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Strategic Speculative Futures Framework in Architecture and Sustainable Development

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Abstract
Architectural discourse must evolve to address environmental challenges, technological disruptions, and societal shifts through future-oriented thinking. Existing methodologies often lack structured approaches to long-term uncertainties. This paper introduces the Strategic Speculative Futures Framework (SSFF), which integrates systems thinking, strategic foresight, and speculative design for architecture and sustainable development. SSFF explores multiple future scenarios, identifying gaps in architectural discourse and proposing adaptive strategies. This study synthesises insights from systems thinking and futures studies using a qualitative, conceptual approach. While still theoretical, SSFF offers a structured pathway to rethink sustainability, advocating for architects, educators, and researchers to engage in future-oriented design.

Keywords: Strategic Speculative Futures Framework (SSFF) ; Futures Thinking ; Strategic Foresight ; Systems Thinking

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1.0 Introduction

The evolving challenges in architecture today necessitate innovative approaches that extend beyond conventional design solutions. These challenges include environmental uncertainties, shifting societal needs and rapid technological advancements (Baldassarre et al., 2024), all of which require long-term, forward-thinking strategies. Climate change and environmental degradation place increasing pressure on architects to design spaces that are not only aesthetically and functionally viable but also resilient to unpredictable natural disasters, rising temperatures, and resource scarcity. Dimuna et al. (2025) state that effective climate change adaptation requires collaborative efforts, including early warning systems, disaster risk management, and community-based initiatives. Architectural design must integrate measures that enhance resilience to flooding and environmental degradation, particularly in climate-sensitive regions.

Beyond environmental concerns, societal transformations driven by urbanisation, demographic shifts, and evolving work-life patterns demand architectural paradigms emphasising flexibility and inclusivity. Malakhov and Alsayed Ahmad (2022) examine the flexibility of architectural designs in adapting to ongoing natural and social changes, underscoring the necessity for architectural solutions that anticipate and accommodate future transformations, ensuring continued relevance and functionality in an ever-changing world. Simultaneously, technological advancements in artificial intelligence, automation, and digital tools are redefining architectural workflows (Marcos et al., 2024). While these innovations enhance efficiency and precision, they also introduce ethical concerns, data privacy issues, and the potential deskilling of traditional architectural practices.

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The architectural profession stands at a critical crossroads. Traditional design methodologies primarily address immediate, present-day concerns, often overlooking the necessity for adaptive strategies (Askar et al., 2021). Given the increasing complexity of contemporary challenges, architects must move beyond static, short-term solutions and adopt forward-looking approaches that integrate strategic foresight into the design process. This study introduces the Strategic Speculative Futures Framework (SSFF), a model that combines systems thinking, strategic foresight, and speculative design to advance sustainable architectural practices. SSFF systematically analyses emerging trends, drivers, weak signals, and potential disruptors, exploring a range of future scenarios, including probable, plausible, possible, preferable, and wildcard futures, to develop adaptive design strategies. By investigating gaps in existing architectural methodologies, this study aims to establish SSFF as a structured framework for addressing long-term sustainability in design. Specifically, it identifies critical limitations in current architectural practices concerning adaptability and resilience, establishes SSFF as a viable tool for fostering future-oriented design approaches, and examines its potential role in transforming architectural decision-making processes. Ultimately, this research advocates for a shift toward futures-oriented and systems-based design strategies, positioning SSFF as a critical framework for rethinking architectural practice in an era of rapid change.

2.0 Literature Review

2.1 The Role of Architecture in Addressing Sustainability, Resilience, and Technological Shifts

Architecture today requires a holistic approach that integrates interior, semi-interior, and exterior spaces, where public, semi-public, and private areas interact to shape urban experiences. However, urban design often neglects semi-public and public spaces, leading to underutilisation and poor maintenance. This disconnect is linked to a lack of community ownership, reducing resilience and engagement (Gehl & Svarre, 2013; Carmona & Wunderlich, 2013). Despite research advocating for human-centric urbanism, exclusionary planning and top-down decision-making persist, raising questions about how architects and planners can enhance community involvement in shaping public spaces.

Arnstein (1969) and Sanoff (2000) highlight participatory design as a key strategy to address urban challenges, enhancing citizens' responsibility and connection to public spaces through their involvement in the design process. However, the effectiveness of these approaches depends on empowering users beyond tokenistic involvement (Ocloo & Matthews, 2016). Co-creation methodologies, which integrate user input, allow communities to contribute ideas and propose solutions tailored to their needs, enabling architecture to better respond to societal transformations like urbanisation and demographic shifts (Smith, 2023).

While participatory approaches enhance inclusivity, technological advancements are reshaping the built environment. The Smart City concept has shifted from an infrastructure-driven to a human-centric Smart Citizen model (Pushkar et al., 2023). Digital tools like real-time data analytics, digital twins, and AI-driven urban planning allow residents to influence urban policies and public space design (Kitchin, 2014). However, Greenfield (2018) states that digital interventions may exacerbate socio-spatial inequalities without meaningful citizen engagement. Though fostering interactive environments, these innovations require active participation to avoid detaching from the real needs of inhabitants, emphasising the need for a paradigm shift that integrates participatory, adaptable, and technology-driven strategies for long-term resilience.

Beyond participatory design and digital innovation, strategic foresight is gaining traction in architecture. Futures methodologies, such as trend mapping, scenario planning, and weak signal analysis, help anticipate long-term urban shifts (Voros, 2003; Candy & Dunagan, 2017). Architects can develop adaptive strategies to address uncertainties by considering multiple future scenarios. While speculative design has been explored in other fields, its application in architecture remains underdeveloped, offering an opportunity to shape resilient built environments. This aligns with the need for architecture to transition from a reactive to a proactive discipline, integrating speculative thinking to create sustainable, future-oriented solutions (Dunne & Raby, 2013).

2.2 Existing Methodologies in Architectural Practice and Their Limitations in Long-Term Foresight

While contemporary architectural discourse increasingly emphasises sustainability, inclusivity, and adaptability, traditional design methodologies remain fragmented and reactive, limiting their ability to address socio-economic, technological, and environmental shifts. Existing frameworks continue to operate within disciplinary silos, tackling specific design aspects in isolation rather than adopting systems thinking and interdisciplinary strategies (Mehaffy & Salingaros, 2017). These shortcomings are evident in current architectural methodologies, which can be identified as follows:

1. Fragmented and Reactive Approaches and Present-Centered Design Thinking
   Baldassarre et al. (2024) and Askar et al. (2021) emphasise how current methodologies remain largely deterministic, responding to immediate design challenges without proactively anticipating future shifts. This reactive approach results in designs that lack the adaptability needed to respond to socio-economic, technological, and environmental shifts, leaving them vulnerable to unforeseen disruptions such as climate emergencies.
2. Lack of Systems Thinking
   Traditional architectural approaches often prioritise site-specific problem-solving, neglecting the broader systemic relationships that influence the built environment. This narrow focus can lead to unsustainable designs that overlook environmental, economic, social, and technological factors. Kamari et al. (2020) advocate for a systems thinking approach, urging collaboration across disciplines to create more holistic and resilient solutions.

3. Limited Future Anticipation and Failure to Address Uncertainty

Architecture often relies on historical data and established trends, limiting its ability to anticipate rapid changes or unpredictable events. Hong (2021) critiques predictive models based solely on past data, arguing that they fail to prepare for unforeseen disruptions. According to Flowers (2014), architectural designs remain unprepared for emerging challenges such as climate change and technological advancements without tools like scenario planning and trend analysis.

4. Rigid and Linear Planning
   Architectural planning often follows fixed, linear progressions, assuming stable conditions, which limits flexibility in adapting to emerging uncertainties. Mba et al. (2024) argue that traditional design methodologies fail to address the complex challenges of sustainability and the growing need for adaptable and resilient buildings that meet current and future needs while addressing interconnected environmental, social, and economic challenges.
5. Limited Speculative Capacity
   Existing methodologies often address current issues but overlook the potential of speculative design to explore alternative futures. Trafí-Prats and de Freitas (2024) argue that modern architectural practices lack the bold visions of mid-20th-century speculative design. Due to market demands and professional validation, architects prioritise conventional models focused on functionality, cost, and materiality rather than embracing visionary, transformative approaches.

2.3 Towards a Future-Oriented Architectural Paradigm

Contemporary architectural methodologies must embrace a future-oriented paradigm shift to address the limitations in long-term foresight**.** Architecture can move beyond short-term problem-solving toward proactive, adaptive, and resilient solutions by integrating participatory design, strategic foresight, systems thinking, and speculative methodologies. Speculative architecture, as seen in works by Dunne & Raby (2013), has demonstrated how provocative design scenarios can inspire critical discourse on future possibilities, offering valuable insights into alternative design futures. Additionally, foresight-driven urban interventions, such as MIT's Senseable City Lab, illustrate how predictive analytics and interactive design can shape more adaptable urban environments (Ratti, 2016).

1. Strategic Foresight
   According to the Asian Development Bank, 2020, strategic foresight is a powerful tool for enhancing resilience, agility, and adaptability by anticipating risks and opportunities through futures thinking. Schwarz (2024) outlines three fundamental aspects of strategic foresight: the mindset required to cultivate foresight, the tools that facilitate its application, and the structured implementation process. Strategic foresight applies various methodologies, such as scenario planning, trend analysis, weak signal detection, and the Delphi method, which are drawn from various disciplines to inform foresight practices. Integrating these approaches into architectural design enables a shift from rigid, linear methodologies to multidimensional, future-responsive strategies.
2. Systems Thinking
   Systems thinking is a holistic, interdisciplinary approach that enables architects and urban designers to analyse the interconnected nature of built environments, societal structures, and ecological systems. Stroh (2015) highlights that effective architectural decision-making requires a comprehensive understanding of long-term impacts across multiple domains, ensuring that interventions do not produce unintended consequences. Unlike linear problem-solving, which isolates individual components, systems thinking examines relationships, feedback loops, and cascading effects within a larger framework. This approach shifts the focus from treating symptoms of architectural and urban challenges to identifying and addressing root causes.
3. Speculative Design
   Speculative design pushes the boundaries of conventional architectural practices, enabling architects to move beyond immediate constraints and engage with radical, future-oriented thinking. Rather than solely addressing present-day challenges, this approach encourages the exploration of alternative futures, questioning existing assumptions and reimagining the role of architecture in response to emerging societal, environmental, and technological shifts.

   Dunne and Raby (2013) argue that speculative design is not about predicting the future but about provoking discussion and envisioning possibilities that challenge the status quo. Unlike traditional problem-solving methods, which focus on refining existing paradigms, speculative design embraces uncertainty and ambiguity, allowing architects to experiment with visionary, unconventional ideas that might initially seem improbable but could inspire ground-breaking innovations. By adopting a "what if" rather than a "what is" approach, speculative design broadens the architectural discourse, considering both utopian and dystopian futures to assess the consequences of emerging trends critically.

3.0 Methodology

This study adopts a qualitative, conceptual research approach to critically examine existing gaps in architectural methodologies and explore the integration of three theoretical frameworks—systems thinking, speculative design, and strategic foresight, to formulate the Strategic Speculative Futures Framework (SSFF). The methodology is structured into three key components: research approach, analytical process, and data sources.

1. Research Approach
   The research follows a three-stage process. First, it identifies deficiencies in architectural discourse, particularly regarding long-term uncertainties and systemic complexity. This involves a critical review of existing methodologies to highlight the limitations of

architectural decision-making, sustainability, adaptability, and future readiness. Second, the study investigates three theoretical approaches:

a) Systems Thinking – This approach examines interdependencies, emergent complexities, and holistic problem-solving within architecture.
b) Speculative Design – This explores alternative futures and critical design thinking to challenge conventional architectural practices.
c) Strategic Foresight – This analyses anticipatory methodologies, including weak signal analysis and scenario-building, to enhance architectural resilience.

Finally, insights from these three frameworks are synthesised to develop SSFF, a novel and innovative approach. This integrative conceptual model combines the systemic logic of systems thinking, the speculative creativity of design, and the anticipatory strategies of foresight to effectively address uncertainties in architecture.

2. Analytical Process

A futures-oriented analytical methodology is applied, consisting of three key steps:

a) Gap Identification – Examining weaknesses in existing architectural methodologies.
b) Comparative Theoretical Analysis – Evaluating how systems thinking, speculative design, and strategic foresight address these gaps.
c) Conceptual Synthesis – Developing SSFF as an integrative framework for future-conscious architectural decision-making.

3. Data Sources

As a conceptual study, this research does not involve case studies or empirical data collection. Instead, it relies on a comprehensive literature review as the primary data source. This involves a thorough examination of the theoretical foundations and applications of systems thinking, speculative design, and strategic foresight in architecture and design and synthesising insights from existing academic discourse to establish the relevance and potential impact of SSFF in shaping future-oriented architectural strategies.

4.0 Findings

Despite significant advancements in sustainability and technology, contemporary architectural practice continues to operate predominantly in a *reactive* mode rather than adopting a *proactive* stance, as emphasised by Baldassarre et al. (2024) and Askar et al. (2021). Rigid planning, fragmented strategies, and limited speculative thinking hinder its ability to anticipate future challenges. While participatory design and digital innovations offer solutions, tokenistic engagement and socio-spatial inequalities often dilute their impact. Additionally, strategic foresight, widely applied in other fields, remains underutilised in architecture, limiting long-term resilience.

Table 1 highlights key limitations in current architectural practices, emphasising the need for integrated, future-oriented design approaches. It also illustrates how Strategic Foresight, Systems Thinking, and Speculative Design can help bridge these gaps, fostering more resilient and forward-thinking architectural strategies.

4.1 Introducing the Strategic Speculative Futures Framework (SSFF)

The findings in Table 1 have identified key limitations in contemporary architectural practice, particularly its fragmented, reactive nature and lack of future-oriented methodologies. To address these gaps, the Strategic Speculative Futures Framework (SSFF) (Fig. 2), built upon the Strategic Speculative Futures Thinking Model (Fig. 1), offers a systematic, future-ready approach by integrating Strategic Foresight, Systems Thinking, and Speculative Design. SSFF moves beyond traditional reactive practices, embedding proactivity and adaptability into design thinking.

4.2 Operationalising the Strategic Speculative Futures Framework (SSFF)

The SSFF provides a structured, actionable methodology within architectural practice based on the Strategic Speculative Futures philosophy. It operationalises speculative futures into a practical tool that guides architects through a systematic process, including:

1. Identifying key challenges and uncertainties in the current architectural context.
2. Mapping systemic interconnections using causal flow loop diagrams to uncover root causes.
3. Analysing trends, weak signals, and disruptors to inform speculative futures.
4. Developing future scenarios based on probable, plausible, possible, preferable, and wild card futures.
5. Translating these scenarios into adaptive design strategies, considering short-, medium-, and long-term possibilities for sustainable solutions.

Table 1. Integrating Strategic Foresight, Systems Thinking, and Speculative Design to Enhance Adaptability and Resilience in Architecture and Sustainable Development

Key limitation	Description	Bridging the Gap
Fragmented and Reactive Approaches	Current methodologies respond to immediate challenges rather than proactively shaping long-term solutions (Baldassarre et al., 2024), leading to environments that struggle to adapt to socio-economic, technological, and environmental shifts.	Strategic foresight enables scenario planning, allowing architecture to anticipate and design for multiple future possibilities rather than reacting to crises.
Lack of Systems Thinking	Designs often focus on isolated site-specific solutions, neglecting broader environmental, economic, and social relationships that shape sustainable architecture. The absence of feedback loops hinders the ability to address root causes, underscoring the need for a systems thinking approach (Kamari et al., 2020).	Systems thinking encourages holistic design by mapping interdependencies between built environments, ecosystems, and social structures, fostering resilient urban solutions.
Present-Centred Design Thinking	Architectural decisions are based on present-day constraints rather than anticipating evolving societal and environmental conditions (Askar et al., 2021 and Mba et al., 2024), leading to static rather than adaptable designs.	Strategic foresight shifts design from static solutions to adaptive frameworks by incorporating trend analysis and future-driven methodologies.
Limited Future Anticipation	Traditional methodologies lack structured approaches to exploring future anticipation (Hong, 2021), making architecture vulnerable to rapid urbanisation, climate change, and technological advancements.	Strategic foresight introduces future scenario modelling, preparing architecture to integrate long-term resilience strategies against uncertainties.
Rigid and Linear Planning	Fixed and linear planning assumes stable conditions, preventing flexible strategies for emerging uncertainties. Without adaptable action plans, architectural interventions lose long-term relevance (Malakhov and Alsayed Ahmad, 2022).	Speculative design explores alternative urban futures, fostering flexible and adaptable solutions that evolve with societal needs.
Failure to Address Uncertainty	Most frameworks rely on historical data and known variables, making them unprepared to respond to wild card events, disruptive technologies, or socio-political shifts (Flowers, 2014).	Strategic foresight incorporates wild card analysis and weak signal detection, allowing architects to design for unexpected disruptions.
Limited Speculative Capacity	The absence of speculative approaches (Trafí-Prats and de Freitas, 2024) restricts opportunities to experiment with visionary concepts, test alternative futures, and integrate disruptive innovations.	Speculative design enables experimentation with radical ideas, helping to imagine and prototype unconventional but possible urban futures.
Underutilisation of Public & Semi-Public Spaces	Contemporary urban design often neglects semi-public and public spaces, leading to underutilisation and poor maintenance due to a lack of community ownership and engagement (Gehl & Svarre, 2013; Carmona & Wunderlich, 2013).	Systems thinking fosters participatory urbanism, ensuring integrated, user-driven solutions that enhance engagement and long-term viability.
Tokenistic Participatory Approaches	While participatory design is acknowledged as valuable, its effectiveness depends on genuine empowerment rather than symbolic involvement (Ocloo & Matthews, 2016). Without deeper integration, public engagement remains superficial.	Strategic foresight and systems thinking reinforce inclusive engagement by embedding meaningful co-creation processes into urban and architectural decision-making.
Technology-Driven but Not Human-Centric	The shift towards Smart Cities has moved from infrastructure-focused to citizen-centred approaches. However, without meaningful engagement, digital interventions risk reinforcing socio-spatial inequalities (Greenfield, 2018).	Systems thinking and speculative design align technological advancements with human-centric principles, ensuring smart city innovations serve real community needs.
Limited Use of Strategic Foresight in Architecture	While strategic foresight methodologies like scenario planning and trend mapping are widely used in policy and product innovation, their application in architecture remains underdeveloped, leaving architectural designs unprepared for emerging challenges such as climate change and technological advancements (Flowers, 2014).	Strategic foresight integrates forecasting techniques into design processes, helping architecture transition from a reactive to a proactive discipline.

(Source: Author)

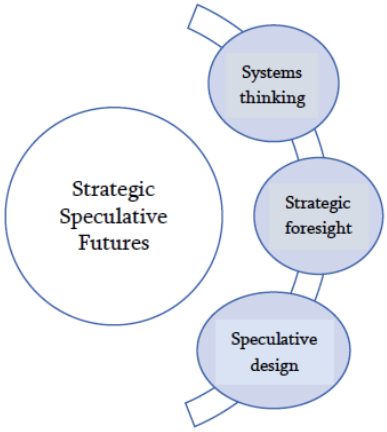

Fig. 1: The Strategic Speculative Futures Thinking Model
(Source: Author)

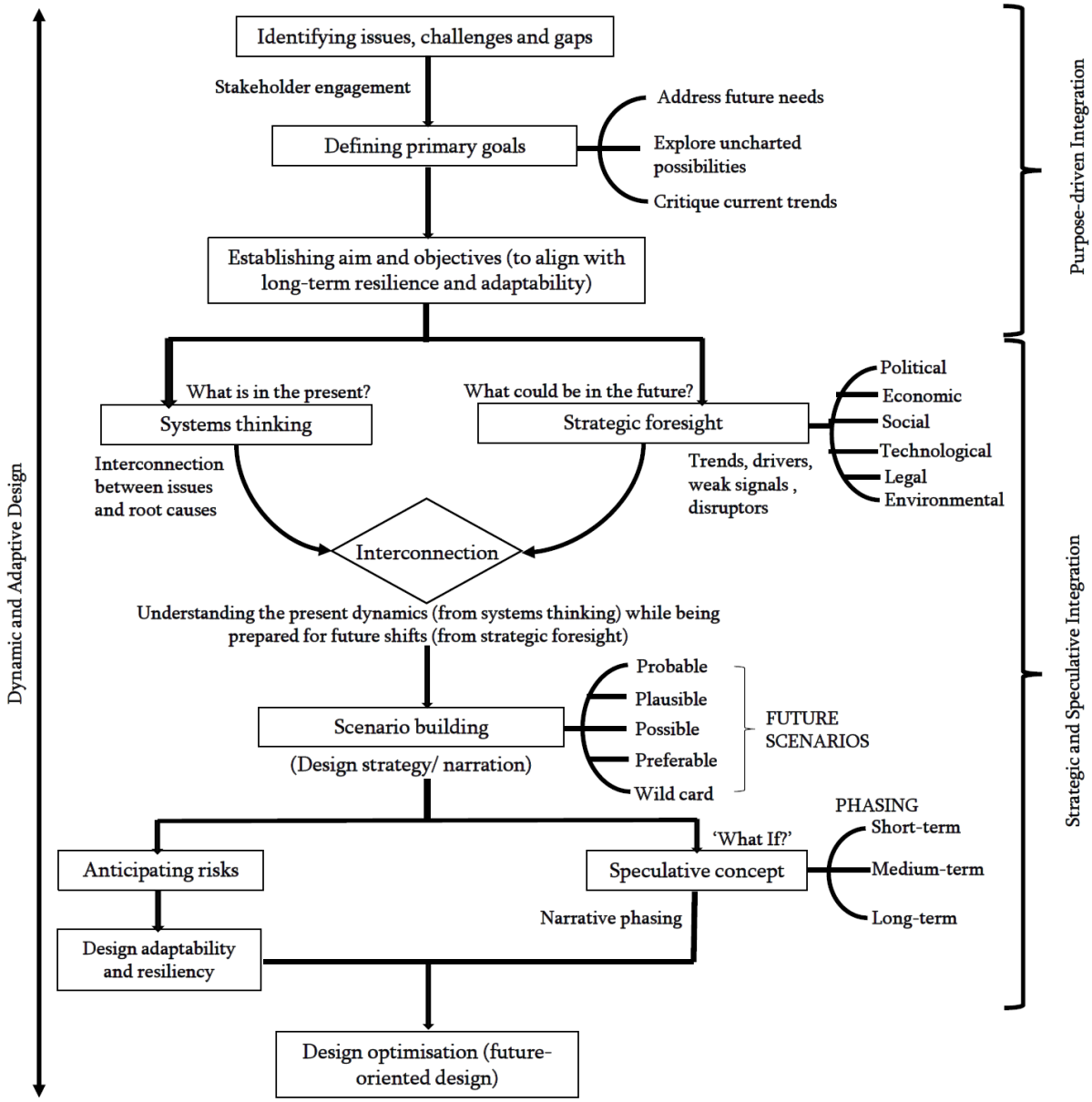

Fig. 2: The Strategic Speculative Futures Framework (SSFF)
(Source: Author)

4.3 The Three Pillars of SSFF: Strategic Foresight, Systems Thinking, and Speculative Design

Each component of the SSFF plays a crucial role in bridging existing gaps and transforming architectural practice into a future-oriented discipline:

- Strategic Foresight empowers architects to anticipate multiple future scenarios through trend analysis, scenario planning, and wild card detection. This shifts architecture from reactive to proactive discipline, embedding long-term resilience strategies into the design process.
- Systems Thinking fosters a holistic and interconnected approach, addressing the lack of integration in traditional design practices. By recognising interdependencies between the built environment, ecosystems, and social structures, Systems Thinking allows architecture to move beyond isolated solutions towards sustainable, people-centred developments.
- Speculative Design introduces a creative and visionary dimension, allowing architects to test radical possibilities and rethink conventional design paradigms. Instead of merely responding to technological advancements, Speculative Design ensures that innovations align with human-centric principles, mitigating risks of socio-spatial inequalities while fostering flexibility and experimentation in architectural solutions.

4.4 *Application of SSFF in Architectural Challenges*

The integration of SSFF into architectural practice has profound implications for addressing contemporary urban and environmental challenges:

- The underutilisation of public and semi-public spaces can be addressed through Systems Thinking, which promotes participatory urbanism and community-driven design strategies.
- Smart city initiatives, while heavily reliant on technology, must be complemented by Speculative Design to ensure that advancements align with human-centric principles rather than reinforcing socio-spatial inequalities.
- Climate resilience and environmental adaptation can be strengthened through Strategic Foresight, allowing architects to prepare for uncertain ecological shifts and disruptive global trends.

By integrating these methodologies, SSFF fosters a future-ready, flexible, and inclusive architectural framework that prepares for uncertainty and actively shapes it. This structured approach repositions architecture as a transformative force capable of anticipating and influencing long-term urban, environmental, and technological trajectories.

5.0 Discussion

The Strategic Speculative Futures Framework (SSFF) provides a structured approach to addressing key limitations in architectural practice by embedding future-oriented methodologies. Flowers (2014) highlights how traditional architectural methods often fail to prepare for emerging challenges. SSFF overcomes this by systematically identifying and framing key future preparedness through futures methodologies. Similarly, the lack of interdisciplinary integration noted by Mehaffy and Salingaros (2017) is addressed in SSFF through causal flow diagrams, which help map systemic interconnections and uncover deep-rooted relationships within the built environment.

In alignment with futures research by Voros (2003) and Candy & Dunagan (2017), SSFF incorporates trend scanning and weak signal detection to analyse emerging disruptors, ensuring a proactive rather than reactive design response. Furthermore, SSFF applies scenario planning methodologies through scenario building to develop probable, plausible, possible, preferable futures and wild card scenarios, enhancing architecture's adaptability to change. While speculative futures are often criticised for being purely hypothetical (Dunne & Raby, 2013), SSFF bridges this gap by translating speculative insights into actionable design strategies, ensuring that visionary thinking informs tangible, future-ready architectural solutions.

A key criticism of contemporary architectural practice, as highlighted by Baldassarre et al. (2024) and Askar et al. (2021), is its reactive rather than proactive nature, leading to short-term solutions that fail to accommodate uncertainty and long-term sustainability. SSFF shifts this paradigm by embedding Strategic Foresight, equipping architects with scenario planning, trend analysis, and wild card detection to prepare for multiple future possibilities. This ensures that architectural and urban interventions respond to immediate challenges and actively shape resilient and adaptable environments. However, despite its strengths, SSFF may face resistance from policymakers and industry professionals who favour traditional, risk-averse planning approaches (Carmona, 2013). Additionally, the resource-intensive nature of scenario planning and speculative design could pose challenges regarding scalability and cost-effectiveness, particularly in developing regions where budgetary limitations often constrain architectural interventions.

SSFF also addresses critical urban challenges such as the underutilisation of public spaces, exclusionary urban design, and risks associated with tech-driven urbanism, as noted by Gehl (2013), Carmona (2013), and Greenfield (2018). Through Systems Thinking, SSFF enhances participatory urbanism, ensuring that public spaces are co-designed with users rather than imposed through top-down planning. This fosters more inclusive and dynamic urban environments that meet real human needs. However, interdisciplinary collaboration remains a persistent challenge in architectural practice (Mehaffy & Salingaros, 2017). While SSFF proposes causal flow diagrams to bridge interdisciplinary gaps, successful integration depends on effective cross-disciplinary communication. Structured facilitation methods, such as participatory foresight workshops (Candy & Dunagan, 2017), are necessary to ensure meaningful engagement between architects, urban planners, sociologists, and technologists, ultimately enhancing SSFF's ability to generate holistic and inclusive urban solutions.

While SSFF is a theoretical framework, its effectiveness is reinforced by real-world analogues that demonstrate its practical relevance. The MIT Senseable City Lab (Ratti, 2016) applies predictive analytics to dynamically shape urban environments, mirroring how SSFF integrates Strategic Foresight into architectural design to anticipate and adapt to emerging challenges. However, the extent to which predictive analytics influence real-world architectural and urban projects remains uncertain, as many applications remain within the research phase rather than translating into built interventions.

6.0 Conclusion and Recommendations

The Strategic Speculative Futures Framework (SSFF) provides a structured approach to embedding long-term foresight into architectural decision-making. By integrating Strategic Foresight, Systems Thinking, and Speculative Design, SSFF shifts architectural practice from reactive to proactive, fostering adaptability and interdisciplinary collaboration. However, as a conceptual framework, SSFF has yet to undergo empirical validation. Its integration into architectural practice might face challenges, including resistance from conventional methodologies and the need for interdisciplinary expertise. Future research should focus on testing SSFF through architectural and urban design pilot projects, refining its methodologies based on practical outcomes to enhance its applicability. Strengthening collaboration with futures studies, urban planning, and technology experts will further enhance its depth and relevance. Additionally, leveraging AI-driven trend analysis, digital simulations, and participatory foresight tools can improve SSFF's predictive capabilities and stakeholder engagement. Aligning SSFF with architectural policies and urban planning frameworks will facilitate its real-world adoption and long-term impact.

Beyond architecture, SSFF highlights important ethical considerations in speculative urbanism, particularly in balancing technological advancements with human-centric and sustainable design principles. While emerging technologies offer transformative possibilities, their unchecked implementation may lead to issues such as data privacy concerns, social inequality, and environmentally unsustainable practices. SSFF emphasises the need for a responsible approach, ensuring that speculative urban visions remain inclusive, ethical, and ecologically conscious. Furthermore, the application of SSFF extends beyond architectural design into broader urban governance and socio-economic planning. Futures methodologies such as scenario planning and strategic foresight can inform city policies, economic strategies, and community resilience planning, providing a more systemic approach to shaping the built environment. By expanding SSFF's scope, future research can explore how speculative futures thinking can drive adaptive urban policies and equitable socio-economic transformations.

Paper Contribution to Related Field of Study

This paper contributes to architectural discourse by introducing the Strategic Speculative Futures Framework (SSFF)**,** which integrates systems thinking, strategic foresight, and speculative design to address long-term uncertainties in architecture, with a strong emphasis on sustainable development. It identifies gaps in current methodologies, particularly in sustainability, and provides a structured approach for architects to analyse emerging trends, drivers, weak signals, and disruptors to develop adaptive, resilient, and future-oriented design strategies. While SSFF is in its early conceptual stage, it lays the groundwork for transforming architectural decision-making by embedding futures thinking into practice, encouraging a shift toward more sustainable and forward-looking built environments.

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