improvement. It encourages the sharing of best practices, effective methods, and emerging research findings among sectors. This knowledge-sharing facilitates the identification and adoption of innovative approaches, technologies, and

interventions that enhance resilience. By leveraging knowledge and promoting innovation, Urban resilience can stay at the forefront of addressing emerging challenges and seizing new opportunities.

- **Participatory and Communicative Approach:** urban resilience emphasizes the importance of interactions between stakeholders that fosters a sense of ownership, builds trust, and ensures that plans reflect the diverse needs and perspectives of the community. Effective communication ensures that information is shared transparently, and stakeholders are informed and empowered to contribute to decision-making processes to responding and recovering from disruptions.
- **Monitoring and Evaluation Approach:** The content approach of urban resilience emphasizes the importance of monitoring and evaluating the effectiveness of interventions. Regular assessments help cities identify strengths and weaknesses, measure progress, and make necessary adjustments to enhance resilience.

By considering these capacities, urban resilience can become a more comprehensive and integrated approach for a different kind of problem-finding and problem-solving process of urban design and planning. Resilience-oriented planning and design process advocates for a place-based approach that considers a community's ability to shape cities that are better prepared, adaptable, and capable of thriving in the face of disruptions and uncertainties (Eraydin, 2013, Mehmood, 2016, Sharifi and Yamagata, 2018, Wardekker, 2021, Bautista-Puig et al., 2022, Aelbrecht and Arefi, 2023). So, in urban design process context, resilience has two roles: (1) it analyzes the disturbance and crises that affect the vulnerabilities of urban subsystems and shape the resilient city form, and (2) it facilitates the communication between urban subsystems that influences the implementation and realization of resilient urban design (Wu and Wu, 2012, Anderies, 2014, Felicciotti et al., 2016, Sharifi et al., 2017).

Therefore, taking a process-oriented approach to defining resilience can be an important step toward achieving resilient urban design. This approach uses resilience as the main lens to identify and resolve urban problems and challenges and presents strategies and solutions based on its principles along with the procedural aspects that shape the path. urban design process based on the resilience approach is not defined by the steps of the process, but by the change and evolution of the content that guides the process and its navigation. Therefore, the resilient urban design process follows the general process of problem-finding and problem-solving based on the steps of preliminary visioning, situation assessing, Statement visioning, objectives, strategies, and design alternatives setting, alternatives evaluating, design, implementing and monitoring (Alikaei and Amin Zadeh Gohar Rizi, 2019). the navigation of these steps is determined by a set of substantive and procedural characteristics of urban resilience in order to achieve the capacity of preparedness,

absorption, adaptation and transformation of urban design subsystems.
 The research conceptual framework, illustrated in Fig. 2, displays the correlation between the procedural and

substantive characteristics of urban resilience and the urban design subsystems

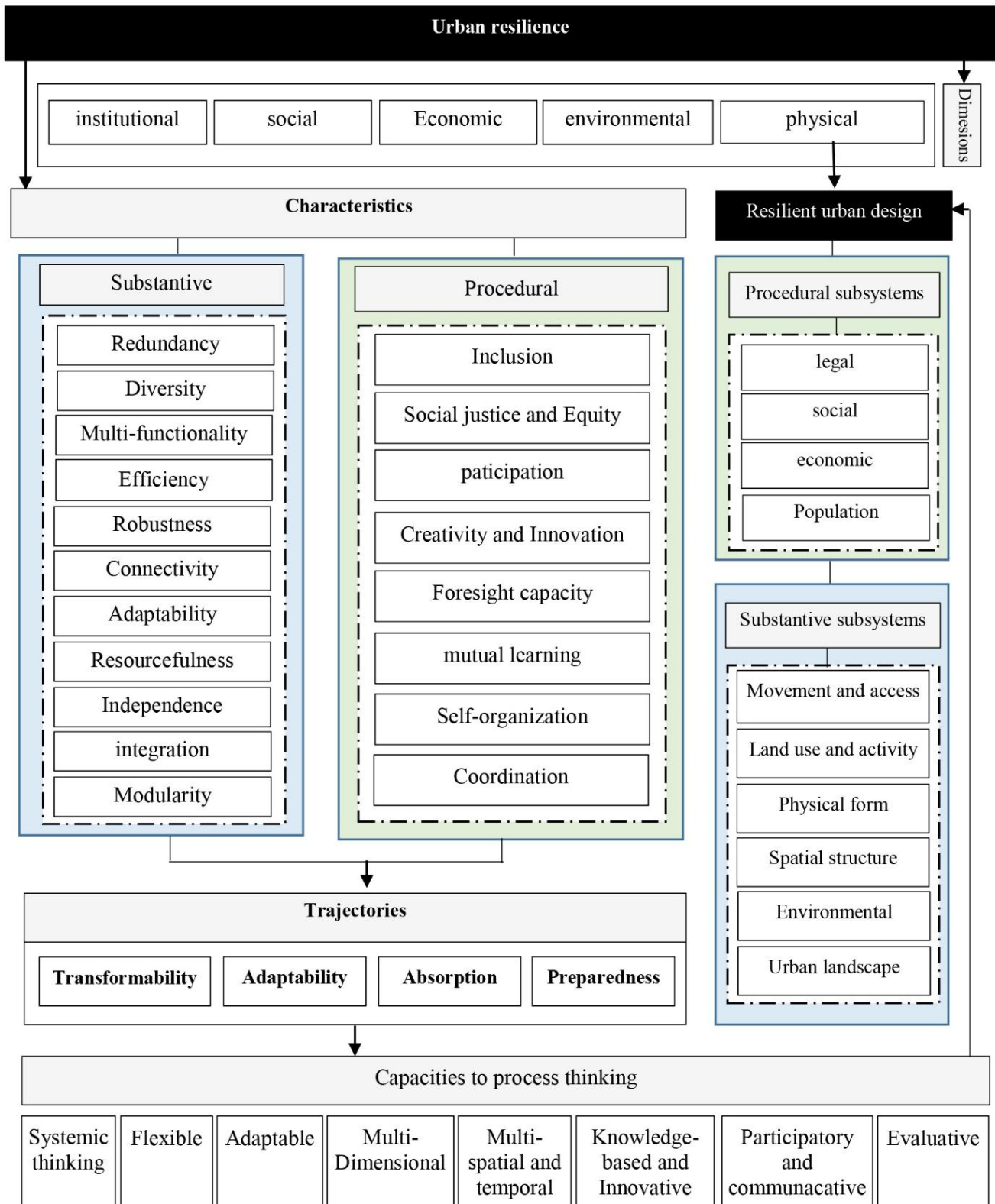


Fig.2 Conceptual framework of resilient urban design

3. Research Methodology

This research is applied research based on descriptive-analytical method to investigate urban resilience as a

content-oriented approach of the urban design process. In the previous step, the basic concepts of urban resilience and its implications in urban design process were analyzed to clarify the conceptual framework of the research. This framework can facilitate the explanation of resilient urban design process based on the methodological framework of “Strategic Planning Approach for Resilience Keeping”

(SPARK) in next step. This methodological framework is widely used in creating possible narratives to enhance the persistence and stability of the urban system, as the main goal of resilience (dos Santos and Partidario, 2009, Teigão dos Santos and Partidário, 2011). Fig. 3 shows the main steps of SPARK.

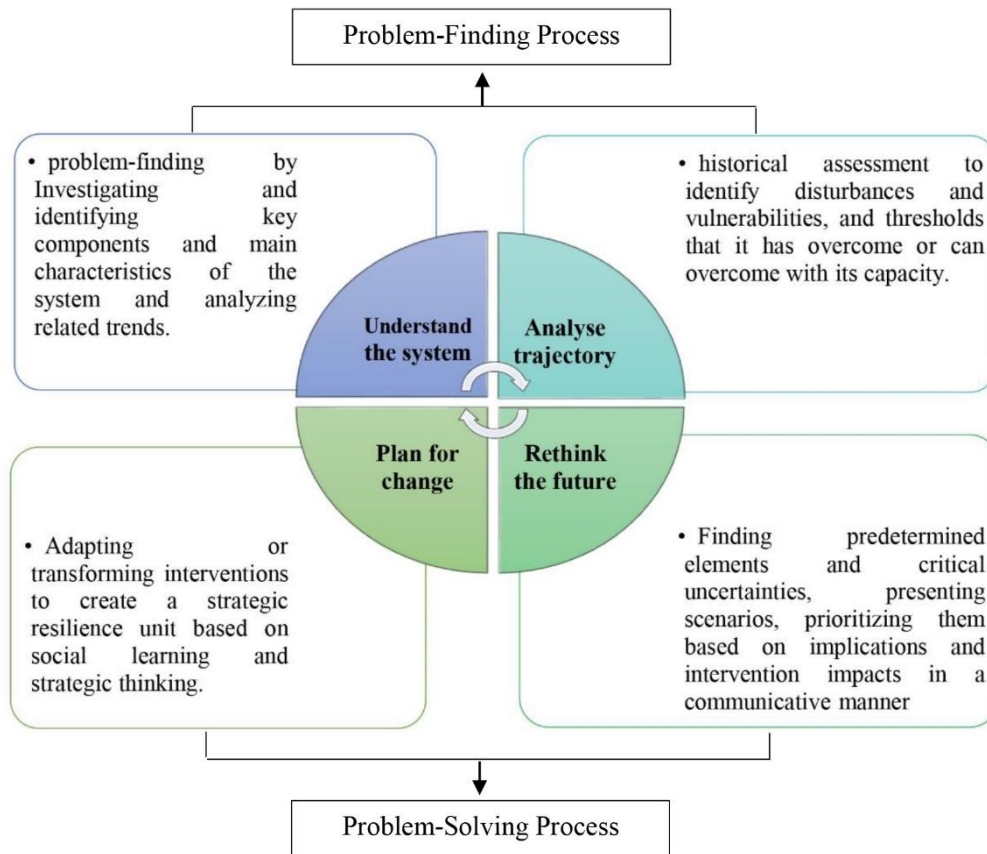


Fig. 3 Main steps of SPARK
(Source: Teigão dos Santos and Partidário, 2011)

4. Results and Discussion

Based on the research conceptual framework and the SPARK framework, the urban design process is explained based on problem-finding and problem-solving stages. All steps of the urban design process based on it are clarified:

Defining priorities, limitations, and red lines of system (problem-finding); Priorities refer to the crises, vulnerable areas, and sensitive time frames that need attention. Limitations are the barriers that hinder achieving these priorities, and red lines are the boundaries that should not be crossed to avoid unacceptable risks or losses (Mushir, 2019). This stage is defined by assessing existing vulnerabilities in both substantive and procedural characteristics of urban resilience.

Improving the conditions and characteristics of urban resilience (problem solving); this stage emphasizes enhancing the ability of the system to cope with and

recover from various challenges while minimizing its exposure and vulnerabilities (UNISDR, 2017, Thupalli and Deen, 2018, Pinelli et al., 2020). It builds on the substantive and procedural characteristics of resilience that were previously discussed. These characteristics can be customized to fit the specific needs and contexts of different risks, changes or crises.

4.1. Problem- Finding Process

Step 1: Preliminary Visioning is the first step of creating and exploring alternative future scenarios for urban design. It aims to pursue more resilient pathways, based on persistence and stability. The visioning is critical because it affects the main characteristics of resilience for proposed strategies. Visioning involves participatory methods that engage all relevant stakeholders in co-designing and co-producing shared visions of desirable and feasible urban

futures. These methods account for the uncertainties, surprises, and complexities of urban systems, as well as trade-offs and synergies among different dimensions and characteristics of urban resilience (McPhearson et al., 2021, Habitat, 2022).

Step 2: Contextual Analysis assesses the vulnerabilities of the city or community to different hazards and stresses. the precise and clear definition of vulnerabilities is very important to avoid destruction and strengthen resilience; Because when the occurrence of risks is accompanied and aligned with existing vulnerabilities, the level of resilience and vulnerability changes (Asadzadeh et al., 2022, Sehili et al., 2022). By assessing vulnerabilities, actors can better comprehend the multifaceted interplay of a circumstance. This involves investigating how social, political, and spatial characteristics may support or obstruct efficient crisis responses for the communities in trouble. For this purpose, this step:

- identify the relevant topics, domains, and time frames based on substantive and procedural characteristics.
- Assess the stakeholders' capacity, interest, and impacts on forced crisis response.
- Analyze how stakeholders relate to each other and how collaboration, alliance, coordination, and participation could enhance the value.
- Consider the legal, institutional, and power structures impacted by the response program, as well as their impact on the program (Meaux, 2016).

So, Assessing Vulnerabilities is a way to understand the specific characteristics, dynamics, and interactions of a city and its components that affect its ability to cope with various challenges (Liu et al., 2022). It can help to identify the sources of vulnerability and resilience, as well as the potential strategies and actions to enhance the latter. it can also clearly express program expectations, uncertainties, and trade-offs involved in design and implementation through substantive and procedural characteristics assessment:

Step 2-1: Substantive Vulnerabilities Assessment analyzes vulnerabilities, opportunities, and constraints of substantive characteristics of urban design subsystems during a crisis. The crisis can be predetermined or selected based on the prioritization of possible crises in the system. So, this step involves:

1. Identifying and prioritizing the hazards and crises that can affect the physical urban subsystems such as land use, access, morphology, spatial organization
2. Analyzing the exposure and sensitivity of urban design subsystems characteristics to these crises

3. Evaluating the capacity and coping mechanisms of the urban design subsystems to these crises
4. Prioritizing the vulnerabilities and risks based on their severity, frequency, and urgency, and identify the most vulnerable groups, areas, or sectors that need attention (Grubestic and Matisziw, 2013, Cutter, 2021, Shafiei Dastjerdi et al., 2021, WHO, 2021).

Step 2-2: Procedural Vulnerabilities Assessment analyzes institutional policies and normative values based on procedural characteristics of urban resilience.

The **institutional policies assessment** evaluates the policies, regulations, and governance structures in place within institutions that influence urban development and resilience (OECD, 2020, Fallahi et al., 2022). It can help identify legal capacities, gaps, challenges, and opportunities for improving urban risk management and resilient urban design. this step Assesses the existing policy frameworks and evaluates the alignment and flexibility of these policies to adapt to evolving challenges and uncertainties. It also evaluates the institutional structures and arrangements, coordination mechanisms, decision-making processes, and the assignment of roles and responsibilities among different agencies and stakeholders (Fu and Wang, 2018). By conducting a comprehensive institutional policy assessment, urban designers, policymakers, and stakeholders can identify areas where policy adjustments, reforms, or new interventions are needed to enhance urban resilience and promote sustainable development in cities.

On the other hand, the **normative values assessment** recognizes the importance of local experimentation and experiential practice in knowledge. The aim is to identify the values and priorities of the community and stakeholders involved in the planning process. The tools will be created collaboratively using participatory design methodology production (Baibarac and Petrescu, 2019). This will involve working with potential users to co-define the local context of 'resilience', identify their needs, and create opportunities for sharing locally developed knowledge. So, it can be done by actively engaging a diverse range of stakeholders, facilitating discussions and negotiations, and finding common ground and consensus on the values that should guide the resilience planning process. Workshops, training programs, and educational initiatives can foster a shared understanding and commitment to these values (Meerow and Newell, 2019, Fisher et al., 2022, Suchá et al., 2022). Integrating local knowledge with technical expertise can enhance the effectiveness and relevance of resilience strategies and help ensure that normative values are represented and considered in decision-making.

Fig.4 shows the steps and basic concepts that navigate the problem-finding process of urban design.

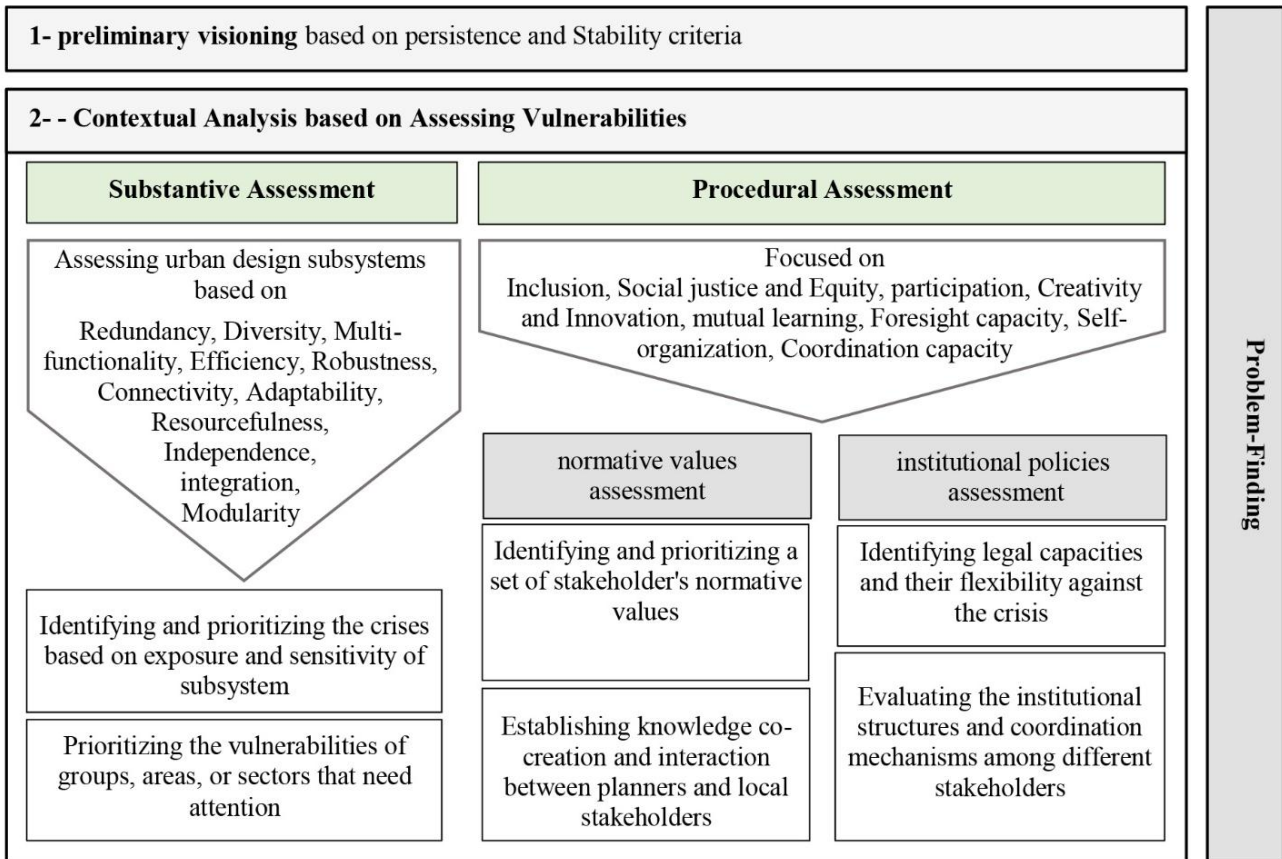


Fig. 4. Problem-finding process

4.2. Problem- Solving Process

Step 1: Visioning Statement is a key step of developing a resilient urban design plan and serves as a guiding document that outlines the desired future state of the urban area. During the visioning stage, planners and stakeholders work together to define a shared vision for the community's resilience goals. This involves identifying the values, aspirations, and priorities of the community, as well as understanding the challenges and risks that were identified in contextual analysis. The visioning statement captures the long-term vision and sets the direction for subsequent planning efforts (McPhearson et al., 2021, Pelling et al., 2023).

The visioning statement in resilience urban planning often includes elements such as:

- Resilience goals: It outlines the specific resilience objectives and targets that the community aims to achieve based on previous stages.
- Stakeholder engagement: The visioning stage encourages active participation and engagement from various stakeholders, including residents, community and institutional organizations, businesses, and government agencies. It aims to ensure that the vision represents a broad consensus and incorporates diverse perspectives.
- Community values: The statement reflects the values, needs, and desires of the community. It emphasizes procedural characteristics of urban resilience such as

inclusivity, social cohesion, equity and innovation, among other considerations.

- Future scenarios: The visioning process explores different future scenarios based on anticipated changes and challenges. These scenarios help stakeholders envision what the city could look like in the face of various resilience issues and determine the most desirable outcome (Baibarac and Petrescu, 2019).

Once the visioning statement is established, it provides a foundation for subsequent stages of the resilience urban design process, including strategy development, and action planning. It helps guide decision-making and prioritize interventions that align with the community's long-term vision for a resilient urban future.

Step 2: Strategies and Design Alternatives Setting identifies urban design strategies and generates a range of design alternatives that address the identified goals and strategies, based on resilience trajectories in multi-spatial and temporal scenarios. Preparedness, absorption, adaptability, and transformability are key trajectories of urban resilience that describe how urban systems can anticipate, cope with, recover from, and learn from shocks and disturbances. These trajectories are essential for building resilient cities that can withstand the challenges of the future (Sharifi et al., 2017). they can significantly influence the definition of strategies and design alternatives in the process of resilient urban design, particularly when

considering multi-spatial and temporal scenarios. For this purpose, two types of macro scenarios can be defined based on the crisis phase:

Step 2-1: Pre-Disaster Phase scenario

pre-disaster phase is the urban system's ability to anticipate, prevent, and reduce the negative impacts of crises. This can be achieved by a continuous process of enhancing the capacity of urban systems and communities to mitigate risks in short, medium, and long-term. It helps cities to prioritize key subsystems, integrate operations, and create opportunities for restoration after a disaster. This is done by identifying potential risks and vulnerabilities, developing early warning systems, establishing emergency response mechanisms, enhancing communication networks and promoting community engagement (Ribeiro and Pena Jardim Gonçalves, 2019, Cheshmehzangi, 2020, Kong et al., 2022) UNDRR, n.d.). Therefore, Preparative scenario follows the principles of active resilience and requires a holistic and participatory approach that integrates multiple sectors, scales and stakeholders in urban planning processes.

Step 2-2: Post-Disaster Phase scenarios

This phase can be split into short-to-medium-term periods based on absorption and adaptability scenarios and long-term periods based on transformability scenario (O'Brien, 2012, Olazabal, 2017, Oxfam, 2018, World Bank, 2020, Kong et al., 2022, Zeng et al., 2022, Sengupta, 2023, Moghadas et al., 2023):

Absorptive scenario includes short-term strategies to return to pre-disaster conditions, immediately after a crisis, with the aim of restoring and maintaining stability. Interventions should include preventive actions and coping strategies that enable fast recovery while avoiding lasting, adverse effects. So, this scenario involves strategies to reduce the exposure and sensitivity of urban areas to shocks and disturbances by implementing Disaster Risk Reduction/Management approaches. This includes triggering early response and self-organization of urban system components, as well as providing relief and recovery services. **Adaptive scenario** intentionally makes incremental, minor, deliberate changes in response to a change through a medium-term process of continuous adjusting, learning, and innovation that creates more flexibility in the future. Interventions may involve both humanitarian and development actions and involve promoting adaptive strategies that allow for iterative decision-making, incorporating modular and scalable infrastructure designs, or facilitating knowledge-sharing platforms to support learning from diverse contexts. Generally, the short-to-medium-term periods scenarios will not involve extensive and large-scale changes. Instead, they will focus on maintaining and creating stability and flexibility in the existing situation with minimal changes or interventions to adjust the conditions after the crisis.

In contrast, **Transformative scenario** involves Long-term systemic shifts (structural and fundamental) and transformative actions that can lead to more resilient urban systems when the existing system untenable.

it implies system-level transformations that allow more persistent resilience and often challenge the current situation through investments in good governance, formal and informal social protection mechanisms, infrastructure, and policies that create the enabling environment required for systemic change. it can involve redefining the urban systems to address the root causes of injustice, vulnerability and risk and creating new opportunities for urban development based on Efficiency, Resourcefulness and Independency, and fostering systemic change and innovation in long- term periods. Planners need to explore alternative futures and design pathways that can support transformative change across different spatial and temporal dimensions.

Note that preparative, absorptive, adaptive, and transformative scenarios can happen at the same time regardless of crisis severity. For instance, during less stressful times, it's possible to create a transformative scenario. Furthermore, improving enabling environments can positively impact communities' absorptive and adaptive capacities and higher-level systems.

Step 3: Alternatives Evaluation establishes a set of evaluation criteria to assess the design alternatives. The criteria should reflect the key characteristics of urban resilience, both substantively and procedurally. Applying these resilience characteristics can identify the options that are better equipped to handle disruptions, uncertainties, and changing conditions. This assessment considers the potential performance of alternatives under various future scenarios using qualitative and quantitative analyses, modeling, simulations, and stakeholder judgment; Engaging stakeholders and considering their perspectives, concerns, and priorities can ensure the selected design aligns with the community's needs and aspirations. So, this stage can include comprehensive training programs and documentation to ensure that all stakeholders understand the system's operation and potential risks. Proper training reduces the likelihood of human error and helps users respond effectively to unexpected situations or failures. Based on the evaluation, ranking, and stakeholder input, the design alternative that best meets the objectives of the urban resilience project is selected and designed.

Step 4: Design and Implementation; The design phase involves translating the best-identified strategies and scenarios into specific plans and projects. This includes designing resilient urban subsystems that can enhance the capacity to prepare, absorb, adapt, and transform in the face of various challenges. To ensure there is a clear and coordinated process and work plan for the plan implementation, the Implementation phase aims to have the plan approved by the responsible governmental authorities, including institutional mechanism, coordination with key actors, investment and resource mobilization (Pitidis et al., 2018). It defines a work plan to map out the entire process of the plan and projects' implementation, with defined steps, phases, and milestones, such as a major reporting date, completion time, meeting nodes, public events, participation activities,

etc. It Predicts outcomes, expenditures, and probable risks, as well as preparing backup plans in the case of a problem to execute.

Step 5: Monitoring and Evaluation is a continuous process that assesses the performance of plan goals, strategies, and projects to determine if adjustments are needed (Béné et al., 2015, QUYEN et al., 2018). When resilience integrated into the monitoring and evaluation phase, urban resilience concepts provide a framework for assessing the effectiveness of urban design process in enhancing a city's resilience. During this stage, a matrix of indicators is developed that monitor, evaluate, and report

continuously on the phases of the plan and the projects' implementation and impact. The matrix of indicators includes a wide range of substantive and procedural characteristics of urban resilience that not only influence underlying vulnerabilities but also determine how related stakeholders respond to crises. Therefore, it is important to develop and establish mechanisms to guarantee the resilience of the design process, such as advocacy measures and mechanisms to gather feedback from stakeholders and the community. Fig.5 shows the steps and basic concepts that navigate the problem-solving process of urban design process.

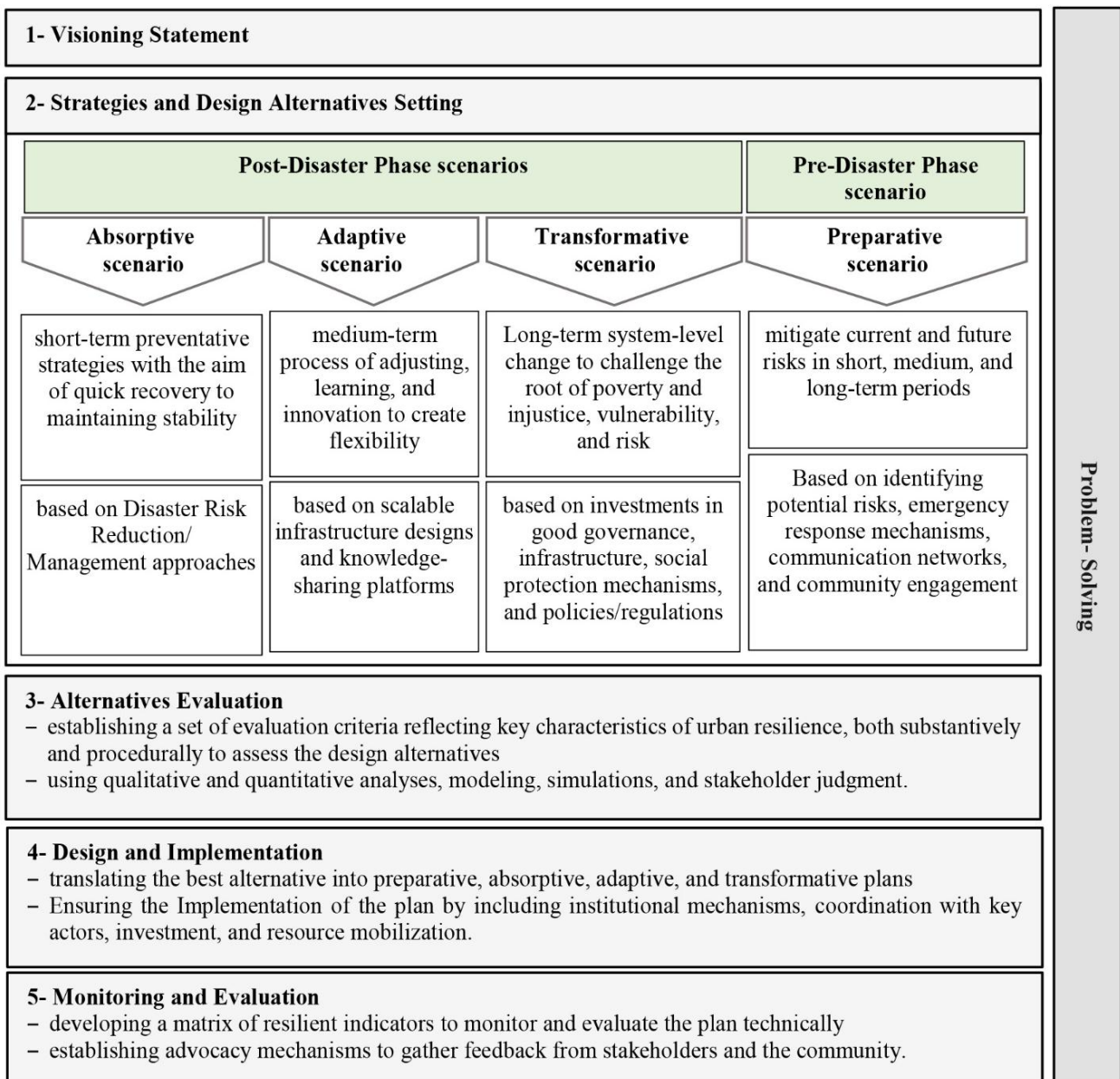


Fig. 5. Problem-solving process

5. Conclusion

Urban resilience is a prominent topic that has gained increasing attention in urban studies like urban design to cope with unforeseen changing world. It refers to the ability of a city to withstand, recover, and adapt to change rather than maintaining the status quo from various disturbances and crises that would essentially change or modify the city's identity. Adapting to change is the basic concept of a process. So, the urban design process has an important role in facilitating this self-organization and adaptive process to change. In this respect, the urban design process must clearly consider disturbances by seeing urban systems as complex, adaptable systems with cross-temporal and spatial scale interactions, feedback mechanisms, and inherent indeterminacies.

To achieve this, this paper discusses how recognizing non-linear, heterogenetic, and multiple stable and flexible states of the urban design process can be explained by dynamic concepts such as trajectories and capacities of urban resilience in both a substantive and procedural manner.

The paper does not believe that there is a new model for the urban design process, Nevertheless, it believes that "a resilient urban design process" may progress through Redundancy, Diversity, Multi-functionality, Efficiency, Robustness, Connectivity, Adaptability, Resourcefulness, Independence, integration, and Modularity as substantive characteristics as well as Inclusion, Social justice and Equity, participation, Creativity and Innovation, mutual learning, Foresight capacity, Self-organization, and Coordination capacity as procedural characteristics which lead to Preparative, Absorptive, Adaptive, and Transformative capacities. These characteristics by defining urban resilience as a content-oriented approach to the urban design process, offer a framework that addresses the multifaceted challenges faced by cities in the 21st century.

This conceptual framework can facilitate the definition of resilient urban design process based on "Strategic Planning Approach for Resilience Keeping" as methodological framework to define resilient urban design. This process includes four critical targets: (1) identifying potential risks and vulnerabilities; (2) developing scenarios and related strategies to mitigate these risks; (3) implementing these strategies through design interventions and implementation; and (4) monitoring and evaluating the effectiveness of these interventions. These four targets try to cover all stages of urban design process through problem-finding and problem-solving steps. This can be viewed as an important initial effort towards elaborating the complexity of the process. Discussions regarding these four important targets brought to light crucial factors that are necessary for improving the resilience of the urban design process.

By following these steps, substantive characteristics, which focus on the geographical-spatial dimensions of urban design resilience, provide a contextual- technical analysis

framework for assessing and prioritizing the urban design subsystem's vulnerability. Additionally, by incorporating these characteristics into strategies and implementation policies for the proposed design scenarios, cities can enhance their capacity to absorb, adapt, and transform in the face of various challenges. To ensure success, it is important to develop anticipatory and monitoring frameworks based on these characteristics to meet targets and avoid being overwhelmed by future uncertainties. In addition to technical analysis, the resilience approach also considers procedural characteristics that examine the social aspects of urban design process. By promoting inclusion and social justice and equity, the resilience urban design process should be context-sensitive and capacity-building activities to ensure the participation and coordination of a wide range of stakeholders throughout different stages. By engaging with diverse stakeholders and incorporating local knowledge and practices, designers can create urban spaces that are responsive, inclusive, and culturally sensitive.

This resilient urban design process is not about creating a new process with new steps to achieve the product. Rather, it is an approach that affects how to navigate the urban design process to achieve the expected product of resilient urban design. This process tries to increase awareness about the possibility of unavoidable uncertainties by identifying vulnerabilities through analysis and assessment of the past, present, and future of the substantive and procedural characteristics of urban design subsystems. It defines goals, strategies, and a design work plan based on spatial-temporal scenarios of how to face different conditions. During such a process, designers assess the compatibility and differences between the current and desired situation. This helps to develop long-term adaptation and transformation strategies, as well as absorption and protection of the current situation, ultimately improving the quality of life for citizens.

Finally, through this process, the content of urban resilience provides valuable insights into the urban design process that encompasses both the physical and social dimensions of a city. it offers a comprehensive framework for creating cities that can adapt to various crises and changing circumstances and uncertainties. However, it is important to acknowledge that the implementation of urban resilience principles in the design process can be complex and challenging. It requires interdisciplinary collaboration, political will, and long-term commitment from stakeholders at various levels. Additionally, the dynamic nature of cities necessitates continuous monitoring, evaluation, and adaptation of urban design strategies to ensure their effectiveness and relevance. On the other hand, based on the presented conceptual framework, it appears that clarifying each characteristic in the urban design process, based on the type of crisis and potential changes, is necessary to enhance its feasibility. This will also guide future research efforts.

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