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Investigating the Activity and Behavioral Patterns of Children in both Designated and Undesignated Open Spaces within Gated Residential Communities: A Case Study of Guntur, Andhra Pradesh

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Abstract. *In South Asian cities, especially in India, the inability to provide a high-quality life and increased migration have led to a rise in gated communities. These gated communities, designed, built, and sold to maximize capital gain within a restricted plot area, fail to address the special needs of children. One reason for this failure is that they are not designed to fit the activity and behavior patterns of children. In such cases, spaces not intended for children become hotspots of their activity. This research identifies and analyzes the parameters that make these non-designated spaces more active. The study aims to record and evaluate the effect of such open spaces on children's recreational activities, using behavior and activity mapping as measurement tools. In the selected case area, identified spaces designated and non-designated, are documented, mapped, and analyzed to list the parameters that made them more active. Statistical tools, such as frequency of uses, intensity matrix, and Karl Pearson correlation, are used to analyze, rank, and find the correlation between the parameters based on their significance. The result provides a list of factors that make these areas children-friendly and indicates that 5.2 percent of the total open areas are non-designated spaces that have become focal points for children's activities, compared to 14.31 percent of designated areas within this community.*

Keywords: *Activity mapping; behavior mapping; children; designated spaces; gated communities; open spaces; non-designated spaces.*

1 INTRODUCTION

United Nations Sustainable Development Goals 3,4, 6 and 11 state the necessity to give access to quality early childhood development (ECD) in our neighborhood along with ensuring well-being for all age groups [20]. It also further discusses the necessity of safe, inclusive, and accessible open spaces, particularly for women, children, and persons with disabilities [20]. Similarly, conventions on the rights of children highlight the importance of children's right to rest, relax, and play and to share their thoughts freely on issues that affect them [17][21]. In South Asian countries, India particularly is witnessing an increase in the number of gated communities and multistoried residences in the last decade [2] And there is an increase in migration from villages to cities especially for employment opportunity which has led to increase in number of nuclear families where both the parents are working.[8] Such families choose to stay in gated communities because various reasons like affordable size and price of apartments, location with respect to children's school and parents workplace, having 24x7 security and availability of common shared facilities like club, swimming pool and other play areas which promotes socialization [1][14]. Outdoor environment in these gated communities offers play opportunities for children in areas which can be categorized in two typology (1) Areas exclusively designed for recreation like parks, tot lots, playground etc. known as designated spaces (2) Areas not designated for recreation like streets, corner, shop fronts etc. considered here as non-designated spaces[7] It has been observed that such areas add significant contribution in the social and cognitive development of children and become center of their activity [14]. The design team and real estate agencies working on the design of these gated communities follows national and local building bye laws and are concerned on maximizing profit and giving minimum areas marked and designated as children's play area/tot lot [16]. Children's viewpoint and opinion on this matter are often not taken and mostly ignored. One of the key factors contributing to this issue is also the inherent complexity and lack of suitable data collection tools for gathering information from children. Mixed method approach along with behavior and activity mapping which includes both qualitative and quantitative research can tell us more about the behavior and activity of

children in such spaces, which will lead to a better understanding of our built environment. This will also help to investigate parameters which makes non-designated spaces more child friendly.

2 LITERATURE REVIEW

Gated communities emerging as a new form of neighborhood can be defined as closed urban residential areas where open spaces are legally privatized with a restriction on their access [15][13]. The two most important places where children spend the most time are homes and school respectively [4]. Oldenburg in his research investigated the role played in children's everyday lives by the attributes and social networks embedded in 'third place' [12]. Third places are open spaces, public parks, and incidental spaces in the neighborhood where children interact [4][9]. These spaces play an important role in children for their independent mobility, social interaction, and development of a sense of place and identity. It has been observed that in the case of gated communities, the third place can be termed as non-designated areas which are not designed for children and yet become the focal point of their activity [10]. Johnson has found in a case that the number of children who use a playground is probably high, but the number of regular users is probably small [7]. Additional studies have found that designated recreational areas receive little use. These non-designated areas serve as third places for children, where their behavior and activities can be observed to provide a functional description of the physical setting [5]. The majority of these studies have used GIS-based maps which have proved to be a reliable tool in spatial planning [9] [11] Although GIS-based maps give accurate information it misses the benefits of observational-based study which are collecting data in the natural setting and at micro-scale. These activities are perceived and actualized opportunities of the setting identified by the individual and can be documented by behavior and thematic mapping [9].

Children vary by age, stage of development, cultural background, health status, and different socio-economic backgrounds [6][13]. Different organizations, agencies, and research exercises investigate different stages of children to maximize the impact of their work. UNICEF and the World Health Organization focus more on health and periodic immunization of children between the age group of 0-5 years because that is the main concern in the world right now [21]. Recent research indicates that for the majority of the global studies on children's behavior and activity in outdoor environments, an age group of 3-13 has been taken [10].

Shamsuddin has argued that children above the age of 6 can decide where they want to go while children of age 3-6 can't totally recognize and mark on maps yet they like to explore outdoor environments. For this study, we will be looking into the children of the age group of 3-13 which is an age group taken for a similar study to find out the effectiveness of the outdoor environment for children in [14]. Thus, for children of age 3-6 observational-based study is done while for children of age group 6-13 who can recognize maps and express, children-based mapping and questionnaire survey are done.

3 MATERIAL AND METHODS

3.1Study Area

The case area is a gated community called Raintreepark Dwarka Krishna (RTPDK) which lies in the Guntur District of Andhra Pradesh, India The selected community is the largest amongst all the thirty gated in this region which is still being developed in phases and has scope for changes. Geographically, the district lies at 16º30'N latitude and 84º43'E longitude.

This community has an area of 120 acres and a proposal of 3300 dwelling units, presently only 153262 sq. m (37.87 acres) has been developed with 964 apartments in Phase I [18] and 632 apartments in Phase II, a total of 1569 apartments. The number of floors ranges from 9-12 and there are 250-300 children in this community.

3.2Methodology of Data collection

A mixed-method approach is used for primary data collection, encompassing both quantitative and qualitative data. Seventeen designated and non-designated open spaces were identified and categorized within the gated community. The author, as a resident for the last five years has observed these spaces were only active with children during early mornings and evenings due to children being in school during the day and the hot, humid climate making afternoons unfavorable for outdoor activity. The categorization was based on 3 months of observation during the specified morning and evening hours.

The satellite imagery data from Google Earth was procured, rasterized, and scaled in AutoCAD 2020. All open spaces including roads, green areas, sports grounds, water bodies, etc., and the building footprint was rasterized. The rasterized map along with the questionnaire was then shared with 1) Parent/Caregiver and 2) Children aged 6-12 years. Based on the site observations and photographic documentation on morning and evening hours the

identified basic activities are walking, cycling, skating, playing, and sitting which are mapped. A survey was conducted using a random sampling strategy. A total of 56 children and 23 caregivers were interviewed. The snowballing technique was used to recruit further participant caregivers/parents from the initial caregivers. Primary data for children aged 3-6 is collected using only an observational-based study and children aged 6-13 were given a map-based questionnaire along with their caregiver to respond. Caregivers of children aged 6-13 were also interviewed primarily because they have resided in the community for over 5 years. This extended stay has allowed them to observe their children's growth from age 3 to 7-8 years, making their feedback more credible and relevant. The survey was carried out for 2 months starting from 01st March 2024 to 30 April 2024.

4. RESULTS AND DISCUSSIONS

4.1 Observational based activity mapping

With the help of photographic documentation and uninterrupted observation a activity and behavior mapping showing designated and non-designated area was done for the entire campus which is shown in figure 2.

Fig. 1 Children and parent sitting in spite of vehicular road near the entry and children using parking ramp for skating [Source: Author]

It has been observed that wherever there is some provision of sitting either a permanent bench or edge of the road with a raised platform parents along with their children sit and take that route often for walking. Another stated reason by parents is that these locations provide visual connection and clear sightlines to other spaces so that parents can relax as well as keep an eye on their kids. around it. Similarly, it is observed to have a very strong correlation between walking and sitting spaces. Any form of sitting space which lies on the walking route has been used. Similar activity mapping was done for cycling and skating of children. Since cycling and skating give independent mobility options and quick access to different areas, this has been widely practiced by children. The active areas are mostly on the peripheral roads for cycling and areas with less traffic and parking ramps (since it offers a natural slope) for skating. Parking ramps which are not designated to be for skating because of their slope become important places for teaching and practicing skating in the early morning as shown in figure 1.

4.2 Mapping exercise with children and their caregivers

A positive response is observed amongst children of age group 6-13 to understand and highlight what places they like/dislike on the map. Basic color scheme as green to mark outdoor spaces which they like, red which they don't like and blue to mark the most frequent path taken to reach these spaces is done. Two examples each of the marked map taken by children and their caregiver are shown in figure2 (a).

(a) **(b)**

Fig. 2 (a) Examples of mapping exercise done by caregiver and children and (b) Activity mapping [Source: Author]

Figure 2 (b) represent the map where both of these designated as well as non-designate areas are marked and later rasterized using Auto CAD to calculate areas as represented in figure 3. It is found that there are around 5.2% (Table 3) of the total site area which are not designated yet offers play opportunities for the children.

Fig. 3 Designated area 14.31% non-designated area 5.21% AutoCAD Drawing [Source: Author]

4.4 Statistical analysis of designated and non-designated spaces

All the identified designated and non-designated spaces are graded at ordinal scale based on the frequency of use. It has been observed that the distribution of frequency of activity towards non-designated spaces like pond front, vehicular road, stage, near shop and vegetable vendors are greater than designated space. The intensity matrix above shows the overall frequency of non-designated spaces is 2.48 times more than designated spaces. This is also supported by the axial chart obtained in figure 4.

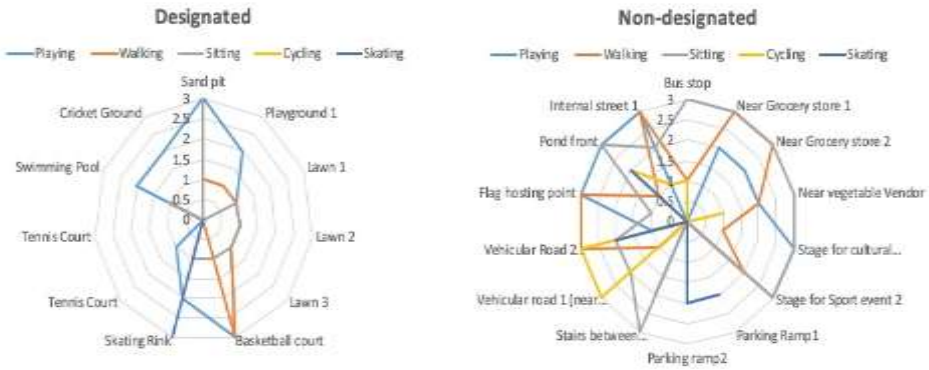

Fig. 4 Axial chart showing distribution of activity over designated and non-designated areas [Source: Author]

From questionnaire survey and activity mapping the following design parameters are identified which makes spaces more/less child friendly.

a. Seating facilities: The availability of seating and rest areas for parents/caregivers is crucial, particularly for children aged 3-6, as they necessitate constant supervision. Caregivers typically do not permit these young children to wander far from them in outdoor settings. Proximity to natural elements: Natural areas such as tree shades, flower shrubs, and water bodies like lakes or ponds provide alternative play opportunities during extreme weather conditions, as well as visually pleasing scenery.
b. Stimulating elements: Elements that pique children's interest, such as a fishing pond where they can feed fish or cattle shed, are more child-friendly.
c. Level difference: Variations in elevation, such as stages, ramps, or raised sitting platforms, give children a better vantage point and a sense of scale change. It has been observed that such areas offer superior play opportunities.
d. Commercial areas like shops and grocery stores attract children. The curiosity and availability of items make them focal points of children's activity, despite being located at a traffic intersection.
e. Motorized traffic has a strong negative impact on children's use of outdoor spaces. It is risky and frightening, as expressed by both parents and children aged 6-13.

f. Visual connectivity: Outdoor open spaces with better visual connections to the surrounding area and long-range visibility are preferred over spaces inside narrow alleys. Such areas provide parents the opportunity to keep an eye on their children while engaging in their activities.
g. Designated sports areas like cricket grounds, which are dominated by adults, are not favoured by children.
h. Multipurpose grounds offer great opportunities for children to engage in various activities, as well as for their caregivers to keep a close watch.
i. Encircling spaces: Spaces or structures that offer a sense of enclosure, such as flag posts, roundabouts, or tree trunks, are elements that engage children. Further these parameters when tabulated against the identified non-designated spaces in table 1 which gave a list which can used for the creating the hierarchy and importance of parameters.

Table 1 Spatial and design parameters of non-designated spaces (Source: Author)

Spatial and Design Parameters / **Non- Designated spaces**	Seating facilities	Proximity to natural elements	Stimulating elements	Level difference	Commercial areas	Motorized traffic	Visual connectivity/ clear sightlines	Multipurpose opportunity	Encircling spaces	
Bus stop	1	1	0	0	0	-1	1	1	0	**3**
Near Grocery store 1	1	0	1	0	1	-1	0	1	0	**3**
Near Grocery store 2	1	0	1	0	1	-1	0	1	0	**3**
Near vegetable Vendor	1	0	0	1	0	-1	1	1	0	**3**
Stage for cultural performance 1	1	1	0	1	0	-1	1	1	1	**5**
Stage for Sport event 2	1	1	0	1	0	-1	1	1	1	**5**
Parking Ramp1	0	0	1	1	0	-1	0	0	0	**1**
Parking ramp2	0	0	1	1	0	-1	0	0	0	**1**
Stairs between internal road at different level	1	1	0	1	0	0	0	0	0	**3**
Vehicular road 1 (near bus stop)	1	0	0	1	0	-1	0	0	0	**1**
Vehicular Road 2 (Roundabout for bus)	1	0	0	1	0	-1	0	1	1	**3**
Flag hosting point	1	1	1	1	1	-1	1	0	1	**6**
Pond front	1	1	1	0	0	0	0	1	0	**4**
Internal streets	1	1	0	1	0	-1	1	1	0	**4**
	12	**7**	**6**	**10**	**3**	**-12**	**6**	**9**	**4**	

Also statistically analyzing this data using Karl Pearson correlations indicates a strong relation between seating facility and observed play activity.

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5. CONCLUSION

Comparative area statements of designated and non-designated spaces in the selected gated community proved that there are non-designated areas which are more active than the designated ones. The design parameters that make these areas active came of out this case example can be ranked as:

1. Seating facility
2. Level Differences
3. Multipurpose opportunity
4. Proximity to natural elements
5. Visual connectivity
6. Encircling spaces and stimulating elements
7. Commercial areas

Also, there is a strong correlation between seating facility for caregivers and play opportunities for children which in a few cases has surpassed the presence of motorized traffic. This indicates the relevance of personal supervision of caregivers given to the children. Conducting similar studies across a greater number of gated communities and

neighborhoods would help identify additional parameters and non-designated spaces, ultimately strengthening the outcomes of this research.

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