

Livability Assessment of Apartments in Kathmandu Valley

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Abstract

Nepal is one of the top ten fastest urbanizing countries in the world with 16.77% of people living in cities in 2010 increased to 20.58% in 2020, Apartment buildings can be an alternative housing option for promoting lower GHG emissions fulfilling the demands of people. This alternative housing solution must ensure the livability of people living in the apartment buildings and also the good quality of life in the city like Kathmandu Valley but no research has been undertaken to ensure the livability of apartment buildings. The main objective of the research is to study the perception of the residents about the residential environment of apartment buildings which also includes the study of livability characteristics from a theoretical perspective and the indicators of livability of apartment buildings in the context of Kathmandu Valley. This article involves the stratified sampling technique to take the sample using primary and secondary data collection from two apartment buildings in the Kathmandu Valley. Both qualitative and quantitative data analysis are used during the research. These findings include that the livability of apartment buildings in the Kathmandu Valley is high but also not that high which can improve the lifestyle of people living in the city with the proper growth of the city. The findings can be utilized by various professionals from architects, engineers, planners, government, policymakers, and real estate developers to the general public in the future for the selection of site, design, construction and utilization of the apartments.

Keywords

Livability, Apartment Building, Indicators of Livability, Dimensions of Livability, Spatial Levels of Apartment

1. Introduction

According to the UN, more people are living in urban areas (3.42 billion) than in rural ones (3.41 billion). The world we live in has shifted from being more rural to being more urban. Whatever perspective you choose, there is no denying that urbanization is altering the world. Almost 200,000 people move from rural areas to big cities every day. By 2050, there will be 10 billion people on the earth, two-thirds of whom will live in cities. This suggests that building faces a significant challenge. Redshift's infographic estimates that to fulfil demand, it will be necessary to build 13,000 structures on average per day[1].

Nepal is one of the ten least urbanized countries in the world. However, it is also in the top ten fastest-urbanizing countries in the world[2]. According to the data of UN DESA of the year 2014, with a population of 5,130,000 and an urbanization rate of 3%, the percentage of the world's population that was urbanized in 2014 was 18.18%. People living in urban areas grew from 16.77% to 20.58%, according to the UN DESA studies on the degree of urbanization from 2010 to 2020. With a predicted yearly urbanization rate of 1.9% through 2050, Nepal will continue to be one of the ten nations with the fastest urbanization rates in the world [3].

Multi-story apartment living is not an old concept in Kathmandu Valley, a city with a high-density urban form and large residential buildings. Urban development patterns in Kathmandu Valley coincide with the ever-increasing private vehicle ownership. Its urban development is characterized by car dependency and urban sprawl, mirrored similarly to many urban settlements all around the world. They both have significant greenhouse gas (GHG) emissions and a strong need for infrastructure related to private transportation,

electricity, water supply, and waste management.

The urban area of Kathmandu Valley has had considerable population expansion over the past 20 years, and this growth is anticipated to continue in the decades to come. To combat the pressures of urban sprawl, local and state governments are pushing compact urbanization strategies. One such policy is regulating the cost of supplying and maintaining urban infrastructure and services. To improve the performance of infrastructure, especially mass transportation, and to reduce the demand for natural resources via better use of land for open space and agriculture, higher levels of urban population density are sought after. Kathmandu's urban sustainability goal relies heavily on initiatives that reduce energy and emissions through urban consolidation and better building design.

The increasing densities that urban consolidation implies will be made possible by multi-residential buildings. Greater-scale, multi-story apartment buildings (MSABs) are one sort of multiple-dwelling structure that Kathmandu Valley real estate developers are responding with [4, 5, 6, 7].

In the post-carbon economy, these sorts of structures will become energy-intensive liabilities borne by the larger community [8, 9], rather than lasting components of a sustainable community, unless they can make a more positive contribution to sustainable city forms in the future. It is crucial to pinpoint specific design elements that support or hinder inhabitants' views of the liveable qualities of residential surroundings, notably the dwelling, to overcome the deficiencies of the present MSAB.

2. Conceptual Framework

Housing, in nature, should be a dynamic system comprising various elements [10]. These elements include the residential environment, which includes the physical and social environment, and the stakeholders, including residents, planners, architects, developers, and social and political organizations. The 'customers' of the system, or those it intends to serve, should decide the system's objectives and performance criteria [11]. There is no question that inhabitants are the system's primary clients in terms of housing. Therefore, the assessments of residents should be fully included while evaluating the effectiveness of the housing system. The evolution of the housing system, which serves as the foundation for public engagement, is directly influenced by resident happiness, according to a number of studies [12, 13]. Historical lessons, particularly the global decline of HHEs in the middle of the 1970s and the success of public high-rise housing in Kathmandu Valley starting in 2004, demonstrate that resident acceptance and satisfaction with the high-rise residential environment was the fundamental and significant key to achieving the sustainable development of high-rise housing. In order to investigate the livability of HHEs, this study develops a resident-centered conceptual framework based on the aforementioned ideas.

2.1 Livability: A Resident-Centered Residential Environment Evaluation

An essential concept of environmental assessment is "livability," which takes into account the immediate requirements and impressions of the inhabitants of a given area from a subjective and micro viewpoint [14]. For instance, the Department for Communities and Local Government of the UK said in the book that "the quality of space and the built environment is concerned with livability [15]. It is about how simple and secure a location feels to utilize. By establishing a setting that is both welcoming and entertaining, a feeling of place is created and maintained. Another study conducted in the USA defines livability as "satisfying human needs in an urban, communal, and environmentally sound context" [16]. However, according to several studies, livability is a term that is challenging to analyze and quantify [17, 18, 19]. A recognized theory or model for residential environmental livability has yet to be developed, according to the literature assessment on the topic [20, 21, 22]. Consequently, a conceptual model of the livability of the home environment is constructed in this work.

A resident-centred assessment of the livability of a residential environment is defined as one that is based on the statistical analysis of the subjective assessments of the residential environment and its livability factors made by a large number of individuals in accordance with their perceptions and experiences of the residential environment. Residential contentment is frequently used to measure how subjectively people rate their living conditions [13, 23]. Residential satisfaction is impacted by a number of elements, referred to as moderators, which are separate from the residential environment as a whole and may alter the inhabitants' experiences and judgements. These moderators affect residential satisfaction in addition to the objective

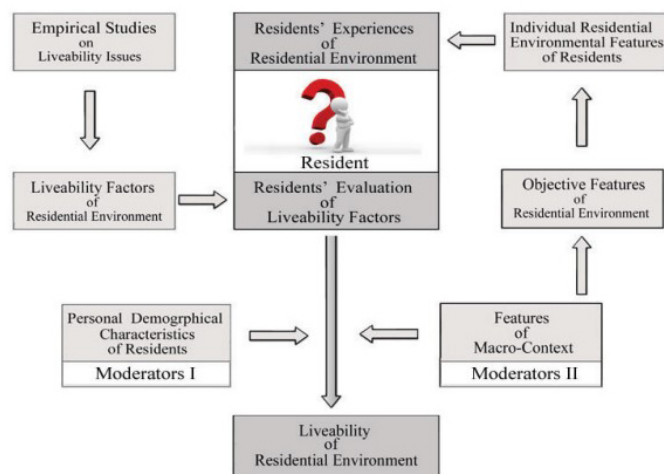


Figure 1: Resident-Centred Livability Model of Residential Environment

characteristics of the residential environment. These moderators are 'factors or variables that are related to variations in outcomes, and not in a directly causative sense, but are part of a causal relationship between the environment and the outcomes [24]. According to previous research on residential satisfaction, there are two categories of moderators: the macro-contextual elements and the inhabitants' individual demographic traits [12, 13]. Numerous research studies have demonstrated how demographic parameters including gender, life stage, and income level may influence how inhabitants perceive high-rise housing. However, there hasn't been enough evidence to support the characteristics of macro-context, such as climate, housing system, and variety of housing kinds.

2.2 High-Rise Housing Estate: A Multi-Level Environment of Residence

HHE is a distinct and discrete geographic housing area that is integrated, planned, designed and constructed and is dominated by several high-rise residential buildings that are multi-family housing and equipped with elevators due to being over the maximum height which people are willing to walk up [25, 26]. However, from the perspective of residents, on the one hand, HHE not only includes the physical environment where the residents are living, but also includes the psychological and social environment which satisfies the resident's non-material needs, such as safety, comfort, and social interaction. On the other hand, HHE constructs a multi-level residential environment that includes: the private family spaces, the collective residential building of shared ownership, the semi-public gated community, and the public urban neighbourhood. Therefore, in this study, HHE is defined as a resident-centred and multi-dimension residential environment that is composed of the psycho-social environment and the physical environment, where the resident is placed at the centre of a series of spatial dimensions, which starts with the 'Dwelling Unit' and enlarges, layer by layer, from 'Dwelling Building', 'Housing Estate', to 'Urban Neighborhood'.

The four spatial levels include architectural design, interior

design, regulatory planning, site planning, urban design and urban planning among other professional subjects. The residential setting of high-rise apartment buildings is created by combining the two spatial dimensions with the four spatial levels. The basic residential components of high-rise housing estates are the four spatial levels of the dwelling unit, dwelling building, housing estate, and urban neighbourhood. These levels can create a platform for communication between residents and professionals involved in developing the residential environment.

A dwelling unit is a separate home that is located in a portion of a residential building and typically comprises three basic practical areas: a family living area (living room and dining room), an individual rest area (bedroom), and an additional service area (kitchen, restroom, storeroom, and balcony).

A multi-family residential building known as a "dwelling building" is made up of a set number of separate dwelling units as well as certain semi-public areas and amenities for its residents.

From a view of the physical surroundings, a housing estate is a residential area with a distinct boundary, within which a collection of residential buildings are built collectively as an individual development that is planned, designed, constructed, managed, and operated in a unified manner [25].

An urban neighborhood, which is essentially the environment of housing estates, is an extensive and multi-dimensional notion that comprises both the physical and psycho-social components of the residential environment.

3. Livability and Sustainability

The built environment's and space's quality are key factors in liveability [15]. It is about how simple and secure a location feels to utilize. By providing a welcoming and pleasurable setting, it is possible to establish and sustain a feeling of place.

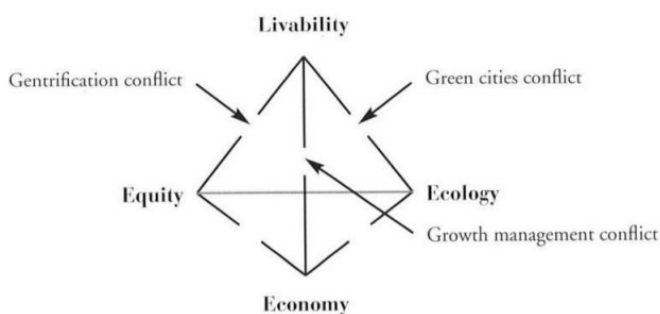


Figure 2: The Livability-Sustainability Prism: Value Conflicts and Gaps

Table 1: Livability vs. Sustainability

Livability	Sustainability
It is a user-centred concept from the micro-perspective.	It is a 3E concept from the macro-perspective.
Individual or community needs	Collective or societal goals
Subjective concept of "Good Life"	Objective carrying capacity
Short-term	Long-term
Local scale	National or global scale
It is about the environment.	It is for the environment.

As compared with sustainability, liveability is a user-centred approach to evaluating environments that focuses on the needs and experiences of the nearby community from a subjective and micro perspective.

4. Literature Review

The term "livability" first came into use in the late 1950s, and it is still used today. Livability, which incorporates emotional and physical states, may be described as the essential requirement for people of a place to lead a happy life. It is important to consider how to increase livability by considering its social, physical, functional, environmental, and safety dimensions. Social connections, culture, tradition, and a sense of belonging affect the social dimension. Infrastructure and transportation are other factors that have an impact on the physical dimension. Moreover, accessibility, cost, privacy, and the availability of services and facilities are factors impacting the functional dimension. The living environment and open spaces are additional factors that affect the environmental dimension. Sustainability should not be mistaken for livability. Although sustainability focuses on people and the environment's long-term well-being by striking a balance between economic, environmental, and social elements of development, livability focuses on a person's immediate needs by enhancing day-to-day living quality. There is debate regarding how livability is affected by apartment buildings. According to certain research, apartment buildings can have negative impacts on livability, such as community breakdown, loss of social security, stress, an adverse social life, and limitations on children's growth. However, some research shows that apartment living might increase the quality of life, privacy, and social life. Canberra City, one of the most livable cities in the world, is an example of a livable region that largely concentrates on open spaces, green infrastructure, walkability, and the import of items to minimize industrial pollution. Bukit Batok is another very livable district that has been developed with diverse housing, employment possibilities, and services with great connectivity via walking and public transit. The livability also depends on the DU, DB, HE, and UN which are the sub-dimensions of the Housing Environment (HE). To ensure the livability of the residents, attention should be taken to these factors also.

5. Research Design

5.1 Research Questions

It was natural that there would be some contradiction between the built environment and its users [27]. It is pointed out that there is a gap between "potential environments" that are presented by designers, developers, and policy-makers, and "effective environments" that are engaged in by the users. With regard to HHEs in particular, mass standardisation and profit-driven planning and design led to the worsening of the residential environment, including congestion, air and noise pollution, the heat island effect, etc. In order to diagnose present issues and enhance future planning and design, it is crucial to comprehend inhabitants' experiences with and views of the current high-rise residential environment. The

following three questions are what this study is trying to address:

1. What are the satisfaction levels of people living in the Westar Regency and Soaltee City Apartment?
2. What is the link between the overall residential environment of HHEs and its four sub-dimensions—dwelling unit, dwelling building, housing estate, and urban neighbourhood—from the viewpoint of the resident? What are the four sub-dimensions of the residential environment as well as its liveability in the case of Kathmandu Valley?
3. What can be done to enhance the planning and design of HHEs to make them more liveable? In order to improve the liveability of the residential environment in Kathmandu Valley, how are the laws and regulations of urban housing development modified to direct and control the growth of HHEs?

5.2 Research Strategy: A Multiple Case Study

An empirical investigation that investigates a contemporary phenomenon within its real-life context [28]. Numerous studies on high-rise housing, like those by [29] on defensible space and [30] on high-rise structure design, demonstrate the viability of the study technique. In the context of the Kathmandu Valley, this study focuses on the liveability of high-rise residential apartments. A multiple-case study will be more useful than a single-case study in a limited research scope if significant elements differ from one instance to another [31]. The high-rise building shape is the primary distinction between HHEs' living environment and other housing kinds.

To assess the liabilities of selected high-rise apartment buildings, a comparison method will be employed. A 4-6 years gap will be kept between the high-rise apartment buildings so that whether the older one has a greater emphasis on livability or the newer one. The study begins with a focus on the indicators of livability. The research will be addressed through a framework. Multiple case studies, historical analyses, qualitative surveys, and quantitative surveys are the parts of this framework.

6. Study Area

The study's ontological premise will be that the current state of the Karmanasha River has an affect on its surrounds and the local people who live nearby. It has experienced a variety of issues and obstacles.

The research area consists of two apartment buildings, one from Soalteemode, Kathmandu, and another from Balkumari, Lalitpur. Two areas of study were chosen to get a representative result about the livability of apartment buildings in the valley. These complexes were selected based on several criteria, including their location, demand, and year of establishment. Finding apartment buildings with similar area sizes and heights was a key consideration when deciding on the research regions since it would enable more precise

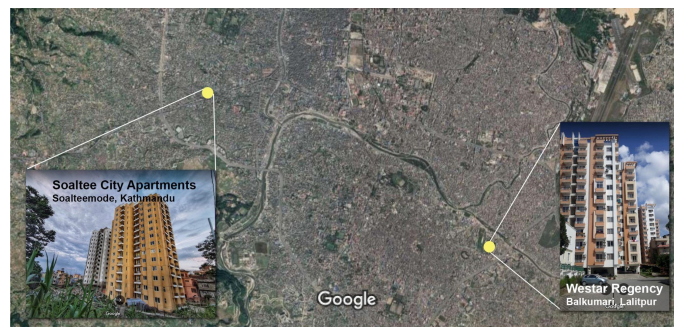


Figure 3: Locations of Research Areas

Source: www.maps.google.com

comparisons. Greater acreage implies more possibilities for various services and facilities, such as stores, open areas, etc. Around 81198.81 sq. ft. and 104044 sq. ft. are the areas for Westar Regency (WR) and Soaltee City Apartments (SCA). The apartment building's age was taken into account since a comparison of these two projects would also demonstrate whether the more current apartment complex is better or whether earlier designs were superior to more recent ones in terms of liveability. The first of the two complexes to be built was Westar Regency, which has been in operation for more than ten years. Soaltee City Apartments, the second, were completed in the past four to five years. The locations were also taken into consideration when selecting them because the neighbourhood around the apartment complex also contributes to the improvement of that area's viability through access to local services, transportation, etc. Westar Regency is located farther from the city centre. Of the two research sites, Soaltee City Apartment is the closest to the city centre.

6.1 Data Collection

The liveability survey is divided into two phases: the first phase consists of a questionnaire, preliminary interviews with respondents selected at random, and an outdoor observation of the three environmental scales (dwelling buildings, housing estates, and urban neighbourhoods); the second phase consists of an in-depth interview with volunteers and an indoor investigation of their dwelling units. First, a face-to-face verbal questionnaire survey was conducted with randomly chosen respondents. At the same time, a preliminary interview was conducted with voluntarily participating respondents utilizing a structured interview based on the questionnaire. In the first stage, 69 questionnaires for a quantitative survey and 16 questionnaires for a qualitative survey were asked to 30 participants from both apartments. Weekends and weekdays were selected to increase the diversification of the respondents.

The questionnaire is divided into three sections: the respondent's personal demographic data, specific aspects of their homes, and their level of satisfaction with them. The last section of the questionnaire had a three-level hierarchy: first, the respondent was asked to score how satisfied they were with each of the livability characteristics on a scale of 1 to 5, with 1 signifying "very dissatisfied" and 5 signifying "very satisfied." The four spatial dimensions—dwelling unit, dwelling building, housing estate, and urban neighbourhood—were used to organise the liveability factors.

Secondly, the respondents were asked to give an overall assessment of each of the four dimensions. Finally, the respondent was asked to rate their level of satisfaction with the overall residential environment, which took into account all four dimensions.

7. Results and Findings

7.1 Qualitative Survey

7.1.1 Dimensions of Livability

As previously indicated, the questionnaire assessed residents' satisfaction with the overall Residential Environment (RE), as well as its four subdimensions: Dwelling Unit (DU), Dwelling Block (DB), Housing Estate (HE), and Urban Neighbourhood (UN), based on the characteristics of HHEs.

7.1.2 Dwelling Unit (DU)

At the spatial level of the dwelling unit, specific indicators such as indoor natural heating and cooling, orientation, indoor natural ventilation, and noise level are studied. The study shows that more residents are dissatisfied with the indicators, indoor natural heating/cooling and orientation in both cases. It's because the residents do not think that their apartment units are getting enough sunlight during summer. One of the reasons is the orientation itself. Due to the improper orientation, only the apartment units facing the south direction and on the upper floors get enough sunlight. In contrast, more people are satisfied with the indicators, indoor natural ventilation and noise level. Being away from the main road, the noise level is considerably low. Also, individual apartment units have enough windows and ventilation necessary for the apartment units. Some other indicators include comfort, views from windows, safety, cost of property, etc. Even though they are not studied in-depth, it can be said that most of the residents are satisfied with their dwelling units. The analysis shows that the satisfaction level is high regarding the individual dwelling units.

7.1.3 Dwelling Building (DB)

At the spatial level of the dwelling building, communal space, universal design, fire/earthquake protection, waste management and maintenance are studied in depth. The responses from the residents of both apartments suggest that the livability of the Westar Regency is more in comparison to the livability of the Soaltee City Apartment. More people from the Westar Regency are satisfied with these indicators. The communal spaces in the buildings of the Westar Regency are gaming rooms, gym, saunas, halls, theatre, terraces etc. whereas the communal spaces in the Soaltee City Apartment in the case of dwelling building are gym, saunas, gaming rooms etc. As more communal spaces are present in the case of Westar Regency, residents from all age groups are more satisfied as they get the chance to communicate with one another. The quick observation of both apartments suggests that the concept of the universal design is followed in almost every part of the buildings of the Westar Regency whereas the entrance to the site of the Soaltee City Apartment itself seems problematic for differently-abled people. The quantitative

data shows that residents from both apartments are mostly satisfied with the provision of fire/earthquake protection, waste management and maintenance. According to the interviews, the waste collection works are timely done and if there is any kind of maintenance work to be done, they are also timely done but in comparison to these two apartments, Westar Regency gets the higher rating because of its speed of maintenance works.

7.1.4 Housing Estate (HE)

At the spatial level of a housing estate, a sense of community, security management, public services, greenery/landscape, activity places for children, and activity places for the elderly are considered important and studied in depth. As people started living in the apartments, they felt that they had been detached from their culture and tradition. They lacked a sense of belonging there. Even though they are feeling detached from their culture and tradition, they have been living in the apartment as one community. They mentioned that they participate in the public programs and events held in the apartments. They already participated in the blood donation program that is held in the apartment. This means that people living in the apartments are feeling more of a sense of community. In some cases, people are dissatisfied with a sense of community but their percentage is low compared to the satisfied people. Also, the security system and the public services available in the apartments are good. More people from the Westar Regency are satisfied with the public services as it has better public services compared with the Soaltee City Apartment. Both apartments have the facilities of water supply, electricity, earthquake/fire protection system, etc. Both apartments have greeneries and open spaces that are used as activity places for children and elderly people. In the case of these three indicators, the number of people with dissatisfaction and satisfaction is almost equal. In response to these indicators, some responses reflect the strong need for open spaces but if we go to the age group, many people are also satisfied and dissatisfied with the activity places that they have. The activity places are adequate for some people, and for others, they are not.

7.1.5 Urban Neighbourhood (UN)

At the spatial level of an urban neighbourhood, a sense of belonging, noise conditions, public transportation, and proximity to hospitals and educational institutions are considered important and studied in depth. People living in the apartments do not feel a sense of belonging if they are from outside Kathmandu Valley. The case is the opposite if they are from the Kathmandu Valley. Most people are from outside the Kathmandu Valley and are also involved in cultural and traditional works. They felt a detachment from their culture and traditions. This makes more people dissatisfied with the sense of belonging. Both apartments are located in such locations that the centre of the Kathmandu Valley is within 5km from both locations. One apartment is located in Balkumari which is near to the Baneshwor area which is one of the vibrant zones of the Kathmandu Valley.

7.2 Quantitative Survey

7.2.1 Introduction

The livabilities of the Westar Regency and the Soaltee City Apartment are studied with the help of livability indicators of a dwelling unit, dwelling building, housing estate and urban neighbourhood that uses the Likert scale as mentioned below. This paper only includes the livability analysis of the Westar Regency.

- Very Dissatisfied
- Fairly Dissatisfied
- Neutral
- Fairly Satisfied
- Very Satisfied

The indicators of livability are filtered regarding the context of Nepal.

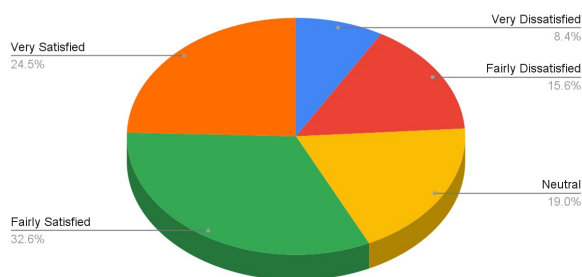


Figure 4: Pie Chart Showing the Overall Satisfaction Level of the WR

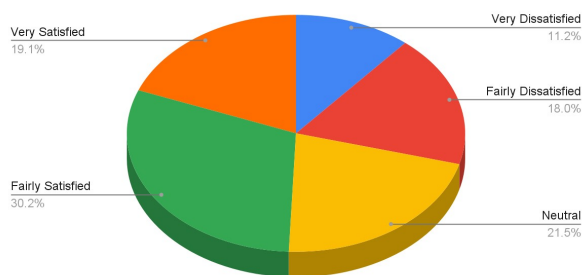


Figure 5: Pie Chart Showing the Overall Satisfaction Level of the SCA

The individual pie charts of DU, DB, HE and UN show that most residents are satisfied in both the apartments. The pie chart of overall satisfaction with DU, DB, HE, and UN in Figure 4 shows that 24.5% of residents were very satisfied, 32.6% were fairly satisfied, and 19% were neutral with the satisfaction level leaving 15.6% fairly dissatisfied and only 8.4% were very dissatisfied with Westar Regency. In a similar manner, figure 5 shows that 18.8% of residents were very satisfied, 29.9% were fairly satisfied, 21.3% were neutral, 18.5% were fairly dissatisfied and only 11.5% of residents were very

dissatisfied. These satisfaction levels show that most residents are living their satisfied lives in both apartments. Yes, there are a small number of people who are dissatisfied with the amenities and services of the Westar Regency but the result shows that the livability of the Westar Regency is comparatively high. A similar case is applied in the case of the Soaltee City Apartment.

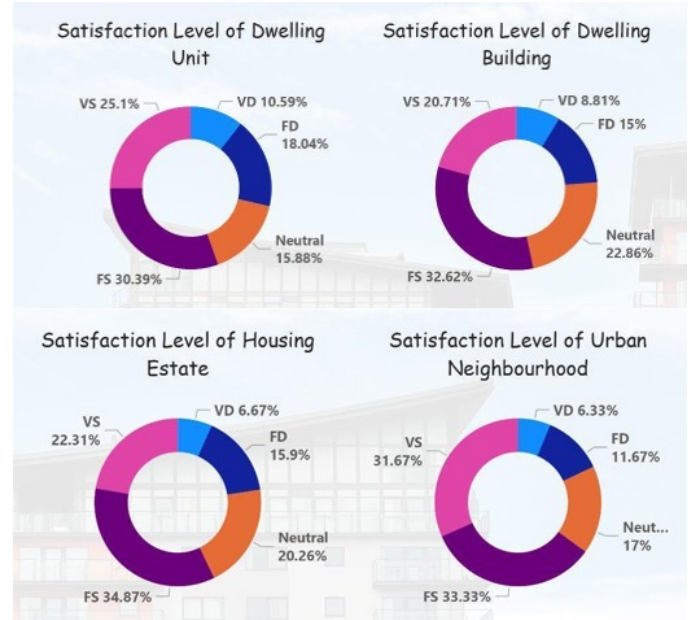


Figure 6: Satisfaction Level of DU, DB, HE and UN

7.2.2 Dwelling Unit (DU)

Satisfaction Level of Dwelling Units

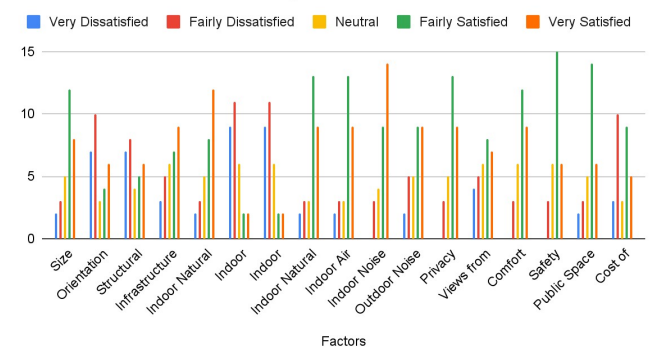


Figure 7: Bar Chart Showing Satisfaction Level of DU of the WR

Satisfaction Level of Dwelling Units

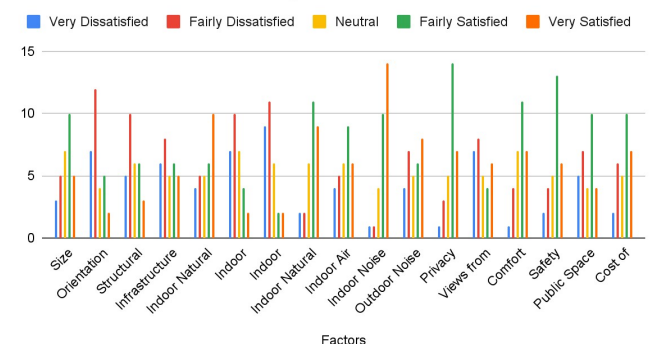


Figure 8: Bar Chart Showing Satisfaction Level of DU of the SCA

The above figures show that for most of the indicators, the residents are satisfied with the dwelling units. This shows that the services provided in the dwelling buildings of both apartments are good. It can be seen that many residents are less satisfied with the orientation of their apartments due to which the spaces are less heated and cooled during winter and summer respectively. The residents whose apartment units are in the south direction on the upper floors are more satisfied with these indicators of livability. Overall, the dwelling units get a good rating in terms of indicators of dwelling units.

Figure 6 shows that 55.49% of residents are satisfied with their dwelling units which is higher than the percentage of residents who are neutral and dissatisfied. Among them, 15.88% are neutral to their dwelling units and 28.63% of residents are dissatisfied with their dwelling units. This data shows that the dwelling units are more livable.

7.2.3 Dwelling Building (DB)

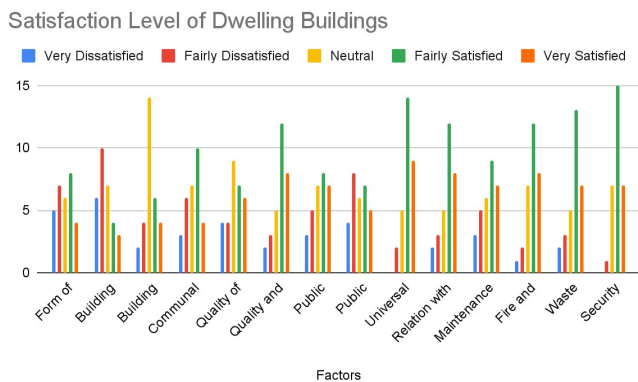


Figure 9: Bar Chart Showing Satisfaction Level of DB of the WR

Similarly, in the case of dwelling buildings, more residents responded with negative answers in the case of building height, elevation and communal spaces. There is the provision of rooms for entertainment on the ground floors but regarding the residents of the age group 51+ people tend to communicate with each other more in the common spaces. As per their responses, only the terrace can be used for communication inside the building. They thought the apartment should have communal spaces in the common lobbies even though there are communal spaces outside the buildings.

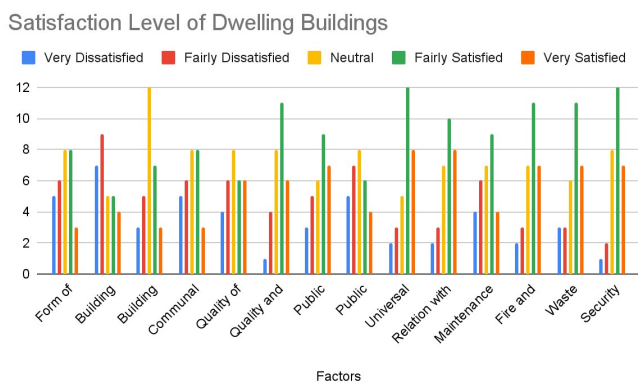


Figure 10: Bar Chart Showing Satisfaction Level of DB of the SCA

From Figure 6 most of the residents are satisfied with the dwelling buildings. 53.33% of residents are satisfied with the dwelling buildings. 22.86% are neutral and only 23.81% of residents are dissatisfied. This data shows that the dwelling buildings of both apartments are more liveable.

7.2.4 Housing Estate (HE)

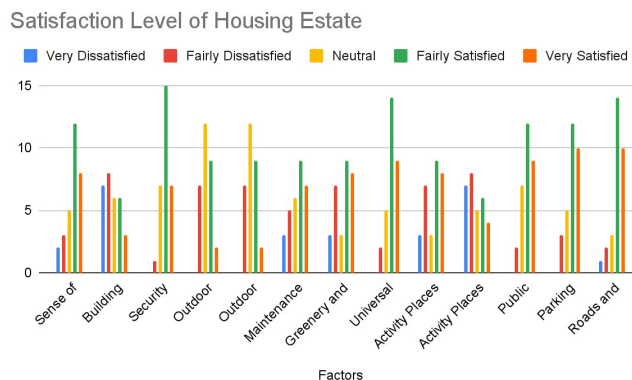


Figure 11: Bar Chart Showing Satisfaction Level of HE of the WR

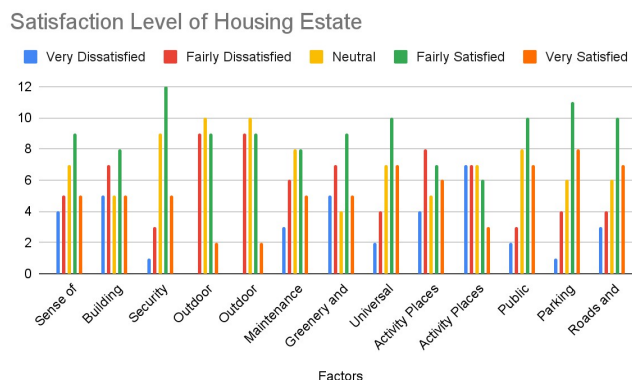


Figure 12: Bar Chart Showing Satisfaction Level of HE of the SCA

At the spatial level of the HE, a sense of community, security management, public services, greeneries, and activity places for children and elderly people are studied in depth. The analysis data shows that the residents are feeling a sense of community. The residents are involved in the social events held in the apartment. They try to participate in events that help the public and the apartment users themselves. More people communicate with each other and try to get to know each other. The basic public services provided in the housing satisfy the needs of maximum residents. But in the case of activity places for children and elderly people, the number of residents satisfied and dissatisfied are almost equal. This shows that there is a strong need for open spaces and activity places considering all age groups.

Overall, the data shows that 58.18% of residents are satisfied with the housing estate. 20.26% of residents are neutral and only 22.57% of residents are dissatisfied with the housing estate.

7.2.5 Urban Neighbourhood (UN)

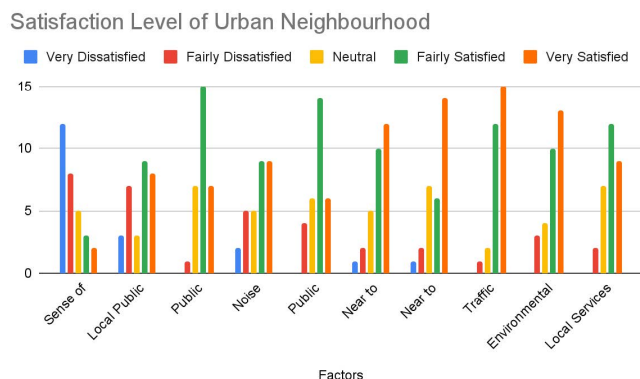


Figure 13: Bar Chart Showing Satisfaction Level of UN of the WR

At the spatial level of the urban neighbourhood, a sense of belonging, noise conditions, public transportation, and proximity to hospitals and educational institutions are considered more important indicators of the livability of apartments and are studied in depth. The Westar Regency is so located that it is feasible considering the public transportation. The apartment is located only 200m away from the ring road. The residents can take a bus easily. Also, in the case of an emergency, taxis are allowed in the apartment premises. This helps in their daily activities. Considering the location of the apartment, many renowned hospitals and educational institutions are located within a radius of 1 to 2 km. Also, the Baneshwor area is considered one of the commercial and official hubs of the Kathmandu Valley which is located within a radius of 2 km. The residents of the apartment are more comfortable regarding the location of the apartment. In contrast, people living in the apartment are feeling detached from their culture and traditions. That's why people living in the apartment are feeling less sense of belonging.

Overall, the residents are more satisfied with the urban neighbourhood. The data shows that 65% of residents are satisfied with the urban neighbourhood which is the highest of all other satisfaction levels. 17% of residents are neutral and only 18% of the residents are dissatisfied with the urban neighbourhood. The main reason for dissatisfaction is the sense of belonging people feel.

8. Conclusions

The research suggests that most of the residents are satisfied with the quality of the dwelling unit, dwelling building, housing estate and urban neighbourhood. The research shows that the Westar Regency scores more regarding all four livability dimensions, DB, HE and UN than that of the Soaltee City Apartment. Each dimension is so interrelated that even if there is a negative result in one of the dimensions, it will impact the overall livability of the apartment buildings.

The research suggested that the livability of an apartment building is highly dependent on various indicators of livability. The study shows that the livability of apartment buildings in

Kathmandu Valley is high but not high enough to enable a good lifestyle needed by people. Considering all spatial levels from dwelling units to urban neighbourhoods, many indicators can be studied but only the indicators affecting more are studied in depth. The livability indicators depend on aspects like physical, social, functional, safety and environmental aspects. These are called the dimensions of livability.

Based on these livability dimensions, the location, design and other aspects should be considered that improve the lifestyle of people living in the apartment considerably. The design of an apartment should strictly consider the livability principles as it can affect the livability of people living in the apartment. The livability principles are a must in the case of Kathmandu Valley because vertical urban expansion is an alternative growth of the city in the case of Kathmandu Valley due to the considerable increase in population and demand as well. If livability is highly considered during the site selection, design, construction and utilization of the apartment, it can ensure a good lifestyle for the residents who are going to live in that apartment and also ensure a good quality of life in the city.

9. Recommendations

The findings of the research are useful for architects, planners, real estate developers, policymakers and the general public in the field of apartment design. In the present day, apartments are being constructed at a rapid pace in cities like Kathmandu due to the rapid growth of population, and their demand but only some of the indicators of livability are considered while selection, design, construction and utilization of apartment buildings. To ensure the improvement of the lifestyle of residents, these indicators should be considered a must. Also, there should be bylaws of apartment design and urban planning regarding the consideration of livability indicators.

The government and government agencies should be aware of the overall livability of the city and should provide guidelines regarding livability because cities like Kathmandu Valley are experiencing rapid population growth and demand at the expense of their livability.

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References

- [1] Leo Sveikauskas, Samuel Rowe, and James D Mildenerger. Measuring productivity growth in construction. *Monthly Lab. Rev.*, 141:1, 2018.
- [2] Deepak Kumar Bhattarai and Padma Bahadur Shahi. Integrated multi-modal transportation system: A sustainable approach for urban transport in kathmandu. *IOSR J. Mech. Civ. Eng.*, 18:47–59, 2021.

- [3] United Nations Department of Economic and Social Affairs (Population Dynamics). World urbanization prospects—population division—united nations—file 22: annual population of urban agglomerations with 300,000 inhabitants or more in 2018, by country, 1950–2035 (thousands). *World Urbanization Prospects 2018*, 2018.
- [4] Alan Perkins, Steve Hamnett, Stephen Pullen, Rocco Zito, and David Trebilcock. Transport, housing and urban form: the life cycle energy consumption and emissions of city centre apartments compared with suburban dwellings. *Urban Policy and Research*, 27(4):377–396, 2009.
- [5] Peter Rickwood. *The impact of physical planning policy on household energy use and greenhouse emissions*. PhD thesis, 2009.
- [6] Patrick Troy, Darren Holloway, Stephen Pullen, and Raymond Bunker. Embodied and operational energy consumption in the city. *Urban Policy and Research*, 21(1):9–44, 2003.
- [7] Karen Wright. The relationship between housing density and built-form energy use. *Environment Design Guide*, (65):1–8, 2010.
- [8] Alan Pears. Does higher density really reduce household energy requirements? it depends... practice reviews. *Urban Policy and Research*, 23(3):367–369, 2005.
- [9] Joseph Francis Wong. Factors affecting open building implementation in high density mass housing design in hong kong. *Habitat International*, 34(2):174–182, 2010.
- [10] G Francescato, S Weidemann, and JR Anderson. Residential satisfaction: Its uses and limitations in housing research, in van vliet-, w., h. choldin, w. michelson, and d. popenoe (eds.) housing and neighborhoods, theoretical and empirical contributions, 1987.
- [11] Gwilym M Jenkins. *The systems approach*. Citeseer, 1969.
- [12] CCM Adriaanse. Measuring residential satisfaction: a residential environmental satisfaction scale (ress). *Journal of housing and the built environment*, 22(3):287–304, 2007.
- [13] Mariá Amérigo and Juan Ignacio Aragones. A theoretical and methodological approach to the study of residential satisfaction. *Journal of environmental psychology*, 17(1):47–57, 1997.
- [14] *New Horizons 2004 Liveability & Sustainable Development: Synergies & Conflicts*. Brook Lyndhurst Ltd, 2004.
- [15] M Crookston, P O'Brien, and E Purser. State of the english cities: Liveability in english cities. *Wetherby, Communities and Local Government Publications*, 2006.
- [16] K Shaw. Liveability in ndc areas: Findings from six case studies, new deal for communities, the national evaluation. Technical report, Research Report 22, Sustainable Cities, The Neighbourhood Renewal Unit, London, 2004.
- [17] Stephen Wheeler. *Livable communities: Creating safe and livable neighborhoods, towns, and regions in california*. 2001.
- [18] Carlos JL Balsas. Measuring the livability of an urban centre: an exploratory study of key performance indicators. *Planning, Practice & Research*, 19(1):101–110, 2004.
- [19] Kristof Heylen. Liveability in social housing: three case studies in flanders. In *ENHR Conference'Housing in an Expanding Europe: Theory, Policy, Implementation and Participation'*, Date: 2006/07/02-2006/07/05, Location: Ljubljana (Slovenia), 2006.
- [20] Robert K Whelan. Introduction to community livability. In *Community Livability*, pages 17–22. Routledge, 2012.
- [21] Jasmine Lau Leby and Ahmad Hariza Hashim. Liveability dimensions and attributes: Their relative importance in the eyes of neighbourhood residents. *Journal of construction in developing countries*, 15(1):67–91, 2010.
- [22] Peter Howley. 'sustainability versus liveability': An exploration of central city housing satisfaction. *International Journal of Housing Policy*, 10(2):173–189, 2010.
- [23] AMM Liu. Residential satisfaction in housing estates: a hong kong perspective. *Automation in construction*, 8(4):511–524, 1999.
- [24] Gary W Evans and Stephen J Lepore. Moderating and mediating processes in environment-behavior research. In *Toward the integration of theory, methods, research, and utilization*, pages 255–285. Springer, 1997.
- [25] Anne Power and Gabriel Segal. *Estates on the edge: The social consequences of mass housing in Northern Europe*. Springer, 1997.
- [26] Martin Lux. High-rise housing in europe: Current trends and future prospects, 2005.
- [27] Herbert J Gans. *People, plans, and policies: Essays on poverty, racism, and other national urban problems*. Columbia University Press, 1994.
- [28] Robert K Yin. *Case study research: Design and methods*, volume 5. sage, 2009.
- [29] Oscar Newman. Design guidelines for creating defensible space. 1976.
- [30] Chris Abel. *Sky high: vertical architecture*. Royal Academy of Arts London, 2003.
- [31] Linda N Groat and David Wang. *Architectural research methods*. John Wiley & Sons, 2013.