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THE ROLE OF PUBLIC SPACES TO ACHIEVE CITY'S WELL-BEING THROUGH GEOSPATIAL ANALYSIS: A CASE STUDY OF ABBOTTABAD CITY, PAKISTAN

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Key Words: Wellbeing, Public Spaces, Qgis, Happy City, Geospatial Analysis, Quantitative Analysis.

ABSTRACT

Scientific research into the environmental and experiential factors that contribute to human happiness has grown into a large and expanding body of work. As city growth is increasing day by day in an uncontrollable manner, it directly affects the infrastructure of the city as well as the mental health of its residents. Urban happiness can be described as a philosophy that gives people a positive perception of the place and encourages them to stay there for a long time and/or want to live there again with the same experience. The aim of this research paper is to analyze geospatial quantitative research based on previously defined parameters for urban happiness in a city. Happy place mapping aims to identify long-term urban satisfaction, as well as the reasons that make areas happy from the visitors' perspective, as well as design interventions to improve or build it. With the use of SPSS, QGIS, and questionnaires, the method consists of surveys, observations, and questionnaires. A survey was conducted in Abbottabad's public space (Jadoon Plaza). These considerations and techniques are expected to be helpful to developers, urban designers, and planners in their efforts to create positive user interfaces and set city-shaping policies.

INTRODUCTION

Two-thirds of the world's countries will live in cities by 2050 (Bele et al., 2018). Characteristics of a city affect our experiences and emotions. Urban planners and designers are focusing on creating communities that are attractive and responsive to the needs and demands of residents so that people can have more positive experiences (Meentemeyer et al., 2013). Public spaces can be described as indoor or outdoor spaces available to the public, like streets, walkways, parks, public transportation facilities, public shopping facilities, and other spaces where people meet or travel (Estoque et al., 2015). A better-experienced urban public space (particularly urban public spaces with natural elements) can benefit the psychological and physical health of people, thereby improving their overall quality of life (Li et al., 2015). Today, public spaces frequently lack adequate amenities or are misused, putting them at risk of deterioration (Li et al., 2018). Maintenance of urban public spaces becomes a public burden in cities that fail to address rapid population growth and societal changes, which eventually leads to negatively experienced urban public spaces.

Public spaces can act as possible settings for urban regeneration strategies due to their potential to enhance residents' quality of life. Incorporating residents' experiences, opinions, and needs in the planning process can prevent deterioration and ensure the regeneration of urban public spaces. The way people feel (e.g., perceived safety) about the urban public spaces is critical for supporting urban design decision-making processes, and there is still insufficient information about the subjective well-being of people (i.e., emotional state) regarding these spaces (Sepe, 2014). Only a few researchers have examined emotions about various aspects of the urban environment. Furthermore, the emotional state of people may be influenced by the perception of urban security (Gehl et al., 2010), green/natural elements in the urban environment (Hauptmann, 1991), or urban identity (Habtour, 2016). More research is needed to obtain a greater understanding of all aspects of the subjective well-being of people (SWB) and how this influences the various aspects of the urban public space.

LITERATURE REVIEW

Nowadays, urban happiness is getting a lot of recognition, but it's usually in a theoretical context or based on a quantitative survey (Wang et al., 2017). The concept of urban happiness is closely intertwined with social, environmental, economic, and philosophical studies. It constantly evolves in response to the rapid transformation of behaviors, needs, and habits. City happiness can be described as a term that gives people a favorable impression of the place and encourages them to stay there for a long time and/or to live there again with the same experience. In this paper, the Happy Place Mapping project aims to recognize factors that make places happy from users' perspectives. Surveys, observations, questionnaires, and QGIS are used in this process.

Understanding the emotional reaction to urban public space is essential in deciding on urban development. People's actions can be affected by personal characteristics and the environment (Lewin, 1951). The effect is a broad term that refers to feelings (Hull, 1990). Emotions are linked to places, and any

location experience will evoke an emotion. Streets and parks, transit and shopping services, and other public areas in the city (Tonnelat et al., 2010) are important because they allow people to move about, communicate, enjoy life, and relax. A good public space is meaningful and facilitates various activities. It should be pleasurable, open to varying individuals and groups (i.e., inclusiveness), provide a sense of protection, and provide physical and environmental comfort (Mehta, 2014). Open spaces, parks, and a healthier environment are more geared toward happiness and fulfillment than mere technological advances (Lee, 2017). Physical activity in a natural environment is linked to more positive emotions (Birenboim, 2018).

According to Charles Montgomery, author of "Happy City: Transforming Our Lives via Urban Design," what we experience matters most. He believes that the most important piece of advice is that we will all live better if we realize that experiences, rather than material possessions, are what ultimately determine pleasure. If we could design and construct our cities more effectively, focusing on the human experience and interpersonal relationships rather than merely adding to the infrastructure. Good infrastructure and planning will improve citizens' experience with urban activity. Numerous insignificant city events can be planned to enhance our happiness and well-being. Examples include digging out a small park from a pedestrian area. There is much room for creativity in the neighborhood area to improve our lives by promoting activity through urban design. Examples include the ideal Portland plan to renovate the city by creating a piazza at a road crossing. To forge a new, strong connection of friendship and trust between the neighborhoods, it will be difficult to persuade all the neighbors to cooperate, work together, network, and fight with the city hall.

Residents of Copenhagen see it as a joyful city with lots of chances for recreation and leisure time. There are fewer automobiles, more bicycles, large streets, an effective transportation system, easy access to all parts of the city, and clean air (Lee, 2018). Copenhagen's urban design is built on promoting walkers, bicycle riders, and other alternative forms of transportation in addition to using sustainable materials (Gehl, 2013). Regarding the metrics promoting happiness, Denmark has the highest ranking. According to statistics, during the past 40 years, happiness has remained at an 8 out of 10 scales (World Happiness Report, 2012). Denmark's position at the top of the list of the world's happiest nations is attributable to its strong democracy system, vibrant civil society, high level of trust, prosperity, security, and freedom, all of which combine with favorable working conditions to promote a balanced way of life.

To increase happiness in the city, we should opt to increase urban activity. Copenhagen, Denmark, has achieved achievement in developing a socially cohesive neighborhood to create a joyful city. One of the instances is when a traffic planner created a double-wide bike lane for a cyclist after realizing the cyclist was conversing on their route to work; this encourages individuals to cycle while also strengthening community ties. In Vauban, Germany's experimental town of Freiberg, they absorbed the external expense of car ownership as another good example of increasing urban activities for enjoyment. In Vauban, if you buy a car, you must also acquire a parking space outside the village. This discourages residents from owning cars while

promoting the social benefits of neighborhood walking. As a port city, Copenhagen utilizes its frontage on the Copenhagen Harbor to create a public gathering space for its residents. Even on the last afternoon of a weekday, after work, the citizen will appreciate the port; they cherish every moment there.

A city can use urban design concepts to guide its long-term plan. Neighborhoods, architecture firms, and urban designers may all embrace certain guidelines to help create a happier urban form. The key design strategies for urban happiness are (Lee, 2017):

An urban design that is safe and secure can help to reduce anxiety and prevent urban crime and conflict.

The walkable and accessible design incorporates ease of travel. Citizens can walk or take advantage of public transportation, which is both reliable and easier. Clean and smart urban growth, which includes green and safe living, can improve the well-being of people. All residents benefit from equal opportunities, housing, and services provided by urban development for public prosperity. A happy city establishes meaningful relationships between diverse cultures and provides public spaces for people to connect and interact. A happier community encourages and supports creative and cultural activities, as well as respects and accepts the city's pride.

Design Strategies (Main Criteria)	Design Elements (Sub Criteria)
A) Safe & Healthy	1) Freedom of fear 2) Zero crime targets 3) High mental and physical health levels
B) Walkable and Accessible	1) Housing proximity to services 2) Awesome Public transit 3) Pedestrian and cycling priority
C) Clean and Green	1) Green space 2) Clean air 3) Outdoor recreational areas
D) Shared Prosperity	1) Empowering educational for all 2) Access to quality housing, energy and food 3) Embraces diversity
E) Socially Connected	1) Happy with friends and relationships 2) Enough people to help me at any time 3) Easy to meet people
F) Culture & Civic Pride	1) Celebrate local and international cultures 2) Music, art, maker and artisan movement

Table 2.1 Design Strategies and Design Elements to achieve happy citizen design (Lee, 2017).

Abbottabad is located in the east of the KPK province of Pakistan. The Karakoram Highway (KKH) serves as the city's downtown since all of the city's public and commercial facilities are located along this route. Along this highway, 18.6 percent of the forest has been lost in the last two and a half

decades. 12 percent of the land is now urbanized, and the forest area is rapidly being urbanized.

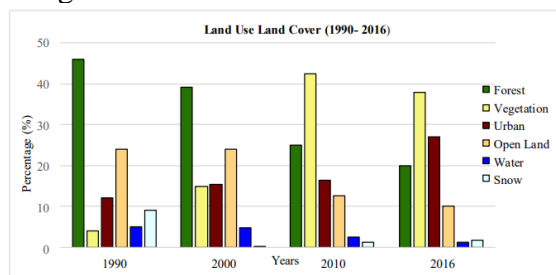


Figure 2.2: Along KKH (Barira, 2018)

As a result, there was a 40.02 percent increase in built territory, a 51.65 percent increase in forest cover, a 28.46 percent increase in open land, a 20.93 percent increase in the recreational arena, and a 40.04 percent decrease in barren lands, and a 69.33 percent decrease in farming. The growth of urban areas is evident.

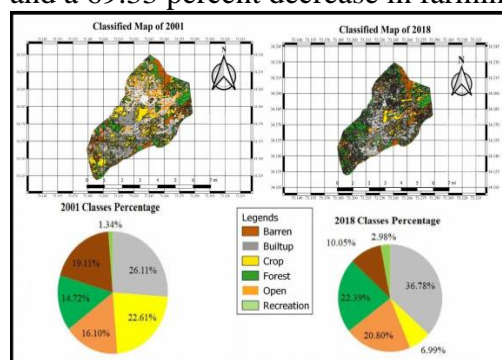


Figure 2.3: Classification of land use at KKH (Akbar, 2019).

METHODOLOGY

Tools:

The research tools for the survey of happy city indicators are QGIS, SPSS, Google Maps, questionnaire, and observation. Georeferencing and SPSS are used for the digital analysis of responses. The detailed recording of gender, time, and date resulted in a spatially specific QGIS database that was used for two different analyses: statistical and spatial. The questionnaire was structured to collect respondents' responses and detailed explanations of a specific area that made them happy. Statistical assessment has been evaluated with the aid of SPSS.

Table 2.1 shows the framework used for a happy urban space design. Six variables are selected to assess social comparisons in this sample. The variables are safety and health, walkability and accessibility, clean and green, shared prosperity, social interaction, community, and civic pride. The Likert scale is used to make this determination. The starting point for each sub-criteria is dissatisfied= 1 to Satisfied=10. The greater the number of facts from the given variables, the greater the citizens' happiness level.

Happy city mapping steps:

There are five stages to the 'happy place mapping' process (Sepe, 2014). The research is conducted at three locations on KKH: Jadoon Plaza. The study

focuses on the relationship between urban design and residents' satisfaction. Through this research, the elements of the city's public spaces that contribute to citizens' enjoyment are identified.

People come to enjoy their summers in Abbottabad from June to September because of the good climate. The harsh winter climate, on the other hand, reduces the rate of tourism in public spaces. The survey was conducted during peak hours (5 pm-10 pm) in July and August for 21 days.



Figure 3.1: Study areas on Karakoram highway Abbottabad

Site Setting:



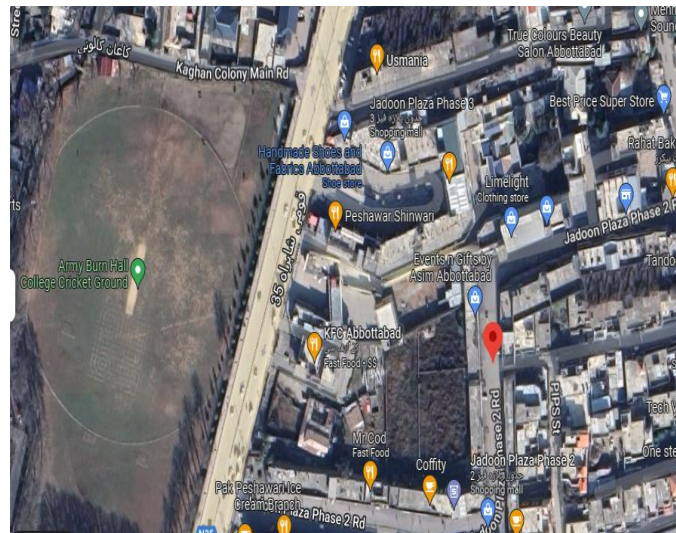
	Site Jadoon Plaza
Location	At the end of KKH
Spatial feature	Semi-enclosed space (Cul de sac)
Peak hours	5 Pm to 10 pm
Pictures taken on August 15th, 2020.	At 4 pm  At 8 pm 

Table 4. 1 Site observation

Measurement of Happy City Indicators:

Jadoon Plaza:



(a)



(b)

Figure 4.2: (a) Location map of Jadoon Plaza on KKH of Abbottabad (b) master plan of Jadoon plaza

Serving as a central place for gathering, Jadoon plaza is a place where residents of all genders, races, and societies come together. The central zone of the plaza is used by residents as cafes and lounging spaces to interact with each other.

Background Study

151 people answered the questionnaire during the observation and data collection, where 85 were female and 66 male participants, respectively. From a total of 120 people, 84 had a minimum of 15 years of education, which made up more than half of the sample size. Most of them are middle-class with a base salary of \$30,000 per year, own homes, and a small family structure ranging from one to five members. The majority of participants did not live in joint

family arrangements. Respondents were financially secure, had a well educational background, and were residents of Abbottabad living in the city for decades, so they were familiar with the establishment.

Safe and Healthy

<p>Do you feel insecure while moving around the Jadoon Plaza? The horizontal axis marks 1 as “least secure” and 10 as secure</p>	<p>What is the crime rate in Jadoon Plaza? horizontal axis marking 1 as “not at all” and 10 as “a lot”</p>																																												
<p>FREEDOM FROM FEAR</p> <table border="1"> <caption>Data for Freedom from Fear</caption> <thead> <tr> <th>Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>1</td><td>30%</td></tr> <tr><td>2</td><td>28%</td></tr> <tr><td>3</td><td>18%</td></tr> <tr><td>4</td><td>18%</td></tr> <tr><td>5</td><td>10%</td></tr> <tr><td>6</td><td>5%</td></tr> <tr><td>7</td><td>5%</td></tr> <tr><td>8</td><td>5%</td></tr> <tr><td>9</td><td>5%</td></tr> <tr><td>10</td><td>5%</td></tr> </tbody> </table>	Level	Percentage	1	30%	2	28%	3	18%	4	18%	5	10%	6	5%	7	5%	8	5%	9	5%	10	5%	<p>ZERO CRIME RATE</p> <table border="1"> <caption>Data for Zero Crime Rate</caption> <thead> <tr> <th>Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>1</td><td>25%</td></tr> <tr><td>2</td><td>15%</td></tr> <tr><td>3</td><td>18%</td></tr> <tr><td>4</td><td>25%</td></tr> <tr><td>5</td><td>10%</td></tr> <tr><td>6</td><td>8%</td></tr> <tr><td>7</td><td>5%</td></tr> <tr><td>8</td><td>10%</td></tr> <tr><td>9</td><td>5%</td></tr> <tr><td>10</td><td>5%</td></tr> </tbody> </table>	Level	Percentage	1	25%	2	15%	3	18%	4	25%	5	10%	6	8%	7	5%	8	10%	9	5%	10	5%
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Table 4. 2 Collected Data of Indicator Safe and Healthy

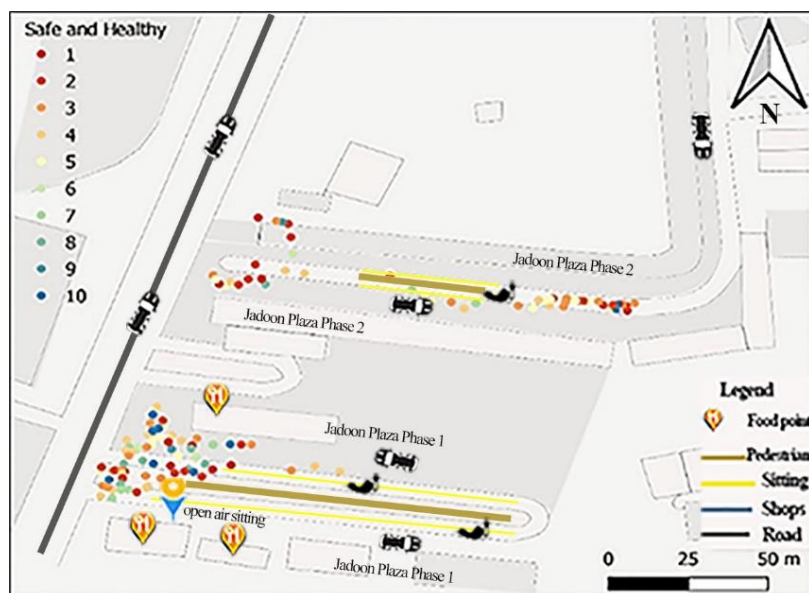


Figure 4.3 Spatial Pattern of respondents for the indicator ‘safe and healthy’ at Jadoon Plaza

The geospatial referencing in Figure 4.3 shows color coding of safe and healthy elements of urban wellbeing in Jadoon Plaza. The crime rate here is low, as shown in quantitative analysis in Table 4.2, because Jadoon Plaza 1 and Jadoon Plaza 2 are not enclosed designs and have no negative spaces. All of the spaces provide ample views, which creates a feeling of a secure atmosphere. Correspondingly, mental and physical health is considered good because this public space, located within the city’s hub, can be easily accessed by every class of society and every age group.

The geo-referencing of safe and healthy indicators of a happy city reveals that people in Jadoon plaza phase 2 do not feel safe and healthy. Jadoon phase 1 has ample space for public gatherings and lounging because the visitors feel safe in this part of Jadoon plaza, as indicated on the map (fig 4.3). Hence the respondent marked this space as safe and healthy, as shown by the blue indicator pointers in figure 4.3. This phase also has paved paths, which are used by pedestrians. For safety purposes, social interaction needs to be maximum by designing more interactive spaces for citizens in public areas like sitting spaces, open-air cafes, etc. When people gather in places like these, they feel connected with the space, and a sense of belonging develops in them. Hence, a sense of safety is also achieved in that particular space for visitors.

Walkable and Accessible

<p>Do you have a straightforward approach to public transit? Horizontal axis marking 1 as “straight forward approach” and 10 as “very fast”</p>	<p>Do you have services near your house? horizontal axis marking 1 as “not at all” and 10</p>
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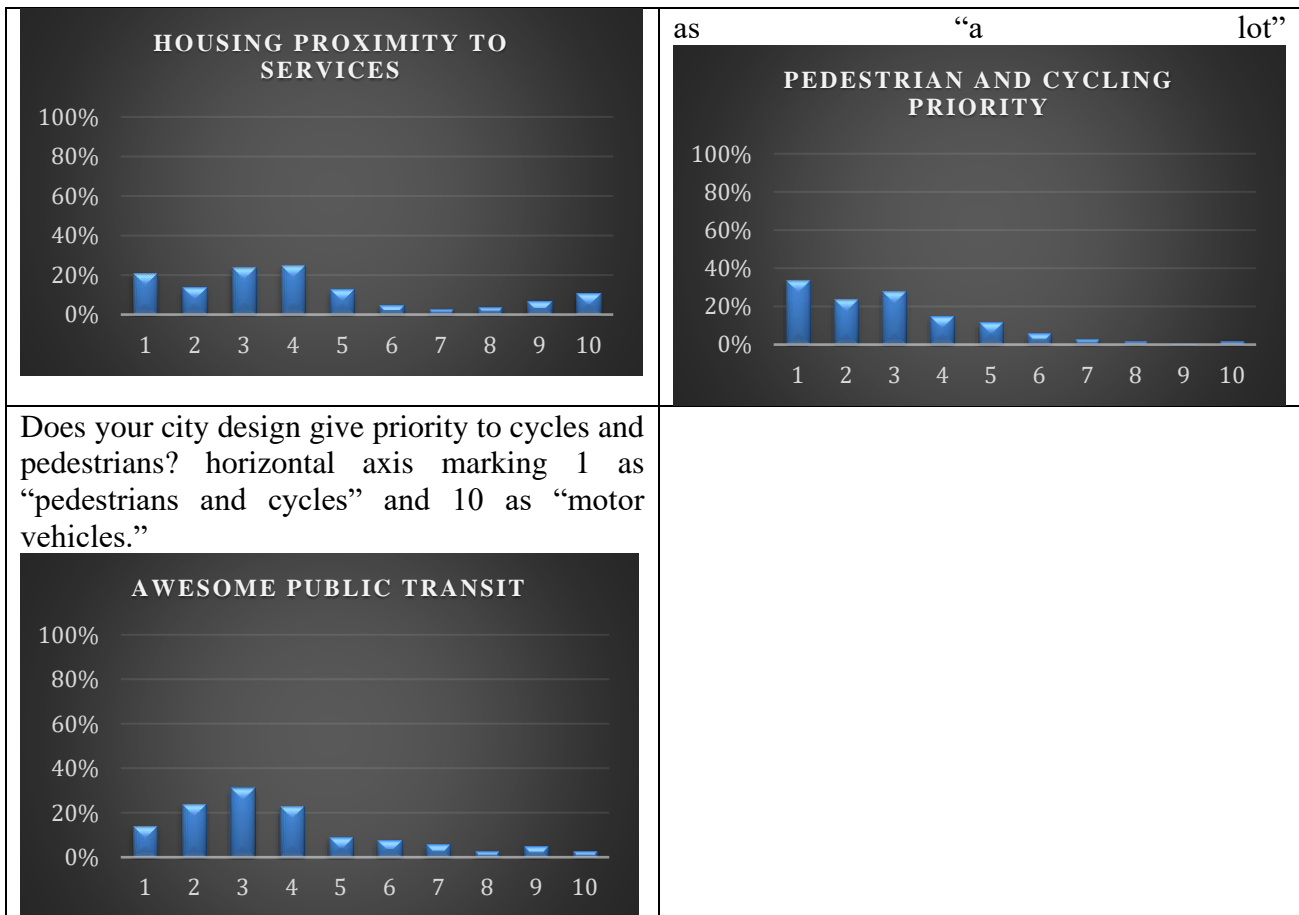


Table 4. 3 Collected data of indicator Walkable and accessible

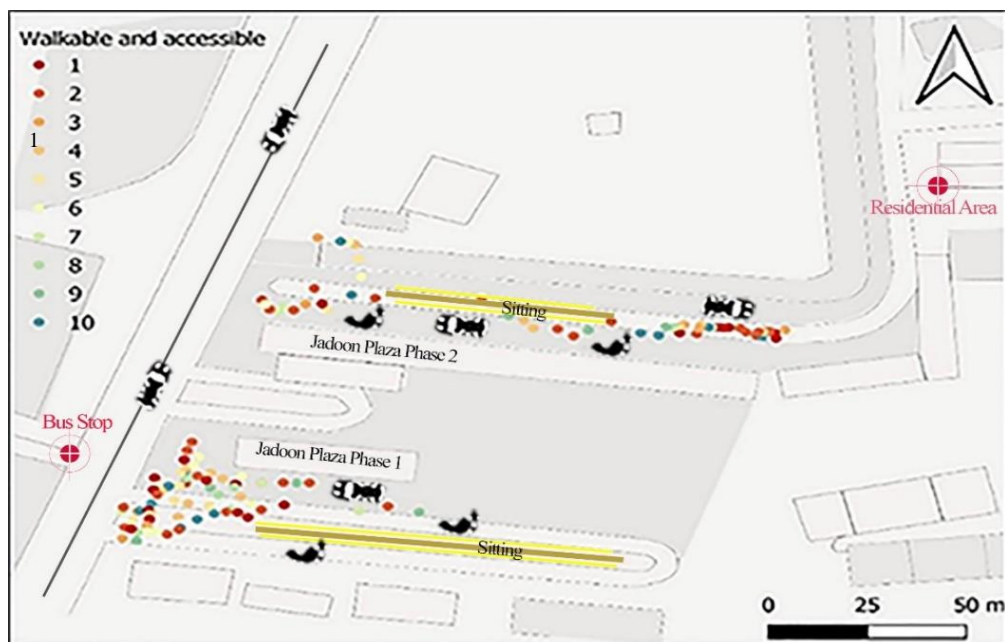


Figure 4.4 Spatial Pattern of respondents for the indicator ‘Walkable and accessible’ at Jadoon Plaza

Observing figure 4.4 closely; georeferencing of Jadoon Phase 1 indicated the maximum ratio of "walkability and accessibility," which scales between 1-4 marked by pointers of shades red and orange, respectively, implying that this public square has limited walkability and accessibility. To increase this urban well-being, the planner must provide paths for pedestrians and bicycles. There should be planned pathways and tracks for pedestrians, bicycles, and motorcycles so people can enjoy and experience the city. Jadoon phase 2 is connected from one wing to a residential area, which is within a walking distance, making the area easily accessible to users, as marked on the map in figure 4.1. Jadoon phase 1 has a bus stop nearby which makes it easily accessible for local transport. Neither of the two phases has a proper design pathway for a bicycle or pedestrian. The services of these public spaces are easily accessible for consumers because of the parking facilities along the road in front of shops.

Clean and Green

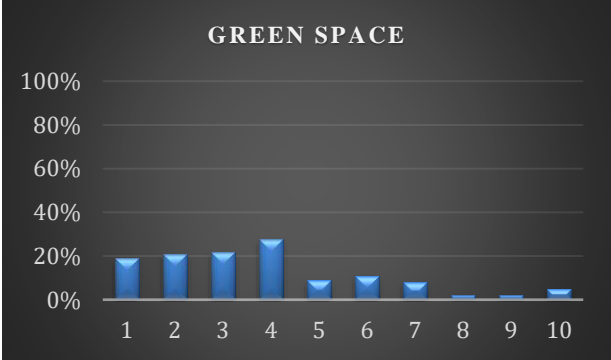
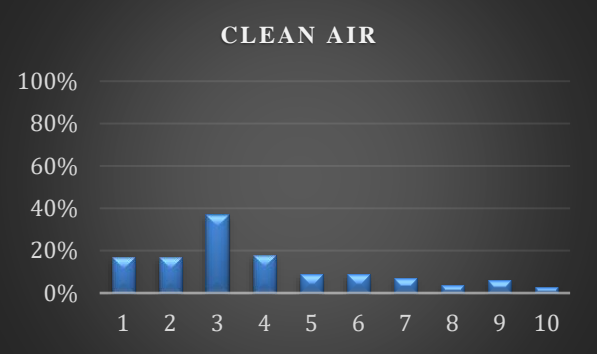
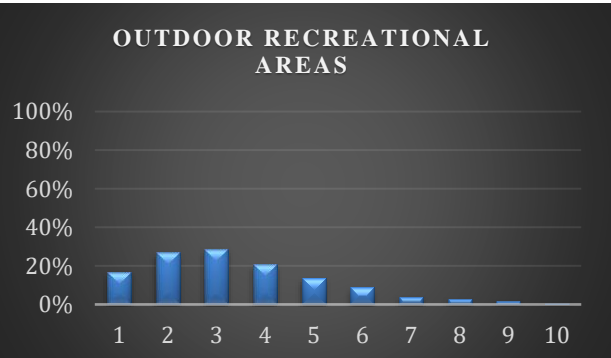
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Table 4.4 Collected data of indicator Clean and Green



Figure 4.5 Spatial Pattern of respondents for the indicator ‘Green and clean’ at Jadoon Plaza
When we observe figure 4.5, the ratio of "clean and green" scales between 3-4 are indicated by orange and light orange pointers, respectively, indicating that the city does not have enough green and clean areas. Jadoon plaza is designed in contemporary style, the context of being more colonial and having landscape as a primary focus of the design. Jadoon plaza phase 1 has an adequate landscape. People love to sit under the trees and enjoy the summer of Abbottabad. Furthermore, this phase of Jadoon faces the north-south orientation inducing the shade of the building. which is a positive aspect of comfort in this space. This phase has a garbage point at its entrance; hence cleanliness factor is observed normally. Whereas, Jadoon plaza phase 2 has no such design for landscape or waste collection in urban spaces, which is important given it is a public shopping square.

Shared Prosperity

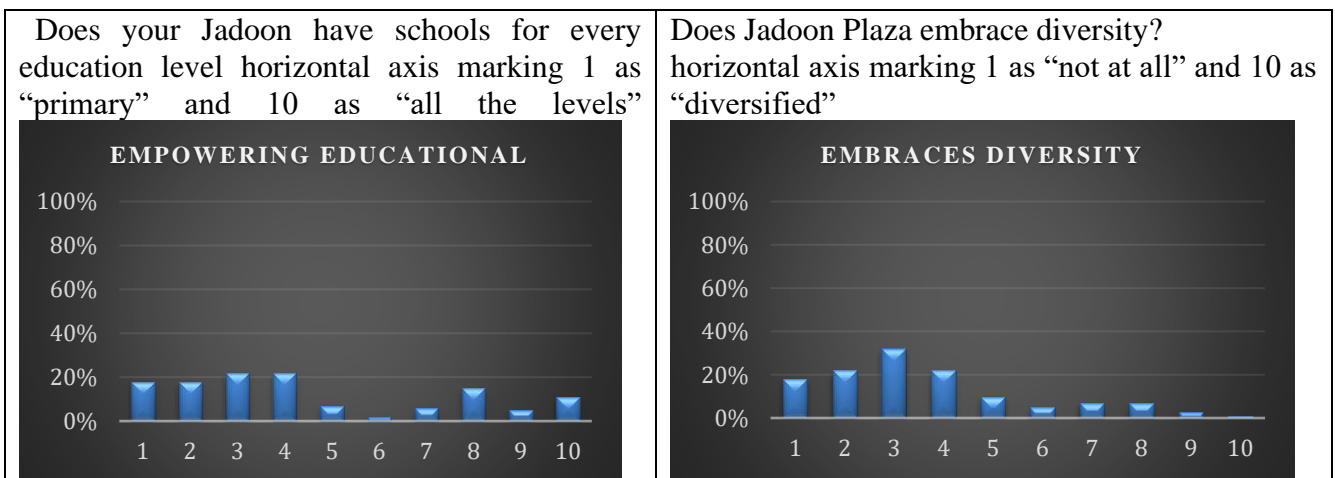


Table 4. 4 Collected data of indicator Shared Prosperity

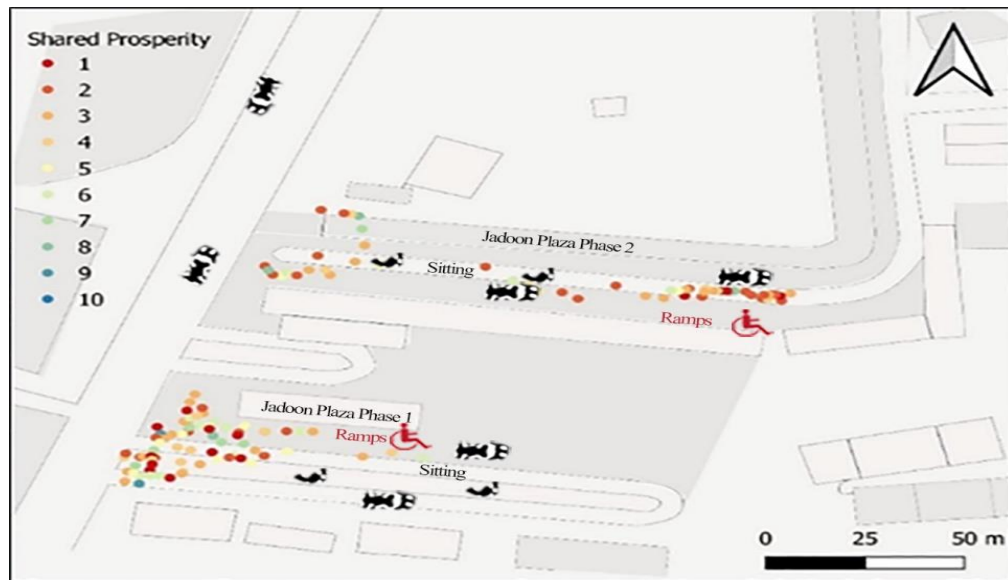
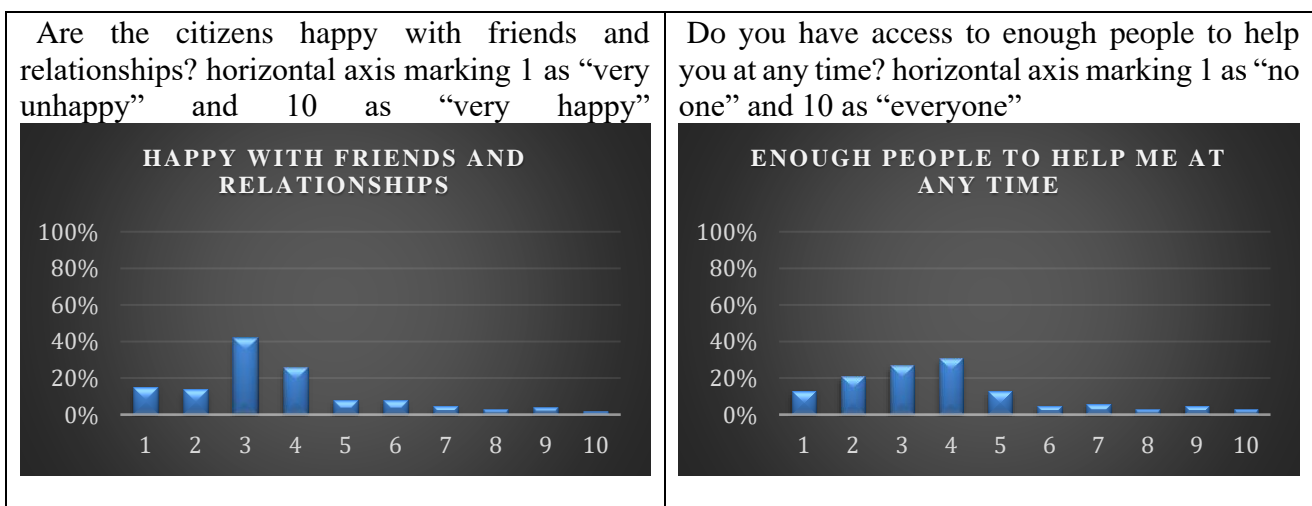


Figure 4.6 Spatial Pattern of respondents for the indicator ‘Shared Prosperity’ at Jadoon Plaza

Observing figure 4.3 closely, the scale of shared prosperity scales between 3-4 is symbolized by orange and yellow pointers, indicating that they have average shared prosperity in the region. Residents have an average quality of housing and education. They seem satisfied with the subjective prosperity of their lives. Jadoon plaza is considered expensive compared to the financial status of Abbottabad residents, which is middle class. There is no culture of hawkers in Jadoon plaza. This hawker culture provided variety to every class of the society, as a result, they felt belonging to the public square, and the prosperity of the space was felt to be shared. Both phases have adequately designed ramps to enter shops for handicaps. This space is for every age group and gender. Hence, the male-female ratio (children, youngsters, and old) is analyzed to be normal: 44% male and 66% female, respectively.

V. Socially Connected



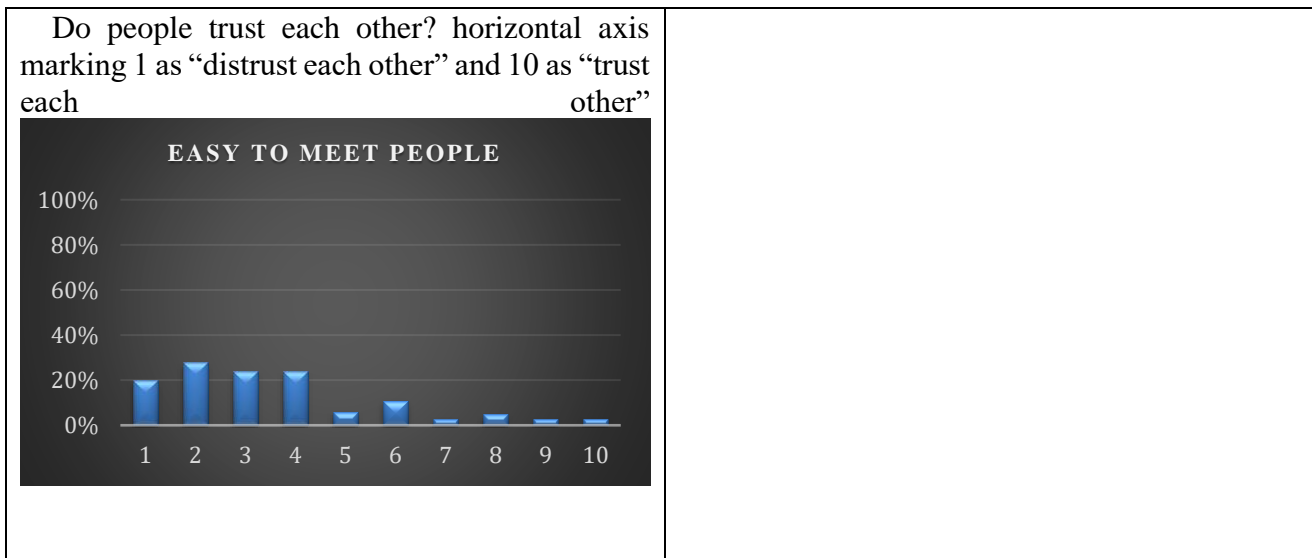


Table 4. 5 Collected data of indicator Socially Connected

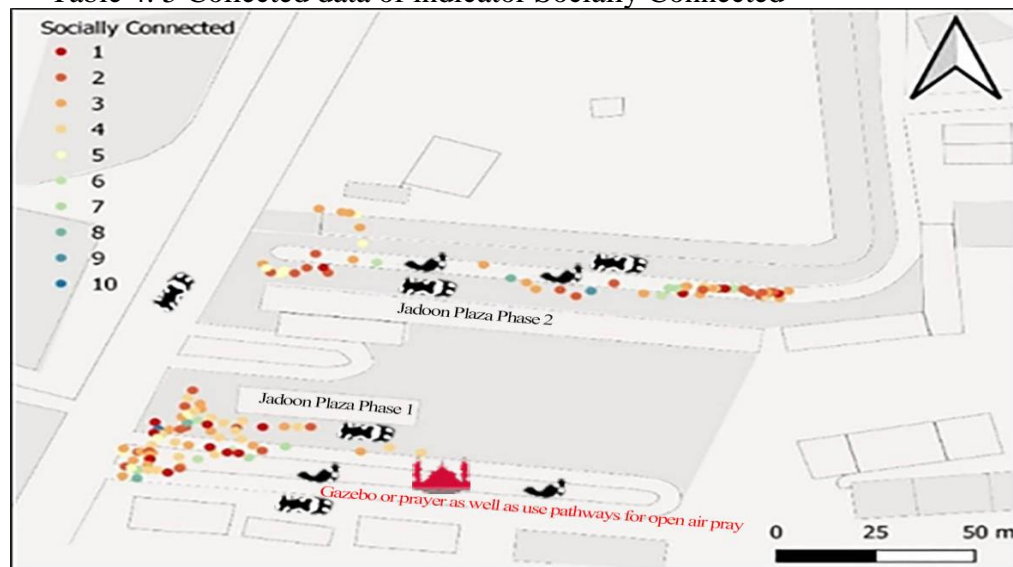


Figure 4.7 Spatial Pattern of respondents for the indicator. Social Connection at Jadoon Plaza

The residents reach out to each other when needed, as shown in the graphs above, which indicates that it is close to the neutral state of respondents. Examining closely figure 4.4, the scale of cultural and civic pride scales between 3-4 are symbolized by orange and yellow pointers, respectively. Jadoon Plaza geo-referencing has many indicators symbolizing that the people are not socially linked. The orange indicators are observed maximum during geospatial analysis. Hence, the people of Abbottabad demand more public areas to get the maximum opportunity for gathering and social meetups. Jadoon plaza phase 1 has Gazebo at the center of a mosque (as shown in figure 4.7). also, the sitting area along with pedestrian pathways are used to offer prayer by shopkeepers as well as the visitors, this allows the residents to connect socially. Phase 2 of the public square has no such space, which explains why respondents mark it as a weak space for social interaction.

Culture and Civic Pride

Does your Jadoon plaza have provisions for celebrating local and international cultures?
horizontal axis marking 1 as “don’t celebrate” and 10 as “celebrate”



Are people satisfied with local government?
horizontal axis marking 1 as “distrust” and 10 as “trust”



Does Jadoon Plaza contribute to art, music, etc.?
horizontal axis marking 1 as “distrust each other” and 10 as “contributes alot”

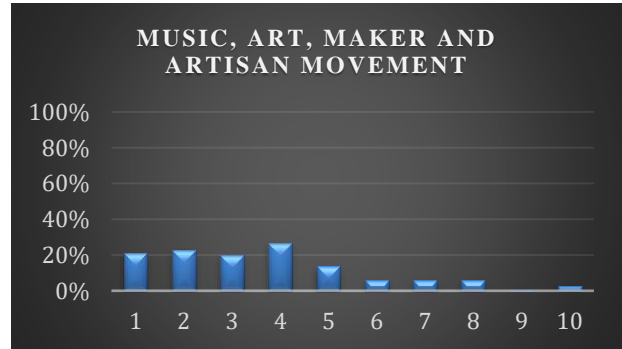


Table 4. 6 Collected data of indicator Culture and civic Pride

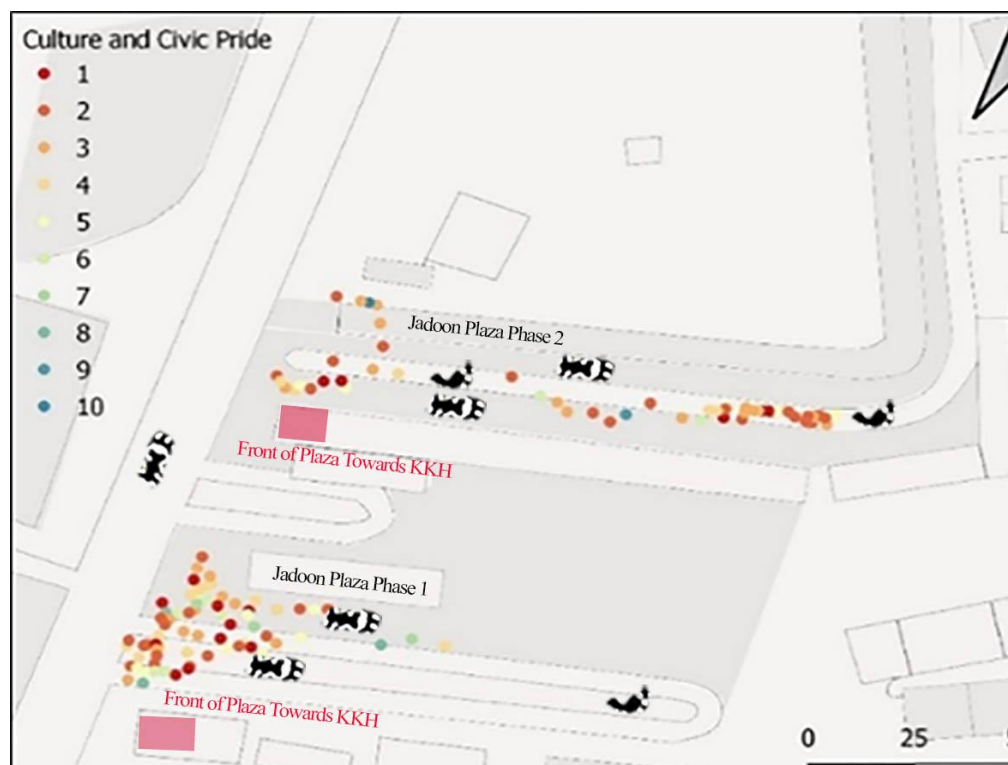


Figure 4.8 Spatial Pattern of respondents for the indicator ‘Culture and Civic Pride’ at Jadoon Plaza

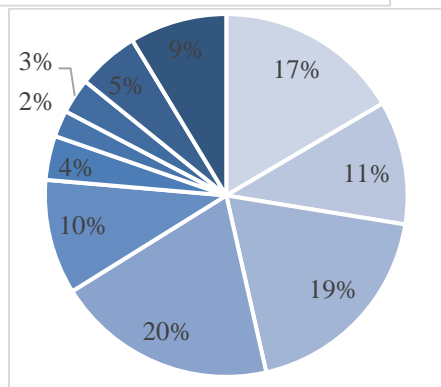
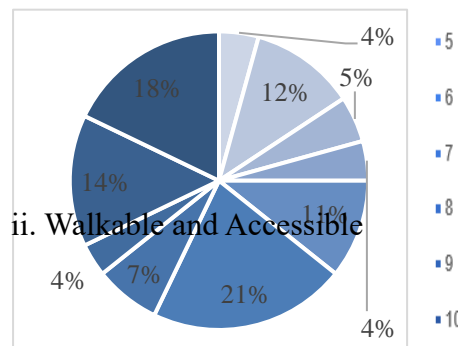
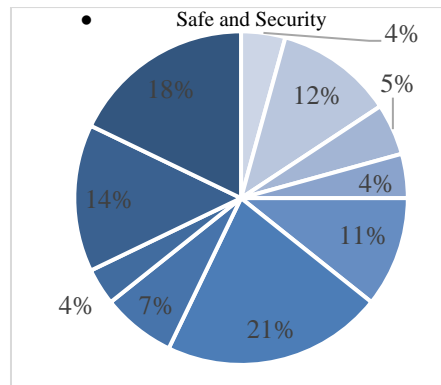
The existence of Pathan, Hindko, and Christian residents makes the culture of Abbottabad rich. The people of the area celebrate and enjoy every cultural event or religious event together. According to a spatial study of quantitative survey data in QGIS, Abbottabad's culture and civic pride are below average. Examining closely figure 4.5, the scale of cultural and civic pride scales between 1-4 are symbolized by red and orange pointers. Multiple uses of the public square for residents are also an option for celebrating cultural events. Both phases are decorated with cultural and religious events like Ramzan, Eid, Independence Day, Christmas, and New Year (the front faces the main Karakoram Highway, as shown in figure 4.8). But neither of the areas is utilized by the authorities. Hence Respondents marked the space as weak for enjoyment purposes.

FINDINGS AND CONCLUSION

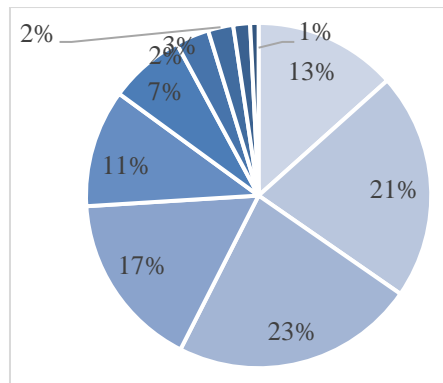
The research aim was to investigate existing parameters for measuring urban happiness; to develop criteria for analyzing urban happiness in the built environment based on previous studies, and to assess the urban happiness of Abbottabad city based on the analysis criteria. Observation and people's experiences are used to assess a concept approach. The research paper denotes the physical effect of urban residents' satisfaction on the scale of urban architecture through the built environment. The findings show how physical stimuli influence satisfaction in an urban setting and how facilities, such as Public Park or Public squares, are established to improve the quality of the urban environment. The data from Jadon Plaza, City Center, and Lady Garden were

examined, and the following conclusion was formed based on data collected from 384 respondents.

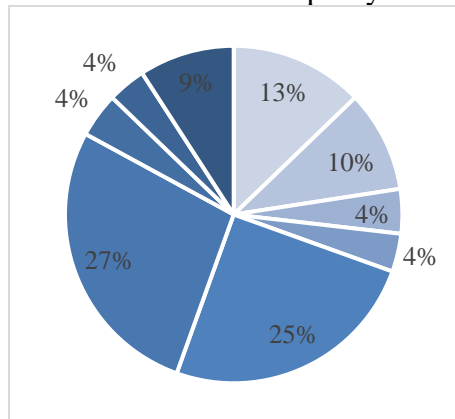
Jadoon



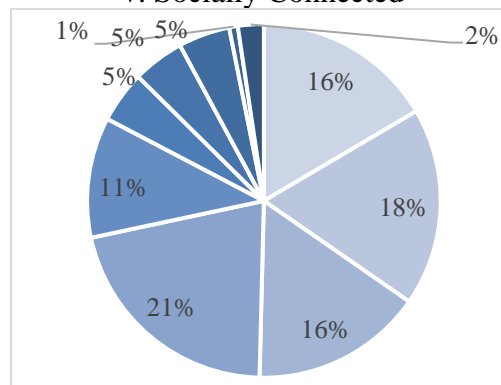
iii. Green and Clean



iv. Shared Prosperity



v. Socially Connected



vi. Culture and Civic Pride

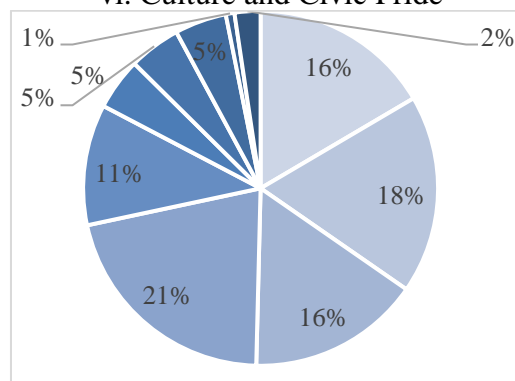


Figure 5. 1 Analysis of Happy indicators for Jadoon Plaza

- It has been determined that the social element of the happy city is strong in Jadoon Plaza, alongside the shared prosperity and walkability levels. This is

because each class in society has easy access and the same ability to share prosperity.

- Design techniques for nature and light aspects are implemented in the Jadoon Plaza, and as a result of these indicators, people feel safe and secure in this public square.

- Spaces designed on the bases of user requirements are sound to be more attractive to the users because they feel a sense of belonging with that particular space.

- Both phases are openly designed according to the pleasing environment of the city. Although there is an open-air sitting area, it is not fully facilitated (no shade or trees around these spaces).

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