Occupancy Rate of Residential Units as an Indicator of Urban Sprawl and Land Efficiency: The Case of Vadodara, India.

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Abstract

Often, increasing relocations to and within cities in search of better quality of life result in demand for residential developments, leading to expansions of cities. Consequential construction of residential properties by the private sector thus result in an inequitable provision of housing leading to physical expansions of city limits. This is one of the major contributors to urban sprawl that has an adverse impact on the viability and efficiency of cities in terms of transportation and infrastructure.

Urban sprawl and land efficiency is often assessed through quantitative markers of population and built density. This research establishes occupancy rate as a potential indicator to analyze land use efficiency implied by urban sprawl through descriptive analytical methods. It uses the tier-2 city of Vadodara as a case. It assesses occupancy and ownership trends of residential properties. It employs the snowball method of non-probability sampling utilizing virtual surveys to reach the respondents while maintaining anonymity of them.

Findings show that 62% of the surveyed population, irrespective of their income levels, owned at least one additional residential property as an investment. However, 48% of the additional residential properties are vacant. This questions the efficiency of land use in Vadodara. The city boundary has expanded by 32.8% during the last 12 years, against Vadodara's 35.33% population growth rate over the past three decades indicating a reduction in population density. It is therefore argued that occupancy rate of residential properties within a city could be used to inform decisions related to expansion of city limits. Therefore, occupancy rates can also be an effective indicator / tool to measure land efficiency to guide housing policies, development plans and town planning schemes in order to manage urban sprawl and eventually increase land efficiency.

Keywords: City Expansion, Residential Properties, Occupancy Rate, Urban Sprawl

Introduction

One of the most significant effects of population concentration in urban centers is urban sprawl (Cobbinah, 2016). However, in many metropolitan places, urban sprawl is frequently referred to as unregulated spread of housing, commercial developments, and roads over large swathes of land with no regard for urban planning (Alexander, 2012). According to Burchell and Mukherji (2003), urban sprawl contributes significantly to infrastructure expenditure and public health problems like obesity, and the presence of chronic disease (Kelly, 2004). In the planning literature, urban sprawl is considered more adverse since it frequently results in excessive land use change in open space, urban floods (Naidu, 2023) traffic congestion from increased travelling, and socio-economic isolation resulting from increased land values in developed urban areas (Carruthers, 2003). Urban development trends that result in sprawls due to inefficient use of land affect many facets of daily life. Time and money spent on transportation, access to amenities, and housing prices are just some of the notable effects of a city's internal structure (Tikoudis, 2022). Succinctly put, sprawl is a reflection of inefficient planning and land management practices and a liability on the natural resources of the urban eco-region as a result of inefficient use of land (Schiavina, 2022). The execution of measures emphasizing the limitations and mitigation of the recognized negative impacts depend, in large, on the indicators of sprawl (Gervasoni, 2017) and land use efficiency (Zhou, 2021). It is therefore imperative to link urban sprawl to land use efficiency.

Review of Literature

Land being a finite resource, needs to be utilized efficiently by the increasing urbanization trends specially in smaller cities, leading to sprawl (Zhou, 2021). Urban sprawl is a complex phenomenon whose various characteristics can be accurately measured through several metrics using a variety of techniques. There are eight quantifiable indicators of urban sprawl that can be measured: density, continuity, concentration, compactness, centrality, nuclearity, diversity, and closeness (Bnai, 2014). One of the main factors attributed to the sprawl of urban centers is the sporadic expansion of residential developments in the peri-urban areas (Goel, 2011). The identified indicators of sprawl and land use efficiency measure the physicality of the spatial extent, and grain of the built urban fabric, but there is a need to investigate the drivers and forces of this trend based on the demand and supply of conducive residential developments. Studies have also established that sprawling patterns in Tier 2 and Tier 3 cities have reduced land efficiencies due to negligent planning (Zhou, 2021). Most researches addressing land use efficiency analyze it through the lens of land consumption rate, population growth rate, and physical expansion of urban areas (Schiavina, 2022; Zhou, 2021). Studies that address occupancy rates highlight the land vacancy rates of various uses (Koroso, 2021; Verburg, 2010), but do not address the occupancy rates of the built fabric.

A 2018 United Nations report states that India will contribute the most to the growth of the urban population of the world, adding 416 million new urban residents, and nearly doubling its urban population between 2018 and 2050 (Gandhi, 2021; Bhat, 2022). During the 12th plan period (2012–17), the Ministry of Housing estimated an 18.78 million housing shortfall. Recently, closing the gap between the severe housing shortfall in housing supply and the effective demand for housing has been a priority. In addition, it is anticipated that there would be a housing shortage nationwide totaling to 30 million by 2022 (Karmakar, 2021). According to the 2012 Government of India assessment, 18.78 million more houses are required to close the housing deficit.

Interestingly, liberalization of policies for real estate developments has resulted in a surge of private residential developments. At the same time, the announcement and sanction of Town Planning (TP) Schemes in urban and peri-urban areas further facilitate the trend of residential projects. Yet, the 2011 India Census states that there is a shortage of almost 19 million urban housing units, while there are also 11 million unoccupied residential units, which is enough to accommodate up to 50 million people or 13 percent of the urban population (Gandhi, 2021; Monani, 2020).

According to a 2001 survey, the states of Uttar Pradesh, Bihar, Assam, West Bengal, Orissa, Gujarat, Maharashtra, and Tamil Nādu have significant housing shortages (Khan, 2012). The 2016 Real Estate (Regulation and Development) Act, which aims to increase transparency, safeguard the rights of homeowners, and encourage investment in the real estate industry, has assisted in enhancing the residential market environment (Dek, et al., 2020). In 2011, 43.6% of the people in Gujarat were living in urban areas and that number is expected to rise by 10% by the year 2036, according to the technical group's study on population predictions (WELFARE, 2019). In the context of urban housing, Gujarat is the second state with a significant amount of vacant dwellings as seen in Fig.1. It has the largest percentage of unoccupied housing stock at 19% (Gandhi, 2021). Above account implies a disparity between the policies and the ground reality indicating an imbalance in the type and quality of residential units available and affordable by a larger section of the society.

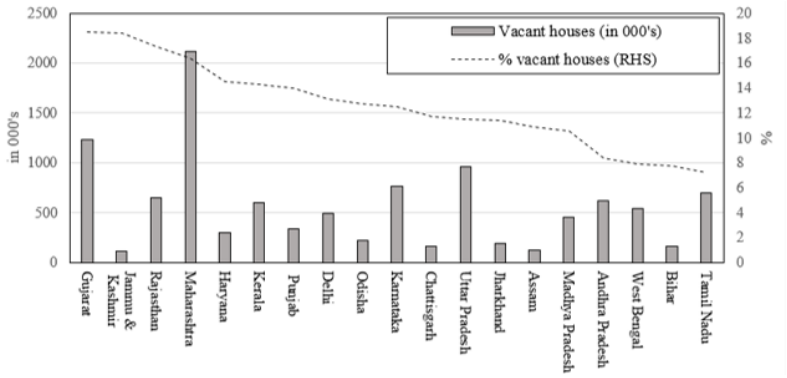

Fig. 1: Vacant housing status as per States
Source: (Gandhi, et al., 2021)

The third-largest city in the state, Vadodara is a prominent urban center strategically located within the industrial belt from Vapi and Ahmedabad and is a key node on the Delhi Mumbai Industrial Corridor (DMIC). The Vadodara Urban Development Authority and the Vadodara Municipal Corporation oversee the city's planned development and are responsible for the agglomerated growth of the city over the past few decades (Sarwate, 2014).Vadodara's population expanded significantly between the years 1991 and 2011. The annual growth rate originally increased from 10.20 % in the year 1931 to 59.30% in 1981, with a decline to 38.5% in 2011 as seen in (Fig.2).

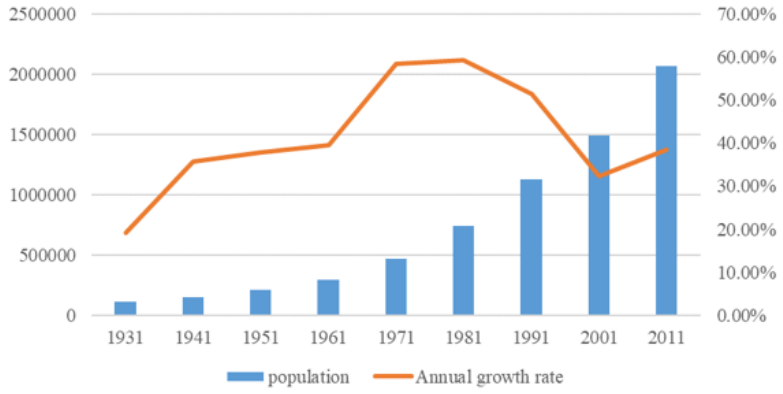

Fig. 2: Population Growth of Vadodara City
Source: author

In conjunction to the population growth, Vadodara spatial extents have also increased from 1964 to 2011; from 108.26 sq. km. (40%) in 1991 to 400 sq. km (151%) in 2019. Even though the yearly population growth rate has been declining, the physical extent has been exponentially increasing implying a decrease in population density, one of the primary indicators of urban sprawl. Concurrently, the land consumption rate has also increased as seen by the upsurge of private residential development in the peripheral areas of the city, and raises the question of housing demand, ownership trends, and occupancy status of those units. During a preliminary reconnaissance survey conducted by driving through the city between 7 pm and 10 pm, it was observed that many residential units, across the city, were in darkness with their windows and balcony doors closed, suggesting that the units were not occupied.

Since residential land uses are predominant in any city, this paper explores the underlying efficiency of the residential fabric through occupancy rates and property ownership, and its implication on sprawl. This paper aims to establish occupancy rates of built residential units as an indicator of land use efficiency through the phenomenon of urban sprawl.

Its objectives are as follows:

1. Examine the trend in residential development in the tier two city of Vadodara in the state of Gujarat
2. Determine the occupancy rates of residential units in the city of Vadodara
3. Discuss the implication of occupancy rates on land efficiency

Research Methods

The study focuses primarily on occupancy trends of residential properties and does not take into account the commercial and the institutional properties. Since, residential trends involve relocations from outside the city and also within the city, the study targeted a uniform representation across the city, spatially as well as demographically. An electronic survey using Google Forms as a tool was conducted for a period of one month to evaluate the private housing trends in the city of Vadodara.

As property ownership information is sensitive, respondents refrain from disclosing personal and financial information in a public forum. Therefore, with the objective of respondent's privacy, a convenient and a purposeful sample was employed for the survey, administered through the digital medium. The respondents included people from various economic strata. To aid a larger outreach and obtain a larger sample size in addition to the advantage of anonymity, snowball method of non- probability sampling was extensively used thereon to reach to as many people in the city as possible. The initial recipients of the survey were requested to forward it to their contacts.

The survey questions focused on the current and previous areas of residence, the duration of residence, housing typology, ownership status, additional properties owned by the respondents, their income levels and reasons for relocation. These questions were essential to identify the trend and the percentage of relocation, the relations between the income levels and property ownership, and the occupancy rate of the additional properties owned by the respondents. Since the survey was an e-survey, close-ended questions were raised in the questionnaire.

The research adopted a deductive approach for the descriptive analysis.

Findings

The findings of the study depict patterns of changing residences within the city (46%) for various reasons (**Error! Reference source not found.**). The need for larger living spaces (26%), desire for better living conditions (24%) and proximity to work and social infrastructure facilities (17%) are three of the major causes for the shift of residences within the city (**Error! Reference source not found.**). It implies that the older neighborhoods may not meet the growing demand of resident's living standards or that older infrastructure is falling apart. On the other hand, 30% of the sampled population have migrated into the city from other locations in search of employment opportunities, better environments and proximity to urban services (**Error! Reference source not found.**). Concurrently, Vadodara as a city has seen a marked

increase in the spatial area by the inclusion of neighboring villages within the urban boundary over the past decade. Out of the 313 respondents, 62% own at least one additional residential property within the city limits (**Error! Reference source not found.**).

A comparison between the income levels and additional property ownership reveals that households in the middle class (26,000 – 50,000 pm), upper middle class (50,000 – 1 lakh pm) and upper class (above 1 lakh pm) income brackets, respectively, have at least one additional residential property in the city (**Error! Reference source not found.**). This suggests that either property rates in the city of Vadodara are affordable to various economic sections of society for the purpose of investment or that there is a lesser demand / oversupply of a particular type of residential properties. On the other hand, a study by (**Error! Reference source not found.**) states that there is a severe housing shortage in Vadodara that implies an imbalance between demand and supply of residential properties within the city.

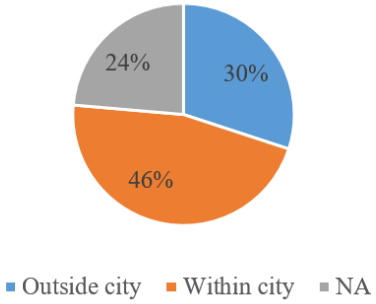

Fig. 3: Relocation Pattern
Source: Author

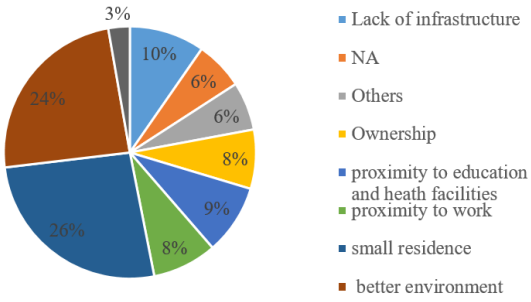

Fig. 4: Reasons for relocations within the Vadodara city
Source: Author

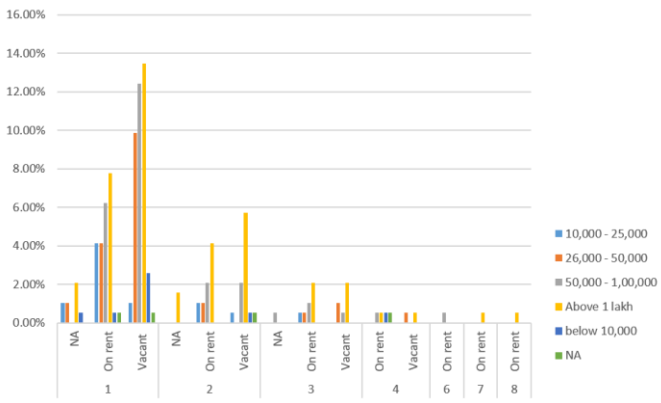

Fig. 5: Income levels and ownership of additional residential properties

Source: Author

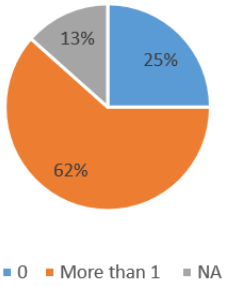

Fig. 6: Additional residential property owner
Source: Author

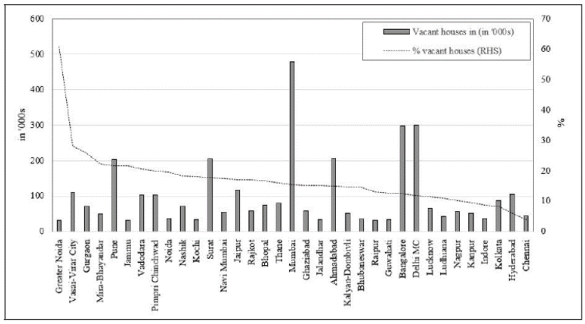

Fig. 9: Vacant housing stock in cities of India
Source: Gandhi, et al., 2021

46% of the total residential properties (611) are owner-occupied while 23% of the residential properties stand vacant and 28% are rented out (Fig.7). On the other hand, of the additional residential properties owned (298), 46% are occupied by renters while a glaring 48% are vacant, indicating that the citizens of Vadodara buy additional residential properties for the purpose of additional income but most of those additional properties are vacant (Fig.8).

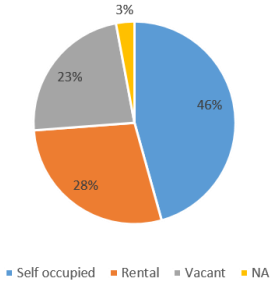

Fig. 7: Occupancy rate of the total residential properties (611)
Source: Author

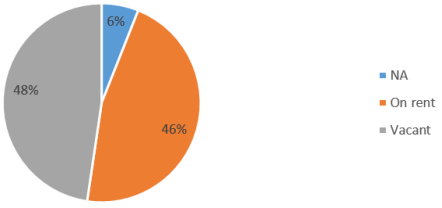

Fig. 8: Occupancy rate of the additional residential properties (298)
Source: Author

Discussion

This research surveyed the existing residents in the city for the status of their residential property ownership within the city of Vadodara. As the city is perceived to be safe and accessible, there exists a trend of residents from the other metropolitan cities or non-resident Indians investing in residential properties in Vadodara for investment, potentially impacting the occupancy rate of residential properties. Though this study began with the purpose of identifying occupancy rate as an indicator for sprawl and land efficiency, above findings reveal a trend in real estate development in the tier 2 cities like Vadodara. Owning a residential property is affordable and therefore preferred to renting (Fig.5 & 8), where retainment of 1 additional property depicts a higher vacancy rate. This suggests a trend of not selling the older property when relocating within the city (Jagatramka, 2020;Naidu, 2023) contributing to the sprawl.

Such phenomenon contributes to the sprawling nature of cities where agricultural lands are appropriated under the urbanization process and poses challenges to the compact city concept, smart city mission, implementation of land efficiency Sustainable Development Goal and provision of transportation and infrastructure.

While this study was conducted for built residential properties, similar studies for commercial, institutional and industrial properties, and vacant lands will bring to light trends in those land uses as well. Therefore, while planning for expansion, the Development Plan (DP) formulating process and the ensuing Town Planning Schemes (TPS), must be preceded by a status report of occupancy rates of existing land uses within the city, and an inventory of vacant lands in already developed areas. Such properties may be subjected to premeditated interventions. Further, policies of land ownership and land development must be deliberated upon to address the issue of higher vacancy rates due to multiple property ownerships.

Conclusion

This study establishes the relevance of occupancy rates of built or developed residential fabric. It also reveals that land efficiency should not be analyzed by just land consumption analysis based on mapping the built fabric against population growth rate, instead the actual occupancy of the units is what determines land efficiency and measures sprawl. Hence, occupancy rate of the built units is an effective indicator of sprawl and therefore, land efficiency.

The study also revealed that income is not a major deterrent towards ownership of multiple residential units implying that over provision of residential units can also contribute to sprawl. The typology of residential development permitted within a city needs to be governed in order to meet the housing demands of a city to curb dead investment as highlighted by the higher vacancy rates of additional residential properties, to address sprawl and increase land efficiency.

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