# AGILE URBAN SYMBIOSIS: STRATEGIC DEVELOPMENT OF HOSUR AS A RESILIENT SATELLITE CITY FOR BENGALURU, INDIA

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## **Abstract**

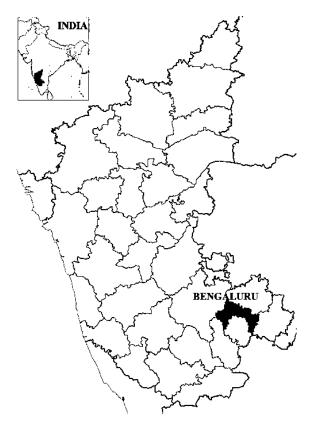
Urban environments exhibit mounting complexity, yet traditional centralized planning methodologies struggle adapting to rapid transformations. An agile approach prioritizes iterative, experimental interventions reconciling short-term necessities and long-term resilience. This paper investigates agile adaptation's potential calibrating secondary municipalities like Hosur, India into sustainable ancillary settlements for major metropoles including Bengaluru. Utilizing Durkheim's organic solidarity concept, diverse, interdependent urban collectives foster social cohesion while enabling flexibility. Through limited pilot initiatives, collaborative governance, and scenario analyses, municipal bureaucracies can nimbly confront uncertainty and evade lock-in to rigid developmental trajectories. Hosur's proximity to Bengaluru engenders opportunities for developing sustainable, habitable auxiliary urban capacity, contingent on reimagining inclusive urban design and infrastructure augmenting resilience, accessibility, and quality of life. This manifests a novel iteration of engineered organic solidarity between municipalities. Though situated in different states, the potential for a symbiotic relationship between Hosur and Bengaluru is contingent on effective intergovernmental collaboration between Tamil Nadu and Karnataka. Adopting an agile paradigm, civic governments can implement adaptive governance addressing immediate needs while expanding prospective options. This empowers equitable enhancement of resilience and sustainability.

*Keywords*: Transformation, Agile City, Organic Solidarity, Reimagine, Contingent.

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## INTRODUCTION

The United Nations projects that 68% of the global population will reside in urban areas by 2050(United Nations, Department of Economic and Social Affairs, Population Division (2018), highlighting the growing urbanization trend. This is exemplified by Bengaluru, Karnataka's capital, which has reached an estimated population of 12 million in 2024, demonstrating the increasing pressure on urban infrastructure and resources (Figure 1).



**Figure 1:** Location & setting – Bengaluru *Source: Wikimedia.org (Edited by Author)* 

The metropolitan area of Bengaluru contributes 18 percent to the states' total population (64 million) as per Census of India. The currently operational Revised Master Plan (RMP) 2015 for land use in the Bengaluru Development Authority has increased the area designated for residential purposes from 28.48% in 2005 to 40.07%, while reducing the area allocated for industrial use from 9.65% to 6.80% (Hanumantharaju & Hanjagi, 2018). The Bangalore metropolitan area's expansion from 100 to 600 square kilometers by 2020, driven by

anticipated population growth and housing demand, has severely impacted water bodies and vegetation cover (Manoharan, et al., 2022). This rapid urbanization has led to water shortages while creating urban sprawl as development extends into peripheral areas. The influence of urbanization extends beyond the Bengaluru Metropolitan Area (BMA) and Karnataka's border, as evidenced by Hosur's growth in Tamil Nadu, driven by Bengaluru's proximity. During India's techno boom in the mid-2000s, Hosur served as a satellite town for Bengaluru's Electronic City. The National Highways Authority of India (NHAI) has opened eighty kilometres of the 288-kilometer Satellite Town Ring Road (STRR), an access-controlled motorway around Bengaluru that diverts commercial vehicles from entering the city.

Located 35 kilometres from Bengaluru, Hosur presents unique opportunities for economic and infrastructural integration, pioneering interstate urban collaboration between Tamil Nadu and Karnataka. The city can develop specialized industrial and residential functions supporting Bengaluru's growth, while infrastructure projects like STRR enhance connectivity. This spatial relationship enables resource sharing and distribution of urban pressure across both administrative regions.

This research aims to study if a secondary municipality like Hosur be developed as a sustainable ancillary settlement for a major metropolis like Bengaluru through an agile approach.

Following are the objectives of the research can be identified:

- I. This research aims to analyse how Hosur's geographic proximity to Bengaluru can be strategically leveraged to develop sustainable urban capacity, with a focus on identifying complementary development opportunities and assessing critical infrastructure and connectivity requirements that would benefit both cities.
- II. The study seeks to investigate effective mechanisms for intergovernmental collaboration between Tamil Nadu and Karnataka, specifically focusing on developing frameworks for cross-border urban planning, resource sharing, and identifying necessary policy interventions for seamless integration between the two states.
- III. The research will explore the implementation of an agile urban development approach, emphasizing iterative and experimental interventions through pilot initiatives and scenario planning, while establishing robust feedback mechanisms for adaptive planning and governance.

This research explores sustainable urban development through crossborder governance and agile planning, examining how secondary cities like Hosur can complement larger metropolises, potentially serving as a model for developing nations.

# THEORETICAL FRAMEWORK

The Concentric Zone Model (Burgess, 1925) and Multiple Nuclei Model (Harris & Ullman, 1945) remain relevant in understanding Bengaluru's urban growth. The city's expansion, evident in the BMA and BMR boundaries, aligns with the concentric zone pattern, while its diverse nuclei challenge the traditional CBD-centric model.

However, cities like Bengaluru also display VUCA characteristics (Volatility, Uncertainty, Complexity, and Ambiguity), as described by the U.S. Army Heritage and Education Centre in 2018. These VUCA traits, stemming from leadership theories by Warren Bennis and Burt Nanus, pose significant challenges as urbanization continues to grow. The VUCA framework provides a lens for organizations to interpret their challenges and opportunities, emphasizing the need for strategic foresight, insight, and the behaviour of entities within organizations.

In response to these VUCA challenges, an agile approach to planning and executing urban development becomes increasingly relevant. Agile principles, such as iterative development, citizen collaboration, self-organizing teams, and embracing change and continuous improvement, offer a flexible and adaptable framework for addressing the dynamic and complex nature of urban environments.

Furthermore, the concept of organic solidarity, developed by Émile Durkheim in book The division of labor in society, highlights the social integration and interdependence that arises from the division of labor and specialization in modern societies. Vukov et al. (2018) examined organic solidarity in modern urban labor markets, demonstrating how specialized professional networks create intricate social interdependencies in metropolitan environments. This concept can be applied to the relationship between Bengaluru and Hosur, where Hosur can serve as a specialized and interdependent ancillary settlement to the larger metropolis of Bengaluru.

Leveraging classic urban theories (Burgess, 1925; Harris & Ullman, 1945) and the VUCA framework, this research explores the potential of Hosur as a sustainable urban centre complementary to Bengaluru, employing agile urban planning and development. This approach seeks to foster "designed organic solidarities of cities" (Durkheim), where interdependence and specialization between urban centres are actively cultivated.

This theoretical framework (Figure 2) integrates concepts from urban planning, leadership theories, organizational agility, and social

theory, providing a multidimensional lens for exploring the research objectives and developing strategies for sustainable urban development in the context of Bengaluru and Hosur.

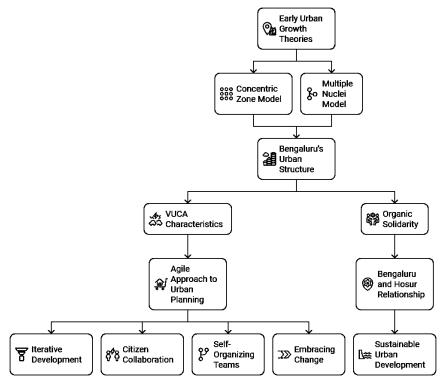


Figure 2: Flowchart to explain conceptual Framework

Source: Author

# REVIEW OF LITERATURE

The investigation delves into the intertwined dynamics of Bengaluru and Hosur, underscoring the necessity to comprehend their distinct challenges and adaptive strategies, thereby unravelling the potential of symbiotic relationship between these two urban centres.

Bengaluru's shift from utilizing local water sources to depending on distant ones has undermined its capacity to withstand flooding and drought events, emphasizing the critical need for an integrated approach that recognizes the significance of local ecosystems in enhancing urban resilience (P. & Sivapullaiah, 2020). Bengaluru grapples with a significant challenge - stimulating its liveability while catering to the overflowing population. There is an ever-increasing need for housing, physical and social infrastructure. Previously, the city had a diverse land use pattern across multiple sectors. However, it now

exhibits a concentric land use pattern, which primarily extends towards the east and north, giving rise to new suburban areas (Sen, 2013). The city faces challenges in balancing growth and preserving liveability simultaneously.

A second-grade municipality typically refers to Municipal Councils or Nagar Palikas in India, which are municipalities for smaller urban areas or towns with a significant population. Secondary municipalities in India face several challenges due to their transitional nature and limited resources. Hosur, with 0.12 million populations in 2011, has the status of secondary municipality (Hosur Development Plan,2018). Secondary cities serve as critical economic connectors complementing megacities in a nation's urban network, and spatial planning coupled with local economic development initiatives at the secondary city level plays a pivotal role in promoting balanced regional and national economic growth, as neglecting to enhance their economic functions and linkages can exacerbate regional disparities.

There are two main views on India's pattern of urbanization until the 2000s. The first view (Kundu 1983) says that the distribution of urban population across town sizes was "top-heavy." This means that large towns and cities were the main drivers of urbanization. Small and medium-sized cities barely grew. The second view (Pant and Mohan 1982) believes that the structure of urbanization was roughly balanced. The distribution across town sizes was stable. In summary, one view suggests large cities dominated urbanization. The other view suggests a more balanced growth across town sizes.

The concept of 'agile' describes methods that inherently accommodate necessary changes during execution (Cambridge Dictionary). The "agile city" concept was introduced by Carlos Vaz Marques in 2002. Agile urbanism is a responsive approach to urban development that focuses on incremental, inclusive interventions aimed at involving various stakeholders in producing versatile, adaptive, and context-driven urban changes. While adaptive theory of governance puts focus on joint decision-making and policy adaptation skills (Folke et al., 2005). The concept of an "agile city" can be described as one that achieves resilience, adaptability, and sustainability through flexible infrastructure, innovative governance, and data-driven decision-making (Samzadeh et al., 2013). These principles are particularly relevant for developing Hosur as a sustainable ancillary settlement for Bengaluru, enabling responsive strategies to address emerging challenges and opportunities.

Émile Durkheim's concept of organic solidarity refers to the interdependence and complementarity of diverse individuals and groups within a complex society, fostering social cohesion (Durkheim, 1893). This theory resonates with the research aim of examining the potential for Hosur to serve as a specialized and interdependent ancillary settlement to Bengaluru. Organic solidarity highlights the benefits of division of labor and specialization, which could be achieved by fostering a symbiotic relationship between the two urban

centres. Social cohesion theory further emphasizes the importance of promoting inclusiveness, shared values, and a sense of belonging within urban communities to enhance resilience and sustainability (Jenson, 1998). These concepts could be valuable in shaping strategies for integrating Hosur into the broader urban fabric of the Bengaluru metropolitan region while maintaining social cohesion and a sense of identity.

Resilience theory in urban planning emphasizes the ability of cities to withstand, adapt, and recover from various shocks and stresses, such as environmental, economic, and social challenges (Meerow et al., 2016). This is particularly relevant given the research aim of developing Hosur as a sustainable ancillary settlement, which requires resilience in the face of urbanization pressures and environmental constraints. Sustainable urban development theory focuses on integrating economic, social, and environmental considerations in urban planning to ensure long-term viability and quality of life (Jenks & Jones, 2010). These theoretical perspectives could inform strategies for balancing economic growth, social inclusion, and environmental protection in the development of Hosur as a sustainable urban center supporting Bengaluru.

Inclusive urban design principles emphasize the creation of accessible, equitable, and user-friendly urban environments that cater to the diverse needs of different groups and promote social inclusion (Hamraie, 2017). Infrastructure theory explores the role of physical and social infrastructure in shaping urban development, resilience, and access to essential services and resources (Graham & Marvin, 2001). These theories could provide valuable insights for ensuring that the development of Hosur as an ancillary settlement prioritizes inclusivity, accessibility, and the provision of adequate infrastructure to support a growing urban population while promoting social equity and quality of life.

Intergovernmental relations theory examines the interactions, power dynamics, and coordination mechanisms between different levels of government (national, state, local) in addressing complex policy issues and implementing collaborative initiatives (Wright, 1988). Given that Hosur and Bengaluru are in different states (Tamil Nadu and Karnataka, respectively), intergovernmental collaboration and coordination will be crucial for the successful development of Hosur as a sustainable ancillary settlement. This theory could provide insights into navigating the complexities of cross-state urban planning and fostering effective collaboration between the two state governments and local authorities. A study of Semarang, Indonesia shows that mayoral leadership in disaster resilience needs public-private partnerships to overcome bureaucratic challenges (Budiati, 2017).

Urban Consolidation (UC) has been defined as "the process of increasing and/or maintaining the density of housing in established residential areas to increase or maintain the population densities of those areas" (Smith, 1997). Similarly, researchers have described this phenomenon as "an

intensification of built form and activity within a particular urban area" (Buxton & Tieman, 2005). The concept of "intensification" of urban land, driven by increased pressure on infrastructure and services, remains a recurring concern associated with urban consolidation (Smith, 1997; Buxton & Tieman, 2005).

By drawing upon diverse theoretical perspectives, the literature review provides a comprehensive framework for examining the research aim, addressing urban planning, governance, social inclusion, resilience, and intergovernmental coordination in developing Hosur as a sustainable ancillary settlement for Bengaluru.

Flexibility in urban planning allows necessary adjustments to land and built environment utilization. It promotes adaptability and enables modifications as required. New developments should be reversible, low-impact, or adaptable for alternative uses. Many cities have abandoned, unused built assets, demonstrating how failing to plan for temporary, time-bound uses leads to waste. Transitory land uses highlight the need for accommodating change.

# RESEARCH METHODOLOGY

The projected exploration path intertwines diverse informational streams, merging subjective and objective approaches to thoroughly probe the viability of sculpting Hosur into a sustainable auxiliary urban cluster complementing Bengaluru's landscape. The impressionistic facet delves into an exhaustive case chronicle, unearthing historical growth narratives, metropolitan tribulations, and prevailing policies through immersive stakeholder involvements and synthesis of primary and ancillary data repositories. Augmenting this qualitative tapestry, spatial simulations and geographic informatics will quantify land utilization motifs, demographic currents, and infrastructural potentials, enabling foresight rooted in data-driven projections.

Iterative pilot undertakings, anchored in the agile urbanism ethos, will serve as experimental crucibles, monitored and refined through inclusive participatory processes. Policy and governance examinations will dissect existing regulatory frameworks, illuminating barriers and openings for intergovernmental synergies between the Tamil Nadu and Karnataka domains. The synthesis crescendo will convergent distil insights across investigative tributaries, forging a holistic stratagem for Hosur's sustainable metamorphosis as an ancillary settlement, encompassing recommendations for urban choreography, infrastructural augmentations, policy evolutions, and institutional architectures.

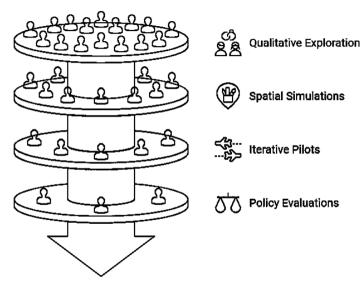


Figure 3: Methodological Funnel for the research Source: Author

The methodology's transdisciplinary essence, interweaving qualitative insights and quantitative spatial analytics with iterative pilots and policy evaluations, aspires to cultivate resilience, organic solidarity, and adaptive governance, culminating in an actionable pathway for symbiotic urban florescence across state demarcations.

# DISCUSSIONS, ANALYSIS AND FINDINGS

Prior to India's independence, the settlement of Hosur was predominantly rural, with its economy heavily reliant on agriculture and animal rearing practices. In 1962, Hosur was established as a selection grade town panchayat. Subsequently, it was upgraded to the status of a second-grade municipality (Hosur Municipality: Profile and key information). This implies that the town has an annual income below 4.00 crore (Directorate of Municipal Administration,2024) increasing the necessity to augment the city's revenue streams.

As part of state's industrial growth initiatives, the State Industries Promotion Corporation (SIPCOT) was established in 1971 (Hosur New Town Development Plan, 2022). A city's prospects are inextricably linked to its place within the broader national and global urban hierarchies (Brundtland, 1987). India's technological revolution in the mid-2000s propelled Bengaluru to the forefront, establishing it as a preeminent centre for the information technology and electronics industries. During India's technology boom in the mid-2000s, Bengaluru emerged as a major IT and electronics hub. This rapid growth led to specialized technology parks like Electronic City. A Study of Kaduna analyses

it's mono-centric urban pattern increases traffic and carbon emissions, recommending better urban planning to improve sustainability (Zakka, Permana & Majid,2017).

With the surging demand for skilled labour and supporting infrastructure, Hosur, a town situated just 35 kilometres from Bengaluru, emerged as a satellite town for the burgeoning Electronic City. Hosur's proximity to Bengaluru and its relatively lower cost of living rendered it an alluring residential and commercial hub, catering to the workforce and businesses associated with the Electronic City (Figure 4). Several IT and electronics companies established operations in Hosur, leveraging its strategic location, talent pool access, and Bengaluru's resources.



Figure 4: Bengaluru to Hosur - Connectivity Source: 2018 B.Arch. Batch, VSPARC

It also witnessed an influx of professionals and workers commuting to Electronic City. Its development as a satellite town was facilitated by improved transportation links like expanded road networks and commuter bus services between the two locations (Figure 4). Hosur capitalized on Bengaluru's technology boom by positioning itself as a supporting satellite, providing residential and commercial options while benefiting from the larger city's growth. A study conducted in Malaysia examined urbanization from 1980-2010,

emphasizing natural increase over migration as the primary growth factor (Danial & Williamson, 2022).

This symbiotic relationship got strengthened by the construction of Chennai – Bengaluru Highway in 2001. Bengaluru City was now able to tap into the resources and infrastructure with ease in Hosur, while providing employment opportunities and economic growth for the satellite town. Over time, Hosur evolved into a complementary urban centre, offering residential areas, commercial spaces, and supporting services for the tech workforce employed in Electronic City.

The completion of the longest national highway, NH-7 (now NH-44), in 2023 opened further opportunities for industries. These opportunities arose along the entire stretch of the highway. This stretch runs from Electronic City in Bengaluru to Hosur in Tamil Nadu. The availability of this highway corridor facilitated the establishment of various industries along its path. Further to restrict freight movement inside the city, a plan was proposed to create eight logistic hubs 100 acres. These logistic hubs would be at the periphery of this highway. One of the proposed logistic hubs is on Hosur Road. This hub is meant to serve the industries located in Hosur and surrounding areas. The logistic hub handles freight and goods infrastructure for this region.

Establishing a dedicated logistics hub aims to reduce freight traffic congestion in Bengaluru. By linking Hosur to this hub, the movement of goods and materials for industries in Hosur and surrounding areas will be streamlined. This logistical infrastructure outside Bengaluru's urban core will enhance efficiency, mitigate congestion, and optimize freight transportation via a centralized cargo management facility. The objective is to facilitate smoother logistics operations, easing the city's transportation burden while serving industries' supply chain needs.

The research methodology for developing Hosur as a resilient satellite city employs a transdisciplinary framework, integrating qualitative insights with quantitative spatial analytics. The morphological analysis reveals Bengaluru's transformation from heterogeneous land use patterns to concentrated development, leading to infrastructural stress and ecological degradation (Manoharan et al., 2022).

Hosur's strategic location, 35 kilometers from Bengaluru, presents an opportunity for urban symbiosis, enhanced by infrastructural interventions like the Satellite Town Ring Road and NH-44. The theoretical framework synthesizes agile urbanism principles for adaptive planning with Durkheim's organic solidarity concept, fostering socio-spatial integration while acknowledging the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) environment of contemporary urbanization.

The spatial strategy emphasizes environmental stewardship through green infrastructure networks and ecological buffer zones, counteracting the urban heat island effect and enhancing ecosystem services. The urban fabric is conceived as a dynamic system, responding to demographic flux and evolving infrastructure demands through iterative pilot projects.

The governance framework advocates interstate collaboration between Tamil Nadu and Karnataka, promoting adaptive management through incremental interventions. This approach enables the creation of a resilient urban ecosystem that balances density with livability, fostering sustainable development across administrative boundaries.

Hosur and Bengaluru form a complementary urban partnership, where Bengaluru serves as a technology and business hub while Hosur functions as an affordable residential and industrial satellite town, providing manufacturing facilities and support services that help sustain Bengaluru's economic ecosystem. The relationship between Hosur and Bengaluru exemplifies urban interdependence, with each city focusing on its strengths while supporting the other's needs. Their shared cultural characteristics, including language and ethnicity, facilitate social cohesion. Through inclusive urban planning, equitable resource access, and collaborative decision-making, both cities can foster a unified identity that transcends state boundaries. This interdependent partnership creates a resilient urban system where both communities work together to address challenges and adapt to changes. The complementary roles of the two cities reflect what Meijers and Burger (2017) term as "functional polycentricism," where cities develop specialized roles within a larger urban system:

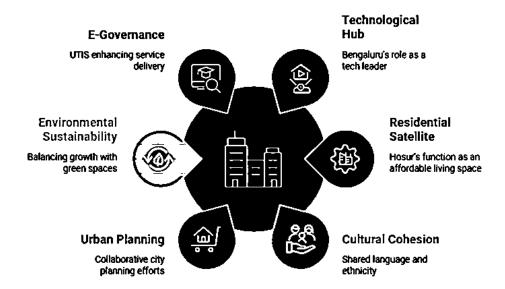


Figure 5: Factors contributing to Urban Interdependence

Source: Author

The Agile City explores how the design and development of buildings and communities can enable cities to rapidly bridge the gap between their current environmental impact and desired sustainability goals. By creating spaces that are more functional, efficient, and aligned with our aspirations, we can transform urban areas into vibrant, eco-friendly environments that meet both our practical needs and our vision for a better future. When two cities engage in a mutually beneficial, symbiotic relationship, it enables them to exhibit agility collectively. If one city experiences deficiencies or shortcomings, the other can alleviate and compensate for those gaps, thereby reducing the strain or distress caused by those deficiencies. This symbiotic dynamic allows the strengths of one city to counterbalance the weaknesses of the other, fostering a responsive and adaptable system that can nimbly address various challenges or lacunae. The Hosur new town development plan- 2046 aims to strike a balance between promoting industrial growth and achieving environmental sustainability. The town plans to preserve blue and green assets Green Belts, Green Barrier to the existing forests, social forestry in vacant government lands, mined areas and on roadsides, etc.

The Urban Tree Information System (UTIS) serves as a sophisticated e-governance solution for Urban Local Bodies in Tamil Nadu, particularly implemented in Hosur Town, offering citizens seamless access to services through multiple channels while ensuring efficiency, transparency, and reliability in service delivery. The platform not only democratizes access to essential services for residents but also maintains high standards of accuracy and affordability, allowing citizens to engage with governmental services at their convenience from any location. Beyond citizen services, UTIS streamlines internal administrative procedures and departmental functions, facilitating effective enforcement of regulations and enabling smooth intergovernmental operations (G2G) between Hosur and Bengaluru, demonstrating its vital role in fostering cross-jurisdictional urban governance.

# PILOT STRATEGIES & RECOMMENDATIONS

The development of Hosur as a strategic satellite town showcases an integrated approach to managing Bengaluru's urban expansion. The proposed Satellite Town Ring Road (STRR) will connect 12 major towns around Bengaluru, with Hosur serving as a crucial node in absorbing industrial and workforce pressures from the metropolis. The planned metro rail link between Bommasandra and Hosur represents a significant pilot initiative, with the Tamil Nadu government recognizing its potential to boost Hosur's industrial growth, which already hosts over 2,000 MSMEs. As part of the "Golden V" region, Hosur's rapid population growth has necessitated thoughtful expansion strategies, leading to the proposal of a satellite township at Chandapura, strategically located 16 km away between Hosur and Electronic City. This development approach mirrors successful models like the greater Minsk metropolitan area in Belarus, where satellite cities are

functionally organized to complement the main city's economic characteristics, creating a sustainable urban ecosystem that benefits both regions.

Conclusions

Developing secondary municipalities like Hosur as sustainable ancillary settlements for major metropolises like Bengaluru offers a promising approach to address urban challenges. Through an agile paradigm involving iterative interventions, collaborative governance, and scenario analysis, cities can nimbly adapt to rapid transformations. Fostering a symbiotic, interdependent relationship between Hosur and Bengaluru, rooted in Durkheim's organic solidarity concept, can promote social cohesion while enabling flexibility.

Effective intergovernmental collaboration between Tamil Nadu and Karnataka is crucial for realizing this vision across state boundaries. Pilot initiatives like the Satellite Town Ring Road and metro rail connectivity can catalyse sustainable urban development in Hosur. Prioritizing inclusive urban design, resilient infrastructure, and resource preservation should underpin planning efforts.

Fostering a symbiotic relationship between Hosur and Bengaluru based on complementary roles and mutual interdependence can create a cohesive urban collective that is economically vibrant and socially resilient. By promoting inclusive planning, shared values, and participatory governance, this interdependent system can leverage the strengths of both cities to address challenges and drive sustainable urban development.

Ultimately, embracing an agile, adaptive approach empowers equitable enhancement of urban resilience and long-term sustainability in the face of mounting complexities. Reimagining the relationship between core cities and satellite towns holds transformative potential.

# ACKNOWLEDGMENT

I extend my sincere gratitude to Dr. Madhumathi A, Director, School of Architecture, VIT, for the support that facilitated the Urban Transformation Studio project in Fall Semester 2022-23. The leadership and vision aided my academic endeavour. The conception of my research emerged during transformative studio site visits to Hosur, where immersive field experiences formed my academic curiosity for an independent scholarly exploration of the urban landscape. I am deeply grateful to Batch 2019 of VSPARC, as the diligent spirit and commitment during our Hosur-Urban Transformation project have been remarkable. My deepest appreciation goes to the Co-Faculty of the Urban Transformation Studio. The site visits were the foundational platform that led to this research vision.

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Received: 7th December 2024. Accepted: 5th March 2025