PLANNING FOR A HAPPY CITY IN KOCHI SMART CITY ABD AREA

FORT KOCHI - MATTANCHERRY REGION

THESIS REPORT

Submitted by

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M. Plan (2021-2023) BATCH

to

the APJ Abdul Kalam Technological University in partial fulfilment of the requirements for the award of the Post Graduate Degree

in

Urban Planning

DEPARTMENT OF ARCHITECTURE
THANGAL KUNJU MUSALIAR COLLEGE OF ENGINEERING
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DECLARATION

I hereby declare that the Project entitled **"PLANNING FOR A HAPPY CITY IN KOCHI SMART CITY ABD AREA: FORT KOCHI – MATTANCHERRY REGION"** is a bonafide record of mine carried out under the supervision of **Prof. Rahna Abubaker Kovoor**, Department of Architecture. I declare that the work reported herein does not form any part of any other project report or thesis on the basis of which a degree or award was conferred on an earlier occasion to any other candidate. This study is done as a part of the fourth semester M. Plan (Urban Planning), Post Graduate Degree Course in the Department of Architecture, Thangal Kunju Musaliar College of Engineering, Kollam.

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CERTIFICATE

This is to certify that the Thesis Report **"PLANNING FOR A HAPPY CITY IN KOCHI SMART CITY ABD AREA: FORT KOCHI – MATTANCHERRY REGION"** submitted by **Minu Augustine** (TKM21MUP012) of MUP (2021-2023) Batch, in fulfilment of the requirements for the fourth-semester final examination in PL6401–Planning Thesis, under the **APJ Abdul Kalam Technological University** is a bonafide work carried out under our guidance and supervision.

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EXTERNAL EXAMINER

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ABSTRACT

Happy city is a concept of a city where residents can experience joy, wellbeing and overall sense of happiness (SEPE, 2017). Mental health problems are becoming more prevalent among urban residents every day. One of the reasons is that the city does not offer the facilities required for people to be happy (Jagannath, 2019). The study includes understanding the concept of happy city and analysing the factors affecting the of happiness in an urban setup. The various case examples of cities such as Bhutan, Chandigarh and Finland were its citizens experience higher levels of happiness are studied in detail to identify the parameters. Also deriving a methodology for accessing urban areas on the basis of Happiness Index, with Kochi city as a case example. The methodology was based on evaluating the components of happy city design based on the enablers of happy city as suggested by the global happiness and wellbeing policy report of 2019. Finally, understanding the opportunities for improving the quality of life in cities, based on the identified challenges for achieving the ideal happy city through improved urban infrastructure, much healthy community gathering spaces to enhance emotional bonding, better connectivity though efficient transport system, providing walk-able neighbourhood, geriatric-friendly and disabled-friendly infrastructure, services and amenities. Thus, planning for the society rather than the conventional planning method of orderly placement of elements of an urban area. Hence Happy city is the perfect city of the future.

Keywords: *Happy city, Disabled-friendly, Urban setup, Quality of life.*

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LIST OF ABBREVIATIONS

GDP-Gross Domestic Product

GHI-Gross Happiness Index

GNH-Gross National Happiness

GNHI-Gross National Happiness Index

PANAS-The Positive and Negative Affect Schedule

PWB-Psychological wellbeing

QoL-Quality of life

SDSN-Sustainable Development Solutions Network

SHS-Subjective Happiness Scale

SWB-Subjective well-being

SWLS-Satisfaction with Life Scale

WDH-World Database of Happiness

WVS-The World Values Survey

CHAPTER 1 INTRODUCTION

This chapter explains about the relevance of the topic as well as the importance of studying this topic. It consists of study background, aim, objectives etc. and also explain the structure of work.

1.1 Background study

According to the idea of "happy city" the most crucial infrastructure in any city is its emotional infrastructure. Through urban planning, the idea of a city as a joyful place for its residents to live is made possible, regardless of their age, gender, race, economic situation, and disabilities (Huemer, 2019). Cities are physical constructions, but when they can provide for their citizens, they transform into happy cities where residents feel more safe, comfortable and at ease in an environment that is intellectually stimulating (Jain, 2019). The concept of happy cities is gaining popularity all over the world. The aim of such a city is to experience joy, well-being and sense of happiness among its residents. This idea gives locals a positive impression of their community and encourages them to visit or decide to go back there after having the same experience. (SEPE, 2017).

Table 1. 1 Ranking of Happiness

Rank	Country	Score	Rank	Country	Score
1	Finland	7.842	56	Japan	5.94
2	Denmark	7.62	76	Russia	5.477
3	Switzerland	7.571	84	China	5.339
4	Iceland	7.554	87	Nepal	5.269
5	Netherlands	7.464	101	Bangladesh	5.025
11	Australia	7.183	103	South Africa	4.956
13	Germany	7.155	104	Turkey	4.948
17	UK	7.064	105	Pakistan	4.934
19	USA	6.951	118	Iran	4.721
21	France	6.69	129	Sri Lanka	4.325
26	Saudi Arabia	6.494	139	India	3.8819
35	Brazil	6.33	149	Afghanistan	2.523

Source: World happiness report 2019-2021

The Sustainable Development Solutions Network (SDSN) is a non-profit organization established by the UN to pursue the goals of sustainable development in 2012. This organisation publishes the World Happiness Report (WHR). It is a significant assessment of the global state of happiness. This report includes a variety of rankings and articles on national happiness. As of March 2022, Finland had won the title of world's happiest country for five consecutive times. The UN General Assembly adopted the resolution 65/309, "Happiness: Towards a Holistic Definition of Development," in July 2011 requesting nations to conduct polls on the happiness of its citizens and use these results to modify public policy. The first High Level Meeting of UN, entitled "Well-being and Happiness," was held on 2nd April, 2012, and was presided over by Secretary of the UN and Prime Minister of Bhutan. The “gross national happiness (GNH)” was considered by Bhutan rather than “gross domestic product (GDP)” as its main indicator of development.

On 1st of April, 2012, the first report of World Happiness was released. To show the level of happiness in the globe, the causes of happiness and suffering, and the implications for policy, they analyzed case studies. It gave a general summary of the level of happiness throughout the world. The 2nd report got published in 2013 and following that the 3rd report was published in 2015. Since 2016, it has been made available annually on March 20 which is the UN's International Day of Happiness.

Understanding and assessing the variables affecting urban living quality is another aspect of the study. Additionally, there are modifications that can be made to enhance urban quality of life, which is accomplished by comparing the best practices for creating the ideal happy city through improved urban infrastructure, much healthier community gathering areas to strengthen emotional ties, better connectivity through efficient transportation systems, providing walkable neighbourhoods, and providing geriatric- and disabled-friendly infrastructure, services, and amenities. Planning for society is thus preferred to the traditional planning approach of arranging urban area components in a systematic manner. Happy City should therefore be supported because it is the ideal city of the future.

1.2 Need and feasibility of the study

The need of the hour is for a city that prioritises interpersonal relationships and community wellbeing over a smart city built on resources, infrastructure, technology, and government. This idea developed based on how different urban planners approached and worked for creating the perfect city, as Charles Montgomery proposed in his book "The Happy City." Happy City places a high value on its citizens' emotional health, making a city where people may live authentically. Other urban planning ideas like "green city," "smart city," and others are related to "happy city." As a result, it is essential to the development of society and the economy.

It is long past time to put improved planning ideas into practice in a developing nation like India. More public areas, according to researchers, can help build vibrant communities where people can mingle, stroll, and explore. Thejas Jagannath claims that "Far too many citizens suffer from mental health concerns because the city does not offer the resources essential for people to be happy" in her blog post. Currently majority people live in cities than in rural areas for the first time in history. Additionally, the UN estimates that by 2050, an additional 2.5 billion people will reside in cities. (Urbanism and the Pursuit of Happiness, 2019).

Compared to people who live outside the city, urban residents have a 20% increased chance of acquiring depression. In the meantime, people who live in cities are 77% more likely than those who live in rural areas to have psychosis, a severe psychiatric disease characterized by hallucinations, delusions, paranoia, and disordered thought. Additionally, those who live in cities have a 21% higher risk of getting generalised anxiety disorder, a mental health condition that is marked by feelings of anxiety and a sense of impending danger or panic. Numerous elements of the urban environment enhance the chance of acquiring these issues, according to epidemiological studies. Some of these draw attention to possible issues with the built environment, like restricted access to green spaces and significant levels of noise and air pollution. Others are social in nature and include social injustices, criminality, and loneliness.

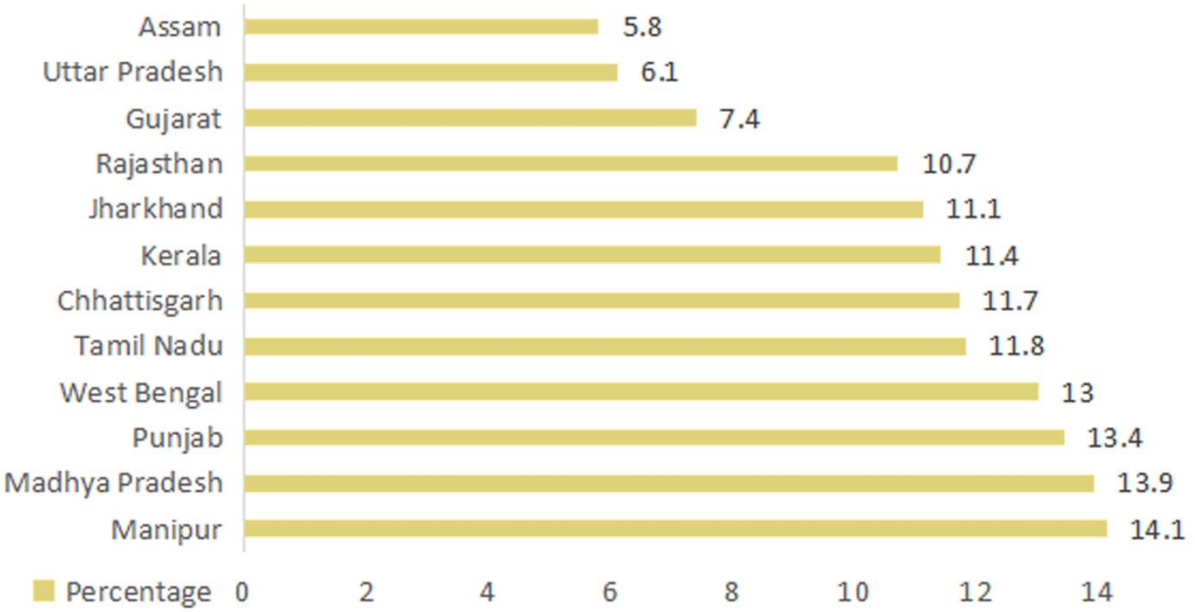

Figure 1. 1 Percentage of Urban Population Affected by Mental Disorder. October 5, 2022

Source: The urban mental health landscape – D. Nathwani. (n.d.). Retrieved

It's crucial to understand that the elements of the urban environment that raise the risk of mental illness are not inherent nor unavoidable features of urban life. Instead, they are the outcome of subpar design, administration, and planning, and they might be undone. When people have access to high-quality housing and green spaces, the prevalence of depression in urban settings is reduced. (King's College London, n.d.).

India lacks well-maintained public squares and central public places that encourage cohesion among its population, and its pedestrian routes are in poor condition and do not enable continuous walkability. Another problem that affects the standard of living in urban areas is the existing level of social and spatial inequality. Absence of a public bicycle hub, lack of a sports facility, lack of pollution control, lack of support for small and cottage industries, and a subpar waste and water management system are all examples of poorly constructed public transportation systems. Therefore, India has the potential to become a happy city by focusing on these aspects.

According to the most recent State Mental Health Survey data, 14.4% of people in the state who are 18 years of age and older have had a psychic condition at least once in their lives. According to research, one in four persons in Kochi experience mild to severe depression. According to the District Mental Health Programme (DMHP), moderate to severe depression affects roughly 25% of the population. The top city among the ten joined to the Center's Smart Cities Mission in 2016 is Kochi. The average literacy rate in Kochi City is 96.29%, higher than the urban literacy rate in Kerala State (95.11%). The sectoral proportion of Kochi City in Kerala State is only 3.2% (**5050 No.-IPC & SLL Cases), and the crime rate is dropping (-) 3.3% (CAGR- from 2016-2019). Unplanned urban growth is hurting Kochi's residents' quality of life. According to the 2011 Human Development Report, the urbanisation rate is 68% and the population growth rate is 5.69%.

According to the Ministry of Housing and Urban Affairs' Ease of Living Index for 2020, Kochi is ranked 39th out of all cities having a population under a million. The city received 61.39 out of a possible 100 points to win the 'governance' component of the Municipal Performance Index. In terms of total municipal performance, it is placed 12. The city's quality of life, economic viability, sustainability, and resident perception have all been evaluated in the study. In all, 111 cities took part in the evaluation that was conducted in March 2020. has the potential to become a joyful city as a result. According to district-level per capita gross state value, Kochi ranks first and has a per capita income growth rate that is 7.9% higher than the state growth rate. Kerala is 20% above the national average and has the highest Human Development Index score of any Indian state (for the year 2017).

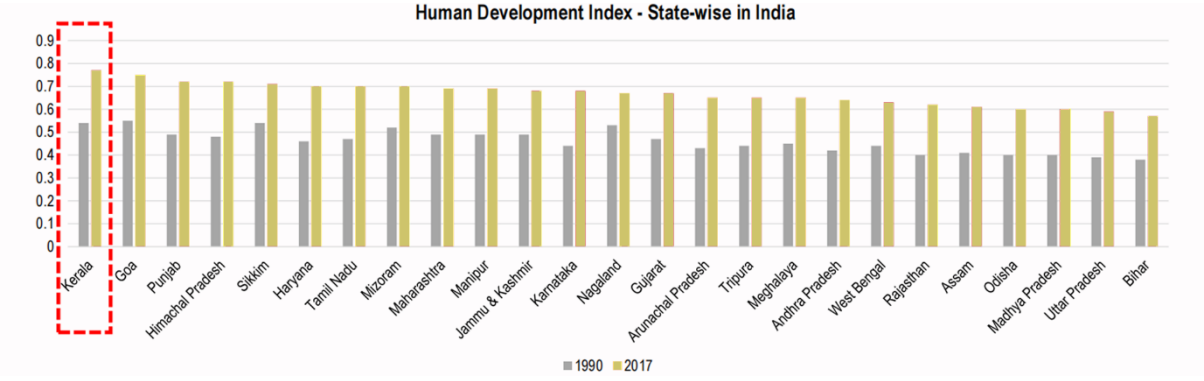

Figure 1. 2 State-wise Human development ranking.

Source: Infopark smart space, Kochi 2019.

1.3 Research question

- How to achieve a higher happiness index through a better planning of urban areas?

1.4 Aim

- To prepare a master plan for a Happy city through effective planning of Kochi smart city ABD area.

1.5 Objectives

- To study and analyse the concept of Happy Cities and its parameters.
- To evaluating planning of Kochi ABD area in terms of Happiness parameters identified.
- To prepare master plan for Kochi smart city ABD area for achieving Happiness Index.

1.6 Study methodology

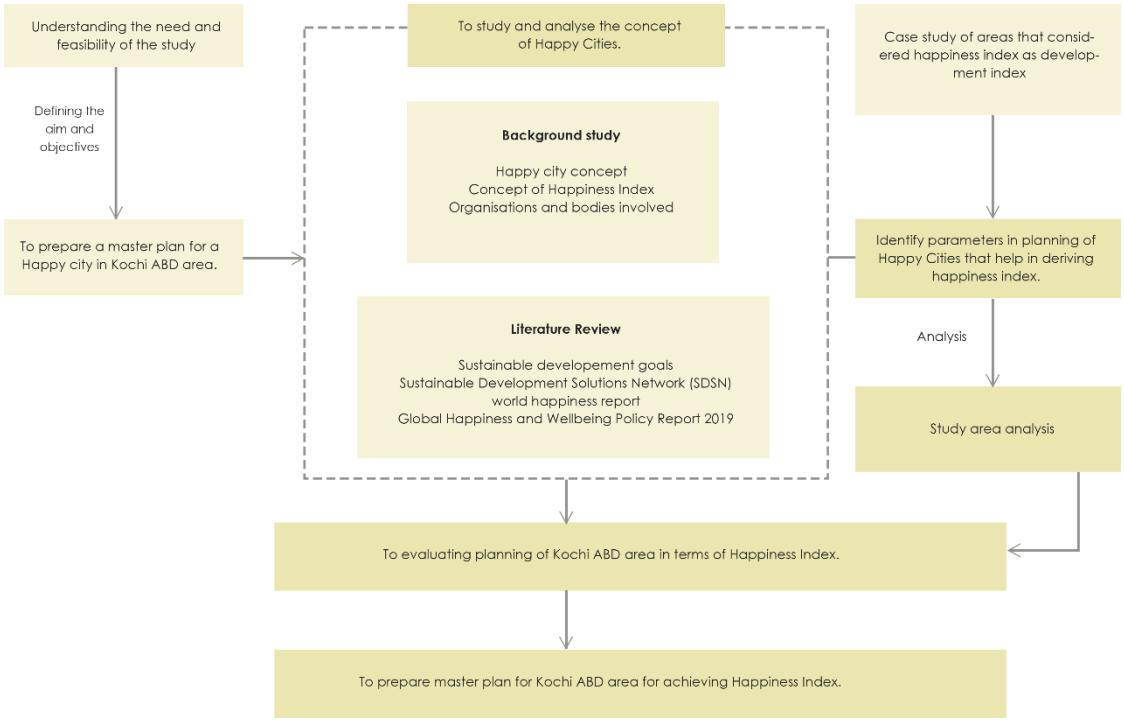

Figure 1. 3 Methodology for the Study

Source: Author generated.

The research method of this study is descriptive analytic. The existing condition of the city is studied at first along with the analysis of the various urban happiness indices are conducted. Suitable literature case studies are selected in relation to the study area under consideration (Bhutan, Country in South Asia). Bhutan is the only country that has a gross national happiness. According to Business Week, Bhutan is consistently rated as the world's happiest nation.

A happy city is often one that has made an investment in the little things: in developing a sense of purpose and belonging, and in ensuring freedom to move around at pleasure. Additionally, there are adjustments that can be made to enhance urban quality of life by implementing best practices for creating the ideal happy city through improved urban infrastructure, much healthier community gathering areas to strengthen emotional ties, and better connectivity while remaining efficient.

1.7 Scope and limitation

Scope: Happy city concept contributes to an integral social and economic development and thus most stakeholders promote this concept. Kochi city is developing into a smart city thus, it encourages the concept of citizen wellbeing. According to the Ministry of Housing and Urban Affairs' Ease of Living Index for 2020, Kochi is ranked 39th out of all cities having a population under a million. The city received 61.39 out of a possible 100 points to win the 'governance' component of the Municipal Performance Index.

Limitation: Happy city gives at most importance to the emotional well-being of its residents. Much wider and less constricted applicability with not much clear-cut guidelines. Involves qualitative analysis and less scope for quantitative analysis. Though happiness is more of a psychological state, the study focuses more on the subjective urban planning aspects.

CHAPTER 2 LITERATURE REVIEW

This chapter describes the concept of happy cities. The various national and international levels agencies involved in attaining and advancing the happy city concept. The chapter also explains the various parameters put forward by these agencies in assisting happiness index.

2.1 The concept of Happy Cities.

The provision of increased "quality of life" is one of the essential components of a happy city. Happy cities provide all citizens with acceptable living conditions, recognising their uniqueness and range of needs (UN Global Compact Report, 2020). A variety of experts and jobs must work together for the development of a happy city.

According to recent research, per capita GDP is not even close to being the most significant factor determining happiness index. However, according to studies, people's level of happiness depends on their social life (Brdulak & Brdulak, 2018). This study aims to develop techniques for assessing urban planning on the basis of quality of life by using “happiness index” as a measurement modality.

Authors compare happy cities to Japanese zen gardens, where it is the space between the rocks rather than the actual rocks that matter. Things work similarly in happy cities, where space between is crucial in the broadest sense (Brdulak & Brdulak, 2018). This research work aims to analyse this space that binds the urban areas with the society. The economic climate of the cities also has a big impact on how much better life is for its citizens.

However, improvements to the many aspects of urban planning have the ability to improve the standard of life and are indirectly related to financial resources. Happy cities are typically managed democratically, with citizens receiving equitable (non-discriminatory) treatment regardless of their differences and having open access to urban space. (Brdulak & Brdulak, 2018).

2.2 The factors affecting Happiness in an urban area

Utilizing the Gallup World Poll, the following 'people' and 'place' factors are taken into consideration (World Happiness Report 2020):

2.2.1 People factors:

According to the world happiness report of 2020, the various people factors include; Economic condition such as the financial status of the residents including their yearly household income, satisfaction with the available levels of income and their occupational status; Economic optimism as trust in their own financial situation; Education is one of the major factors of happiness, here it is accessed on the basis of the level and total number of years studied; Health status which includes whether the person is facing any health issues or under any pain can affect ones happiness; the next factor considered is social capital, that is the involvement of the person in the social events, in simple terms the public participation of the people; another factor that affects the happiness of the people is the level of safety and security they can ensure in the surrounding environment. Demographic factors like age, sex, partner, and children are considered. People factor influencing happiness considers the origin of the resident whether belonging to the same region or a migrated from somewhere else. The last factor considered under people factor is the perceptions of the state of the nation, including perceived freedom, corruption, and institution quality.

2.2.2 Place factors:

Similar to the people factors various place factors are also considered which are purely based on the living conditions of the surroundings of resident; such as contentment with the local geographical region's water and air quality, satisfaction with the community's physical and social infrastructure, in addition to public transportation, the availability of excellent medical care, and the quality of education which comes under the public infrastructure as a whole. Availability of affordable housing facility, Housing affordability means the housing facility is accessible to the user and is cost effective. Local economic circumstances and labour market conditions can also influence the happiness of the residents. Satisfaction with the local place and desire to remain there and finally whether the local area accommodates diversity making it a safe and happy place for minorities to reside.

2.3 Elements for happier cities:

Urban happiness includes three overlapping conditions which are; healthy, happy, and thriving (*Charles Montgomery,2019)*.

Figure 2. 1 Three overlapping conditions of happy city.

Source :Charles Montgomery.(2019).A Recipe for Urban Happiness: Nine essential ingredients for happier, healthier cities. Happy Cities Digest.

2.3.1 Subjective wellbeing:

Subjective wellbeing expresses one's own state of happiness, at any particular period of time. This measure can be used in surveys and can be related to societal and environmental conditions.

2.3.2 Psychological wellbeing:

Psychological wellbeing is described as a state of positive mental state, such as happiness or satisfaction. Effective planning of urban areas can enhance the metal health of its to some extent.

2.3.3 Healthy life years:

Healthy life expectancy is a strong predictor of happiness among nations.

Figure 2. 2 The nine essential elements of wellbeing.

Source :Charles Montgomery.(2019).A Recipe for Urban Happiness: Nine essential ingredients for happier, healthier cities. Happy Cities Digest.

Core needs: The term "core needs" refers to everyone's basic requirements for food, water, housing, sanitation, and safety.

Social relationships: Social ties are the most significant factor in determining health and wellbeing when core needs are addressed. The physical layout of our communities holds the key to the antidote to loneliness. Creating sociable streets, public areas, and housing can enable us all re-connect.

Health: A vital component of personal wellbeing is physical health. By reducing our exposure to dangers, pollution, and physical danger, urban planning directly affects people's health outcomes and sentiments. But it also influences the quantity and calibre of our social connections, nudges us toward more active or passive types of mobility, and contributes to our sickness or health. Happier behaviour also seems to be healthier behaviour. According to studies, persons who commute by foot or bicycle feel more happiness and less sadness, fear, and fury than drivers of cars.

Equity and relative status:

For the welfare of society, equity and social inclusion are important. We are all stronger when everyone has the ability to engage in economic and cultural life. Even while cities may not be able to totally eliminate social disparity, how urban areas are planned for and managed is crucial to any endeavour to lessen poverty and integrate everyone in the city's social and economic life.

Ease:

People who feel capable of overcoming obstacles in their daily lives and thriving do so with greater happiness and disease resistance. But by making things simpler or harder, urban architecture, places, and systems can either strengthen or weaken this capacity to deal with day-to-day obstacles like commuting, wayfinding, socialising, or working. People experience ease and freedom when they are in well-designed spaces.

Joy:

Our daily emotions are clearly and immediately impacted by city processes and spaces. They produce wellness benefits that persist much beyond the immediate moment and give both pleasure and suffering.

Meaning and belonging:

Cities have the power to express meaning and give residents in metropolitan areas a sense of identity.

Resilience:

Cities are the primary users of finite resources as well as the primary producers of the greenhouse gases that cause fast climate change. The cities and their inhabitants are expected to anticipate the effects of these changes. Communities may respond to, adapt to, recover from, and thrive in the face of environmental, economic and social change with aid of resilient systems.

Various aspects of Happy city are as follows: -

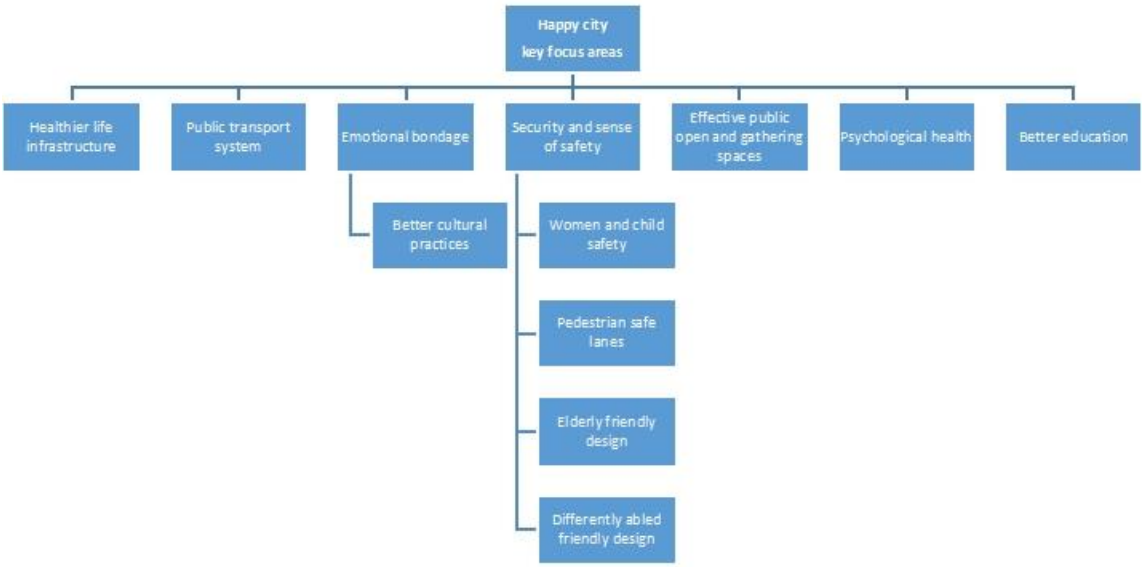

Figure 2. 3 Key focus areas of happy city.

Source: Author generated based on Montgomery, C. (2021, December 9). A Recipe for Urban Happiness - Happy Cities Digest. Medium. Retrieved October 5, 2022.

2.4 Happiness index

This Index is a thorough survey modality that evaluates resilience, sustainability, and happiness. Community organisers, researchers, and anyone looking to use a well-being statistics and index can use this index as a survey tool. This tool can be used to gauge happiness with one's life and living circumstances. (Musikanski, L., Cloutier, S., Bejarano, E., Briggs, D., Colbert, J., Strasser, G., & Russell, S. 2017).

This index assesses life satisfaction, happiness, and other happiness-related factors, such as psychological well-being, physical health, social support, community, time balance, arts, culture, education government and employment. (Happiness Alliance, 2014).

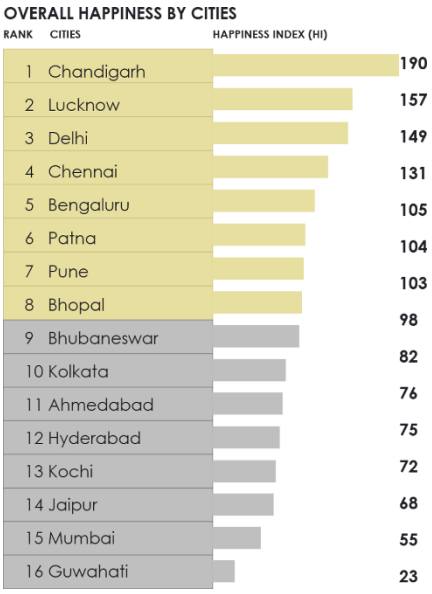

Figure 2. 4 Ranking of Indian cities according to Happiness Index

Source: Mitra, S. (2015, June 11). Chandigarh India's happiest city.

HAPPINESS IN VARIOUS ASPECTS OF LIFE

TOP 10 ATTRIBUTES	MIDDLE 8 ATTRIBUTES	BOTTOM 10 ATTRIBUTES
Amount of time they get to spend with family-133	Living conditions such as water, electricity, infrastructure, etc-102	Current overall status of their country-67
Quality of relationship with family/ friends-130	Opportunity to fulfil their family's needs. and desires-98	Things they have that enhance their social status-81
The authority they have to take decisions over their own life: 123	Having balance between work and life-98	The social and cultural values around them-88
Support that they get from friends and family-123	Freedom they have to do anything they want-98	Their material posses sions that they own such as house, car, etc-88
Their physical appearance-116	Current overall status of their neighbourhood and city-95	Getting things hassle free-88
The time that they have for themselves-112	Their overall financial status-95	Their personal success and achieve- ments-88
Extent to which they feel connected with others in society beyond family. friends-112	The purpose of their life-95	Their preparedness for emergency or adverse situation-88
Recognition they get for their work-109	Things or products that they have make their	Opportunity to fulfil all their needs and desires-91
Being able to do things only for themselves: 109		Access that they have with new technology and products- 91
The extent to which they feel connected with their city-102		Access that they have to new and innovative products that make their life easier-91

Figure 2. 5 Parameters considered under the survey.

Source: Mitra, S. (2015, June 11). Chandigarh India's happiest city.

The Smart Dubai programme is bringing to reality the ambition of making Dubai "the happiest city on the planet"; Dubai established the first Ministry of Happiness in the world in 2016.

In collaboration with the Gallup Organisation, the "Smart Happiness Index" (SHI) was created. Through a compound index generated from quantitative data analysis, the six components of the Smart Dubai 2021 Strategy—economics, people and society, governance, mobility, environment, and living—are connected to happiness. The project has since advanced to the next phase, which involves the creation of a decision-making tool known as the Smart Happiness Project Evaluation tool (SHAPE tool). The SHAPE tool takes into account various key performance indicators (KPIs) within the city plan's six pillars and provides weighting, based on the relationship between these KPIs and sample satisfaction, using data from over 4,300 Dubai residents as a representative sample (chosen from all segments of society, including residents. In 2016, Dubai established the first Ministry of Happiness.

According to the 2012–2014 World Happiness Report, UAE is rated 20th overall. The survey claims that since 2005, happiness in Dubai has grown by 2.5%. UAE is certain they have the ideal combination of city leaders, partners, and innovators to significantly improve and sustain happiness in Dubai. UAE consistently prioritises the pleasure of its citizens. UAE already sets the bar high when it comes to happiness, and with the Happiness Agenda, UAE hopes to set the example for other cities to follow.

The following characteristics are evaluated throughout the domains:

Psychological wellbeing of the residents which provides a sense of positivity, a feeling of orientation, and success; Health which supports the level of stamina and capacity to carry out daily tasks; time availability for delight, a sense of urgency, and relaxation; A sense of community, Volunteerism, a sense of safety, and a sense of being accepted; Social Support, Feelings of loneliness and pleasure with friends and family; Access to cultural and educational events which includes aspects of education, the arts, and culture; relationship with the environment which is levels pollution, preservation, and accessibility to nature; Confidence in the governance, perception of corruption, and competence; Financial Well-Being such as having enough money to cover basic expenses; and pay, freedom, and efficiency at work.

2.5 Gross national happiness

Bhutan created the idea GNH in response to use of GNP by the government (Ura et. al, 2012). They measure GNH using GNH Index. According to the Bhutan's GNH Commission's mandate, all development strategies and plans must be created in accordance with principles of GNH. The third GNH report from the government, Compass Towards a Just and Harmonious Society (The Center for Bhutan Studies & GNH Research, 2015), found that among factors for wellbeing that showed improvement were youth literacy of the youth, community event participation despite hike in working time, performance of government, and a feeling of belonging.

2.6 Cantril Ladder

The Cantril Ladder is one of many well-known, valid, and reliable scales that the Happiness Index uses to rate different aspects of happiness. In order to quantify life contentment, this Ladder asks participants to picture their ideal life, their hopes for the future, as well as the worst possible scenario for their lives, and the concerns connected to that future. After that, students are shown several images of this ladder where they were asked to indicate where they envision themselves during various time periods of their life - present, past and future. In the well-being literature, the Cantril's Ladder approach is widely used to assess the reliability of other measures. It has also been heavily integrated into surveys and composite indices (Musikanski, L., Cloutier, S., Bejarano, E., Briggs, D., Colbert, J., Strasser, G., & Russell, S., 2017).

2.7 Sustainable development goals.

Goal 11 - Sustainable Cities and Communities

In 2015, seventeen goals were set by the General Assembly of United Nations of which the 11^{th} goal is "sustainable cities and communities". Making cities safe, inclusive, sustainable and resilient is the stated goal of SDG 11. The 17 SDGs recognise that sustainable development must balance social, economic, and environmental sustainability and the decisions made in one area will affect the outcomes in other areas as well. Cities serve as centres for business, culture, research, productivity, social advancement, and many other things. Effective urban planning and management techniques must be used to address the problems that urbanisation has brought forth. (Goal 11: Sustainable Cities and Communities, 2022)

Figure 2. 6 Sustainable Development Goals.

Source: UNESCO and Sustainable Development Goals. (2020, January 14). UNESCO. https://en.unesco.org/sustainabledevelopmentgoals.

The targets of 11th sustainable development goal:

- **Safe And Affordable Housing:** Access to essential services, safe and affordable housing and to improve the living condition and standards of slums by 2030.
- **Affordable And Sustainable Transport Systems:** Improve road safety and access to affordable and sustainable public transportation systems by the year 2030 with particular attention to elderly, disabled, women and the children.
- **Inclusive And Sustainable Urbanization:** Enhance global human settlement planning and management capabilities by 2030, with a focus on achieving equitable and sustainable urbanisation.
- **Protect The World's Cultural and Natural Heritage:** amplify efforts to defend and conserve the world's natural and cultural heritage.

- **Reduce The Adverse Effects of Natural Disasters:** Drastically reduce by 2030 the number of fatalities particularly underprivileged, the number of those impacted, and the direct economic losses as a percentage of the world's gross domestic product.
- **Reduce The Environmental Impact of Cities:** Reduce the negative per capita environmental effect of cities by 2030, with a focus on waste management, air quality, and other factors.
- **Provide Access to Safe and Inclusive Green and Public Spaces:** By 2030, all people should have access to green spaces that are accessible, inclusive, and safe, especially women, children, the elderly, and disabled people.
- **Strong National and Regional Development Planning:** By improving national and regional development planning, support strong links between urban, peri-urban, and rural communities on economic, social & environmental fronts.
- **Implement Policies for Inclusion, Resource Efficiency and Disaster Risk Reduction:** Adoption and practice of integrated policies that promote diversity, efficiency of resources, climate change mitigation, disaster resilience, and implementation of disaster management in accordance with the Sendai Framework for Disaster Risk Reduction 2015–2030.
- **Support Least Developed Countries in Sustainable and Resilient Building:** Help the underdeveloped nations construct durable structures using local resources, including by providing financial and technical support.

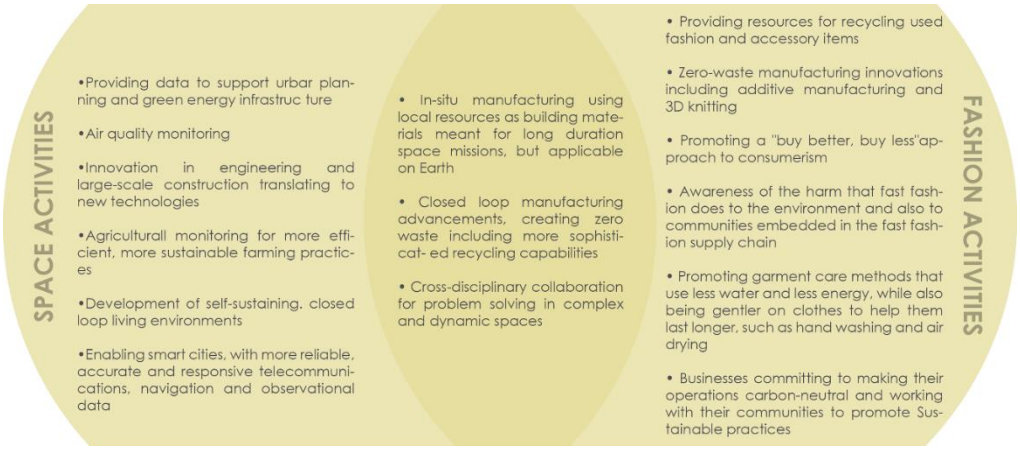

Figure 2. 7 Sustainable development goal 11 activities

Source: Department of Economic and Social Affairs, Sustainable Development

Other Sustainable development goals achieved through the concept include:

- **Goal 3: Good health and well-being:** Happy city focus on the wellbeing and health of its residents.

- **Goal 5: Gender equality:** Happy cities ensure inclusivity in its design.

- **Goal 6: Clean water and sanitation:** Cities help in providing clean and safe water and sanitation to ensure the well-being of the citizens.

- **Goal 7: Affordable and clean energy:** Happy cities mostly rely on passive energy Sources to reduce the environmental impact.

- **Goal 8: Decent work and economic growth:** This concept indirectly promotes economic growth.

- **Goal 9: Industry, innovation and infrastructure:** Happy cities provide infrastructural developments to the cities to satisfy the needs of the people.

- **Goal 13: Climate action:** Happy city concept reduces the adverse effects on the environment.

2.8 World happiness report.

The SDSN publishes the World Happiness Report. The Gallup World Poll is mostly used in the report's data. It is a significant assessment of the global state of happiness. This report includes a variety of rankings and articles on national happiness. As of March 2022, Finland had won the title of world's happiest country for five consecutive times. The public can download each annual report from the World Happiness Report website.

The UN General Assembly adopted the resolution 65/309, "Happiness: Towards a Holistic Definition of Development," in July 2011 requesting nations to conduct polls on the happiness of its citizens and use these results to modify public policy. The first High Level Meeting of UN, entitled "Well-being and Happiness," was held on 2nd April, 2012, and was presided over by Secretary of the UN and Prime Minister of Bhutan. The GNH was considered by Bhutan rather than GDP as its main indicator of development.

High Level Meeting of the UN gained attention on a global scale. The first study included an overview of global happiness, the factors that influence pleasure and suffering, and the policy implications as illustrated by case studies. The 2nd report got published in 2013 and following that the 3rd report was published in 2015. Since 2016, it has been made available annually on March 20 which is the UN's International Day of Happiness.

World Happiness Report 2020

Global disparities in urban-rural happiness were investigated in the paper. It was discovered that urban residents often score higher on happiness scales than rural populations. The fact that the disparities may be predominantly attributed to greater living standards shows that, in the more industrialised Western world, urbanisation may result in lower average levels of wellbeing than in higher levels. However, cities have greater costs of living due to a number of factors, such as less access to owner-occupied property and longer commutes on average, which result in lower levels of wellbeing. longer commutes, which reduce free time and family time.

2.8.1 Significance of happy city

The happy city ranking is based on the self-reports of city residents about how they personally assess the quality of their lives, as opposed to a list of variables that researchers believe to be significant. By emancipating respondents in this way, it allows individuals to decide for themselves which factors—observable or invisible to researchers—matter most to them. It may be argued that this bottom-up strategy offers the populace a direct voice as opposed to the more top-down strategy of selecting ex-ante what should important for the wellbeing of city people. Importantly, using the results of well-being surveys is a method that enables us to gain a more comprehensive understanding of the factors that influence happiness. In actuality, using well-being surveys makes it possible to determine the relative significance of various domains in determining well-being, giving politicians evidence-based advice on how to maximise the well-being of their communities.

2.8.2 Methods and philosophy

A Cantril ladder poll served as the basis for the national happiness rankings. Respondents were asked to visualise a ladder with the best standard of living represented by a 10 and the worst standard of living represented by a 0. On a scale of 0 to 10, they are then asked to score their own current lifestyles. The results of the life evaluation are correlated with numerous life elements in the report.

In 2022, Finland is ranked first in the world for happiness. Denmark came in the 2nd spot and following it is Iceland. The top 10 "happiest" nations of the world were included in this list. Afghanistan receives the lowest score of 2.523 out of 146 nations evaluated for the report, making it the least "happy" nation in the world as of 2022.

The Gallup-Sharecare Well-Being Index (Harter & Gurley, 2008) and Gallup's in-depth daily poll of America's well-being (Cantril Self-Anchoring Striving Scale; Cantril, 1965) both use the Cantril Self-Anchoring Striving Scale. Together, these initiatives represent more than 98% of the world's population. The Cantril Self-Anchoring Scale is a ladder with steps numbered from zero at the bottom to ten at the top that was created by eminent social researcher Dr. Hadley Cantril.

The rungs at the top and bottom of the ladder stand for the finest and worst conceivable lives, respectively. One sort of well-being measurement is the Cantril Scale, which has been applied by a wide range of researchers ever since it was created by Hadley Cantril. The Cantril Scale assesses happiness at the extreme of the continuum that represents assessments of life (Diener, Kahneman, Tov, & Arora, 2009).

Figure 2. 8 Ranking of happiness 2019-2021.

Source: World Happiness Report 2022

The report also looked at disparities in happiness between urban and rural areas globally. It was discovered that urban residents generally score higher on happiness scales than rural populations. The fact that the disparities may be predominantly attributed to greater living standards shows that, in the more industrialised Western world, urbanisation may result in lower average levels of wellbeing than in higher ones. Cities have greater costs of living for many reasons, such as fewer owner-occupied homes available and longer commutes on average, which result in poorer levels of well-being, longer commutes which reduce free time and family time. The WHR assesses happiness of the subjects. The study also makes an effort to justify nation's ranking by evaluating various underlying causes such as;

- Trust in Democracy
- Per individual gross domestic product (GDP).
- A good life spans
- Community resources available
- Decision-making liberty
- Generosity within community
- Absence of illicit activities

2.9 Global happiness and wellbeing policy report (GHWPR).

The Global Happiness Council (GHC) prepares the 2019 GHWPR. This paper offers data and policy suggestions on the most effective ways to foster happiness and wellbeing. According to this study, the first group of topics examines how happiness is related to city design, namely the physical elements, operational procedures, and traffic patterns that make up the city's more obvious structure. The city's enablers of happiness, which are frequently linked to the results, are described in the second set. As a result, the city's physical features, such as its streets, buildings, cycle routes, and parks, may be seen and touched, as well as its physical structure and social fabric. Contrarily, the conceptual aspects—such as culture of the city, partnerships of the communities and services—are more symbolic and relational even though they are tangible.

Figure 2. 9 Creating happy city.

Source: Global Happiness and Wellbeing Policy Report 2019

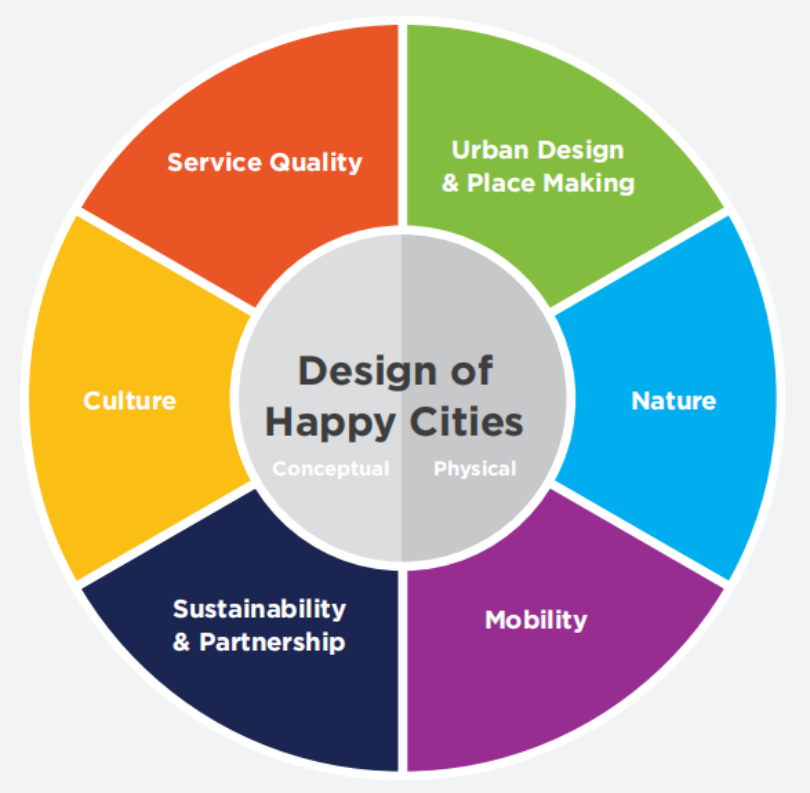

Figure 2. 10 Design of Happy cities.

Source: Global Happiness and Wellbeing Policy Report 2019

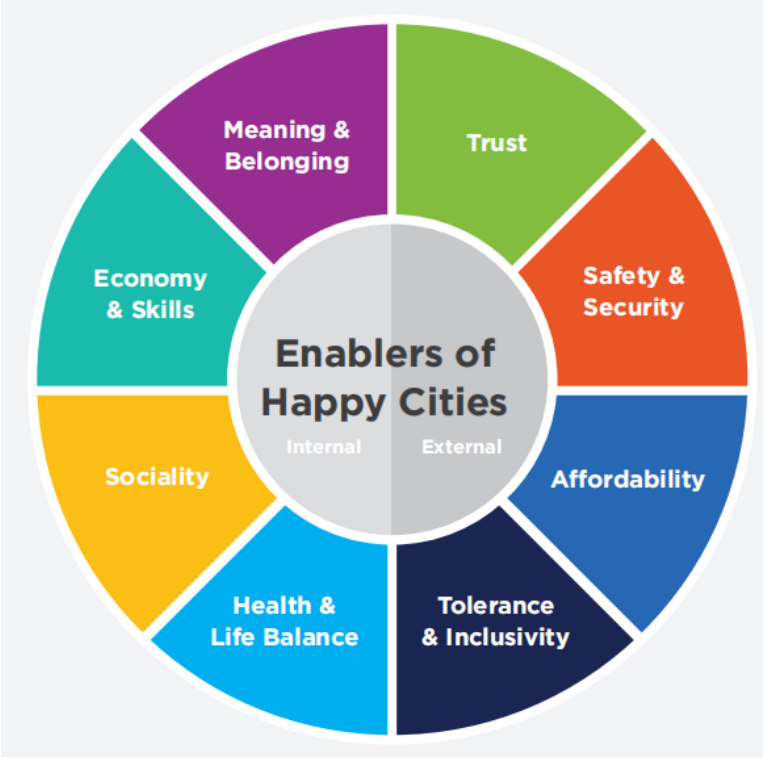

Figure 2. 11 Enablers of Happy cities.

Source: Global Happiness and Wellbeing Policy Report 2019

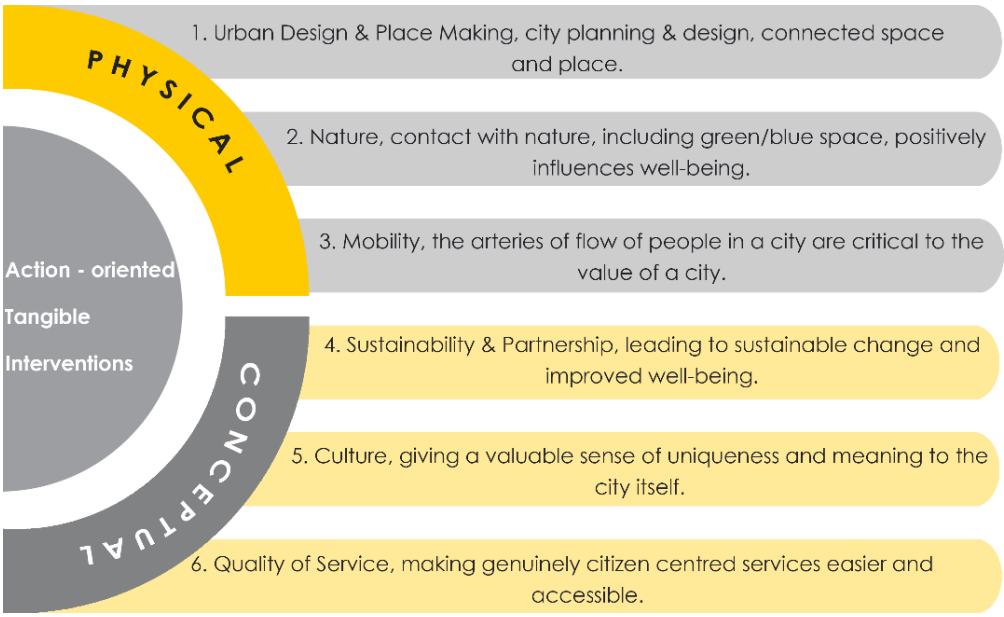

Figure 2. 12 Tangible Interventions.

Source: Global Happiness and Wellbeing Policy Report 2019

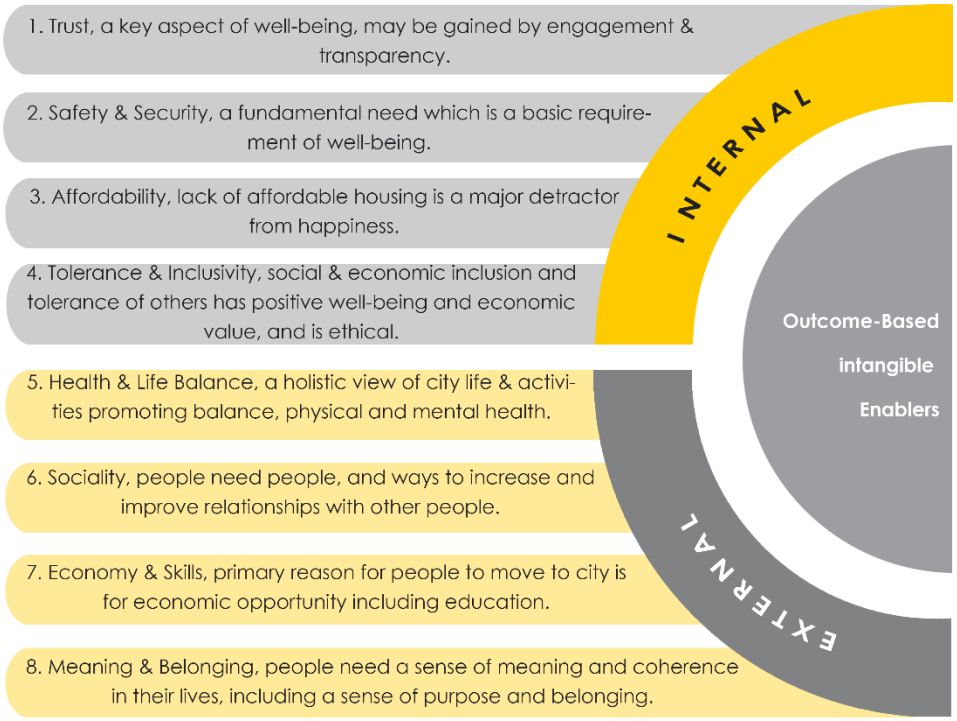

Figure 2. 13 Intangible Interventions.

Source: Global Happiness and Wellbeing Policy Report 2019

2.9.1 Checklist for happiness and wellbeing

By embracing a data-driven strategy towards a socially smart city and increasing the themes identified in the world happiness and wellbeing policy report, as described in the accompanying checklist, the Happy Cities Agenda suggests that city administrators and leaders promote happiness in the city.

A- Designing happy cities.

1. Urban Design & Place Making: Take measures to strengthen a feeling of community and adhere to rules to improve place-making in public areas. Make sure that proper city planning and urban design standards are promoted and supported, for example, mixed-use, transit-oriented development.

2. Increase the opportunity for citizens to interact with nature by increasing the number of green and blue places on all dimensions, including tiny spaces like roofs.

3. Mobility: Provide multimodal transportation choices for locals and visitors, lessen reliance on personal vehicles, and enhance real-time information on traffic patterns in the city.

4. Sustainability & Partnership: City administrators must work with interested organisations that stand to gain from the opportunities, such as the private sector and community organisations, in order to create long-term and sustainable gains in the levels of happiness in the city.

5. Culture. City administrators must aggressively support cultural activities, both directly (by planning events, for example) and indirectly (by assisting organisations in the development of specialised eco-systems, for example).

6. Quality of Service: City management must make sure that all services, digital and otherwise, are of the greatest quality, are designed with the user in mind, and adhere to the strictest standards for usability and accessibility.

B- Enabling happy city

1. Building institutional trust requires growing involvement and openness within city organisations.

2. Safety & Security: By making safety measures more visible and creating more airy, well-lit spaces, you may increase both real and imagined emotions of security.

3. Affordability: Increase the variety of housing alternatives and financing solutions to make housing affordable for all societal groups.

4. Tolerance and Inclusivity: By guaranteeing equal access and opportunity for everyone, we can ensure that no one in the city is left out and that they can all contribute to society and the economy.

5. Health & existence Balance, support a balanced existence, such as between work, play, and family life, and promote healthy activities and lifestyles in the city, such as active travel.

6. By giving individuals more chances to interact and find common interests, sociality helps people connect and enhance their connections with one another on all scales, including those of the family and community. It also actively combats loneliness.

7. By offering education and skill-building programmes, as well as business and job opportunities, Economy & Skills encourages citizens to participate actively in the city's economic life.

8. Aiming to ensure that newcomers and migrants are assimilated into society, Meaning & Belonging works to advance common values, experiences, and meaning at the community and city scales.

2.10 Three Characteristics of a smart city which leads to happy city

The “Smart City” concept can be reviewed within three dimensions: Technology, Human and Institutional. But cities experience higher cost of living for a variety of reasons including reduced access to owner occupied housing and longer average commutes, experience return lower levels of well-being. Longer commutes, which lowers time for leisure and time with family.

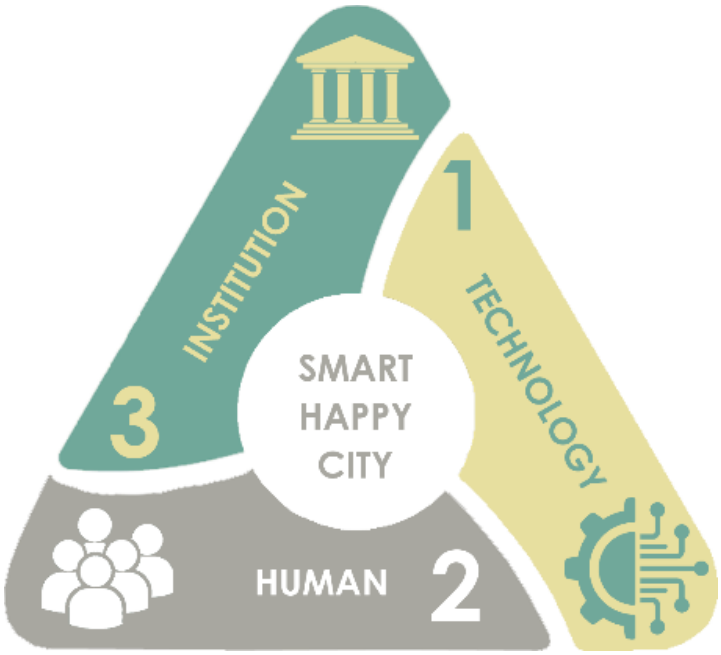

Figure 2. 14 Characteristics of a Smart City leading to Happy city

Source: Authors, 2021.

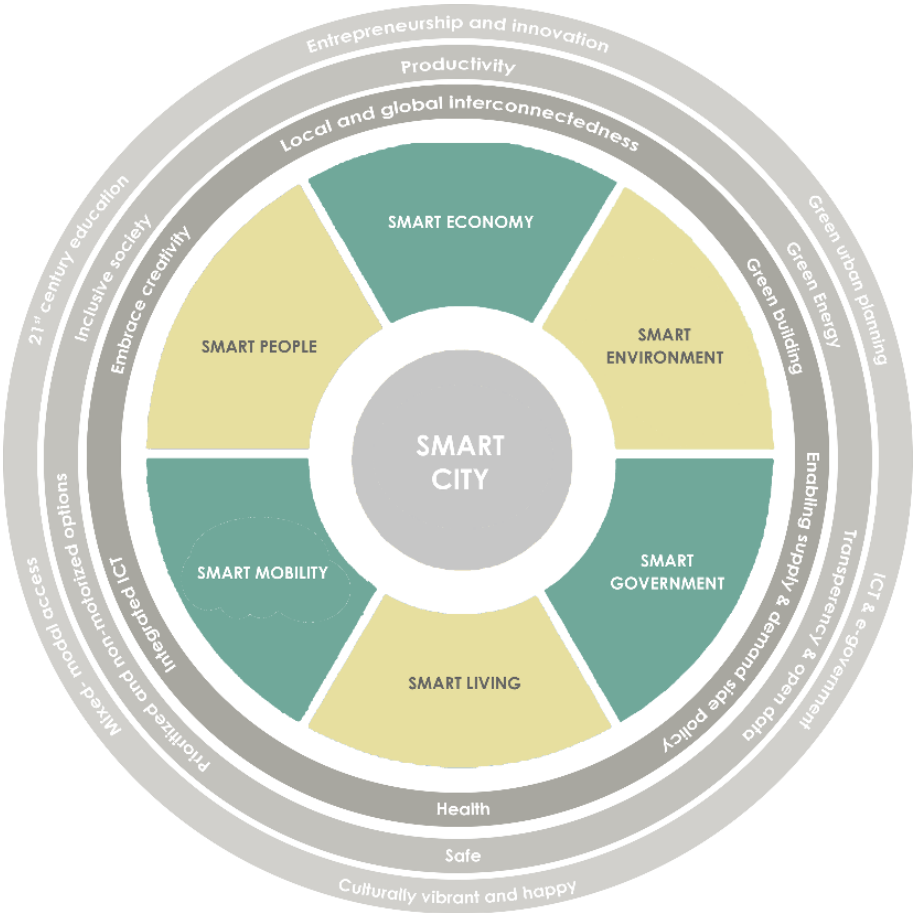

Figure 2. 15 Characteristics of a Smart City.

Source: Authors, 2021.

CHAPTER 3 CASE STUDY

This chapter deals with three case studies in detail and a brief of other cities that are successful in attaining a higher happiness index. The chapter covers the best practices they have used and also the related parameters in achieving a higher happiness index in each of the selected cities and methods used for measurement of happiness index.

3.1 Case Study 1: Bhutan

3.1.1 Introduction to the Study

Bhutan is a nation in south-central Asia that is situated on the eastern Himalayan ranges. Bhutan, a historically secluded country, began to lose its isolation in the second part of the 20th century, which caused the rate of development to quicken. A journey that traditionally required six days by mule could be completed in only a few hours by vehicle down a tortuous mountain route from the border town of Phuntsholing in the early 21st century thanks to advancements in transportation. The governmental setup also underwent a significant adjustment. Reforms started in the 1950s and 1960s by King Jigme Dorji Wangchuk (reigned 1952–72) resulted in a transition from absolute monarchy to multiparty parliamentary democracy in the 1990s and 2008.

Although it is unclear, Bhutan's northern and western borders with the Tibet Autonomous Region (a province of China) largely follow the Great Himalayan crest. The border between Bhutan and the Indian states of West Bengal and Assam is located in the Duars Plain to the south of the Himalayan range. Bhutan shares boundaries with Sikkim and Arunachal Pradesh, two Indian provinces.

3.1.2 Climate of Bhutan

Perhaps more than any other comparable sized region in the globe, Bhutan has a varied climate. With elevation comes a difference in climate that brings about pronounced meteorological contrasts. Additionally, different exposures to sunshine and moisture-laden winds provide intricate local variations. There are three main climatic areas that may be distinguished: the Great Himalayan alpine tundra region, the Lesser Himalayan milder region, and the hot, humid subtropical tract of the Duars Plain and its surrounding foothills.

Only the valleys of the middle mountains experience a moderate climate. For instance, in January, the west-central city of Thimphu typically experiences highs in the low 50s F (about 12 °C) and lows in the mid-30s F (about 2 °C); in July, however, Thimphu experiences somewhat warmer temperatures, with highs typically reaching the mid-60s F (about 19 °C) and lows typically falling to the mid-50s F (about 13 °C). The rest of the nation either endures extreme cold, as in the north, or intense heat, as in the Duars.

3.1.3 Plant and animal life

Bhutan's floral diversity and steady shift from tropical to temperate to entirely alpine species make it unique. The southern region, including the Duars Plain and nearby hills, is home to the wet zone of tropical deciduous vegetation. In the lower altitudes, tall, thick grasses that are utilised to make paper and pulp are a valuable plant resource. On hills between 3,000 and 6,000 feet (900 and 1,800 metres), pine and oak forests predominate.

A variety of species, including pine, oak, walnut, rhododendron, ash, poplar, willow, aspen, and magnolia, can be found in the woods at higher elevations. The most valuable woods are found between 1,800 and 2,700 metres (6,000 to 9,000 feet) above sea level; these majestic forests are home to juniper, cypress, fir, and spruce trees. At 14,000 feet (4,200 metres), the timberline, birch trees can be found. The Great Himalayas' upper slopes support an alpine flora of shrubs and grasses.

In Bhutan, people may find sambar deer, gaurs (a species of wild ox), rhinoceroses, elephants, tigers, and other creatures, especially along the Manas and Sankosh rivers in the central and eastern parts of the nation as well as in the hills covered in forests. The Royal Manas National Park (1966), which borders India on the banks of the Manas River and is home to the endangered golden langur (a slender long-tailed monkey), is one of several protected areas that the government of Bhutan has established in order to conserve this species and its natural environment. The vast Jigme Dorji National Park (1974), located in northwest Bhutan, is exceptional in that it encompasses each of the nation's three temperate zones.

3.1.4 Ethnic groups and languages

Bhutan's three main ethnic groups are Bhutia (also known as Ngalop), Nepalese, and Sharchop. The Bhutia comprise the majority of the population and are the largest ethnic group. They are descended from Tibetan immigrants who entered Bhutan from the south about the ninth

century. Bhutan's northern, middle, and western regions are dominated by the Bhutia. The majority of them, Dzongkha, is the official language of Bhutan; the written form is the same as Tibetan. They speak a number of Tibeto-Burman languages. The Bhutia are in charge of politics in Bhutan.

In the southern and western regions of Bhutan, there is an ethnically diverse population. The majority ethnic group in the area, the Gurung, makes up nearly one-third of the whole population of Bhutan. They are the newest immigrants to the country. Nepali is the most common language. The Bhutanese authorities banned further immigration from Nepal beginning in 1959 and forbade Nepalese settlement in central Bhutan due to the rising numbers of Nepalese.

Assimilation between the Tibetan and Nepalese tribes have been rather slow, and conflict between the two groups has continued to be a significant internal political issue for Bhutan. The majority of the population in eastern Bhutan shares ancestry with the hill tribes that inhabit the nearby states of Assam and Arunachal Pradesh. It is thought that these individuals, known as the Sharchop, were Bhutan's first settlers.

3.1.5 Religion

Buddhism, mostly of the Tibetan kind, is practised by almost three-fourths of the people of Bhutan. Formerly the official state religion, it is now referred to in the 2008 constitution as the nation's "spiritual heritage." Nyingma (Rnying-ma-pa) and Kagyu (Bka'-brgyud-pa), two of the four principal schools of Tibetan Buddhism, are practised in Bhutan. The Nyingma sect predates the other one by roughly 800 years and has roots in both Bhutan and Tibet. The Drukpa Kagyu subsect of the Tibetan Buddhist Kagyu lineage, which was established in the 11th century, is the most dominant in Bhutan. The Drukpa subsect, which was founded in the early 17th century, has grown in importance in Bhutan's political and religious life and today has the majority of the country's citizens as followers. Despite the Nyingma and Kagyu groups maintaining their distinct sectarian identities, there have historically been strong linkages between the two lineages, mostly due to shared philosophies and lines of succession.

Bhutanese Buddhism has a distinctive personality while being a part of the greater family of Tibetan Buddhist traditions. Despite the prevalence of monasteries, neither the monastic order nor monastic scholasticism rule Bhutanese culture. Instead, the image of lamas (spiritual

leaders), who through the practise of meditation practises have acquired siddha (perfection, supernatural abilities), but otherwise remain unnoticeable in daily life, best captures the essence of Bhutanese Buddhism.

Hinduism, in addition to Buddhism, has a sizable following in Bhutan, notably among the Nepalese population. Nearly one-fourth of the population are Hindus. There is a little Christian community as well, despite the fact that proselytising is forbidden in Bhutan.

3.1.6 Settlement patterns

Bhutan is a country with a relatively low population density and a population growth rate that is about in line with the global average in the early 21st century. The icy, mountainous Great Himalayan region and the malarial regions surrounding the Duars Plain are its least populous areas. Most of the population is restricted to these two areas due to the unfavourable physical conditions: the lush and heavily cultivated Lesser Himalayan valleys in central and western Bhutan, as well as the southwest of the nation, close to the Indian border.

The majority of people in Bhutan live in quite tiny, dispersed settlements. The nation had no urban areas until the late 1960s. However, some of the bigger villages have developed into towns as a result of the building of roads and economic growth; the government has designated a small number of these towns as "urban centres." Nearly two-fifths of the population lived in such urban areas as of the middle of the decade.

Domestic architecture in southern Bhutan mimics that of neighbouring India, whilst architecture in the Great Himalayan region and the Lesser Himalayan regions is particularly Tibetan. The dzong, or fortress-monastery, is a distinctive feature of Bhutanese communities, particularly in the Himalayan highlands. In the past, the dzong functioned as a fortress against adversaries, and it still serves an essential role as a combined administrative hub and monastery. A dzong may be found in almost every populous valley, generally on a prominent position overlooking a stream or river. Bhutan's political, economic, religious, and social life revolves around the dzongs. Buddhist lamas, government officials, and craftsmen are housed behind their thick white walls, which slope inward in Tibetan style.

Phuntsholing, in the Duars Plain, is the most important of the bigger urban centres or towns. It is the southern end of a main highway that runs from Thimphu and serves as an entrance to the densely inhabited Lesser Himalayan regions. In the town core, a thriving business sector has

emerged. Thimphu, Bhutan's capital, was a tiny cluster of dwellings in the 1960s, but it has since grown into a big metropolis. Its historic dzong has been renovated and expanded to accommodate the Bhutan government's secretariat. Paro is Bhutan's second-fastest-growing town after Thimphu. Scheduled air service has been created between Paro and the cities of Kolkata (Calcutta) and New Delhi, India; Dhaka, Bangladesh; Bangkok, Thailand; and Kathmandu, Nepal since the mid-1980s.

Figure 3. 1 Demography of Bhutan

Source: Karan, P. P., & Norbu, D. (1999, July 26). Bhutan

3.1.7 The Concept of Gross National Happiness

The Kingdom of Bhutan invented the idea of gross national happiness (GNH) in response to efforts to utilise Gross National Product as the primary aim and indicator for the government. The GNHI is used in Bhutan to calculate GNH. The Bhutanese Gross National Happiness Commission, comprised of the Prime Minister, Secretaries of all ministries, and other high-level officials, is charged with ensuring that all development programmes and plans are developed and implemented in accordance with GNH principles.

Figure 3. 2 The four pillars of Gross National Happiness, (GNH) in Bhutan.

Source: Gross National Happiness USA

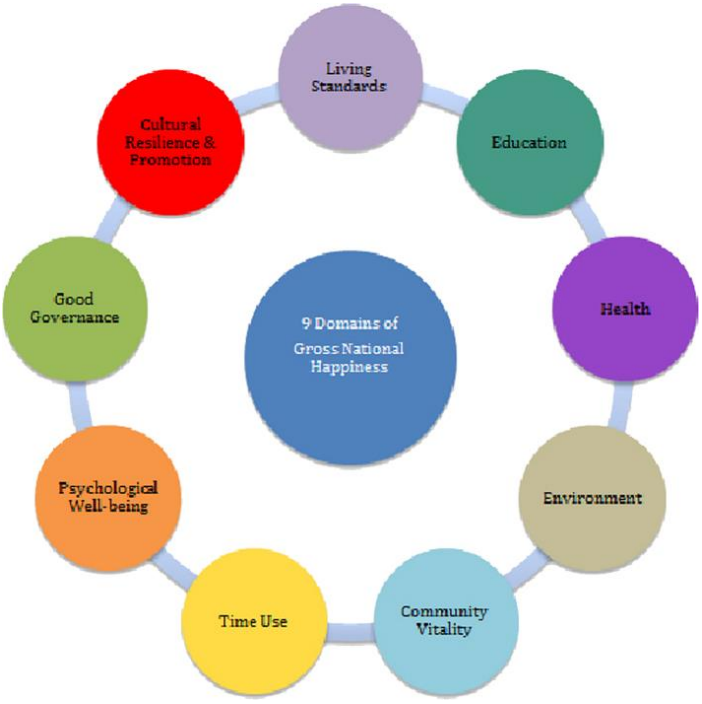

Figure 3. 3 Gross National Happiness

Source: Gross National Happiness USA

The four pillars of GNH are mentioned in the above diagram. To clarify the idea of GNH, these four pillars contain nine domains as its subgroups. These nine categories are pictorially represented. Additionally, there are 33 indicators throughout these nine categories. There are many variables in each of the 33 variables that make up the gross national happiness index. Each of these factors contributes to the citizens' increased wellbeing and consequently higher level of living.

According to the legal definition found in Article 9 of the Bhutanese Constitution from 2008, the State is mandated to "promote those conditions that will permit the achievement of Gross National Happiness" (Karma Ura et all, 2013). Bhutan's government holds the opinion that there is no justification for a government to exist if it cannot bring happiness to its citizens.

Weighting and Methodology

The weighting and methods of the GNH domains are explained in this section. All of the domains have an equal index weightage. In order to determine if a person is happy, the index used two different types of thresholds:

• Sufficiency threshold (ST)

• Happiness threshold (HT)

ST indicate the minimum amount required for a person to enjoy sufficiency in the thirty-three indicators. The HT aims to provide a response to the query, "What percentage of the thirty-three indicators must a human being attain in order to be understood as happy"?

Figure 3. 4 Gross National Happiness

Source: Gross National Happiness USA

Table 3. 1 Gross national happiness indicators

	Domain	**Indicators**
1	Psychological wellbeing	4
2	Health	4
3	Time use	2
4	Education	4
5	Cultural diversity and resilience	4
6	Good Governance	4
7	Community vitality	4
8	Ecological diversity and resilience	4
9	Living standards	3
	Total	**33**

Source: Gross National Happiness USA

Since none can be consistently evaluated as having a higher value than others, the GNH also assigns equal weightage to each of the domains that make up its indications. However, several of the thirty-three indicators carry smaller weights. The various weights are displayed in the table below.

Bhutan's happiness index was developed by taking into account a number of indicators from nine different areas that were organised around the political, economic, cultural, and environmental pillars.

Table 3. 2 Gross national happiness weightage

Domain	Indicators	Weight	Domain	Indicators	Weight
Psychological wellbeing	Life satisfaction	33%	Time use	Work	50%
	Positive emotions	17%		Sleep	50%
	Negative emotions	17%	Good governance	Political participation	40%
	Spirituality	33%		Services	40%
Health	Self reported health	10%		Government performance	10%
	Healthy days	30%		Fundamental rights	10%
	Disability	30%	Community vitality	Donation (time & money)	30%
	Mental health	30%		Safety	30%
Education	Literacy	30%		Community relationship	20%
	Schooling	30%		Family	20%
	Knowledge	20%	Ecological diversity & resilience	Wildlife damage	40%
	Value	20%		Urban issues	40%
Cultural diversity & resilience	Zorig chusum skills (Thirteen arts & crafts)	30%		Responsibility towards environment	10%
	Cultural participation	30%		Ecological issues	10%
	Speak native language	20%	Living standard	Per capita income	33%
	Driglam Namzha (Etiquette)	20%		Assets	33%
				Housing	33%

Source: Gross National Happiness USA

As mentioned, the sufficiency thresholds and the happiness threshold are the two types of thresholds or cutoffs that the GNH index utilises. Allowing for variance or irregularities in the measurement is one of the justifications for the second cut-off. In order to report the GNH, the population is divided into four subgroups along with their attained sufficiency percentage.

Table 3. 3 Happiness classification

	Definition of Groups; Sufficiency in
Happy	**66 Percentage – 100 Percentage**
Deeply Happy	77 Percentage – 100 Percentage
Extensively Happy	66 Percentage – 76 Percentage
Not Yet Happy	**0 Percentage – 65 Percentage**
Narrowly Happy	50 Percentage – 65 Percentage
Unhappy	0 Percentage – 49 Percentage

Source: Gross National Happiness USA

Advantages of GNH:

In 2007, a Bhutanese happiness expert suggested using the GNH Index in the following situations at a government conference called dasho karma ura.

1. Setting an alternative framework of development:

Bhutan's GNH has a distinctly all-encompassing approach to development. When all nine GNH areas are considered, the typical welfare indicator of GDP per capita does not adequately capture the quality of life and wellbeing of citizens.

2. Allocating resources in accordance with the need of people:

GNHI allows you to find out who is happy and at what levels. It serves all of these purposes, making it an effective instrument for resource allocation by policymakers.

3. Providing indicators for sectors to guide development:

By tracking activity in a certain domain, the GNHI assists makers of the policy in providing specific pointers that can help in direct development.

4. Usage of GNH screening tools:

GNHI helps to indicate whether or not a specific policy can be put into effect.

5. Measuring people's happiness and well-being:

In comparison to standard GDP, socioeconomic measurements of economic and human development, the index finds it difficult to assess human well-being of the subjects. GNH makes it easier to gauge people's contentment and health.

6. Measuring progress over time:

The GNHI must be responsive to changes that occur throughout time. In other words, it makes an effort to adapt to pertinent shifts in policy action.

7. Sustainable Development:

Sustainable development satisfies the requirements of the current generation without jeopardising capacity of later generations to do same. GNH works to encourage more sustainable development.

GNH is a process indicator as well as an outcome indicator. In other words, it aids administrators in discovering how processes and results are related. As a result, it aids in modifying, analysing, and putting policies into practise.

3.2 Case Study 2: Helsinki

3.2.1 Introduction to the Study

Helsinki, the southern capital of Finland, is located on a peninsula on the Gulf of Finland. Finland is a Nordic country in Northern Europe, formally known as the Republic of Finland. It has land borders with Sweden to the northwest, Norway to the north, and Russia to the east, as well as the Gulf of Bothnia to the west and the Gulf of Finland to the south, which runs through Estonia. Finland has a land area of 338,455 square kilometres and a population of 5.6 million people. Helsinki is Finland's capital and biggest city. The ethnic Finns constitute the large bulk of the population. The official languages are Finnish and Swedish. 5.2% of the population speaks Swedish as their first language. The climate of Finland ranges from humid continental in the south to boreal in the north.

Figure 3. 5 Key Map of Helsinki

Source: Google Images.

According to the World Happiness Report, Finland has been named the happiest country in the world for the fifth year in a row. People in 156 nations were asked in the study 2022 to "value their lives today on a 0 to 10 scale, with the worst possible life as a 0." It also considers aspects such as social support, life expectancy, charity, and the absence of corruption. The capital city of Helsinki is deemed to be the happiest and most liveable city in Finland.

3.2.2 Demographics of Finland

Table 3. 4 Demography of Finland

Criteria	Value
Population	55,69,431 (27.9. 2022 est)
Growth rate	0.24% (2022 est.)
Birth rate	8.9 births/1,000 population (2021)
Death rate	10.4 deaths/1,000 ppl (2021)
Life expectancy	81.76 years
Fertility rate	1.45 birth/woman (2021)
Infant mortality rate	2.13 death/1,000 live birth
Migration rate	2.35 migrants/1000 ppl (2022 est.)

Source: H, T. (2021, January 8). From Rurban to Urban. From Rurban to Urban.

Finland is known as "Land of a Thousand Lakes": With 1,88,000 waterways, it has some of the purest water in the world, as reported by the World Health Organisation (WHO). Finland is the safest country in the world: Finland also happens to be one of the few nations in the world that returns lost wallets and cell phones to their rightful holders. People feel secure wandering alone in urban green spaces or taking public transport at any hour. The finest place for a youngster to grow up: For numerous years, Finland has ranked number one in the Committee for Economic Cooperation and Development's (OECD) Programme for International Student Assessment (PISA), indicating that its education system is among the finest in the world.

3.2.3 Parameters of happiness in Finland

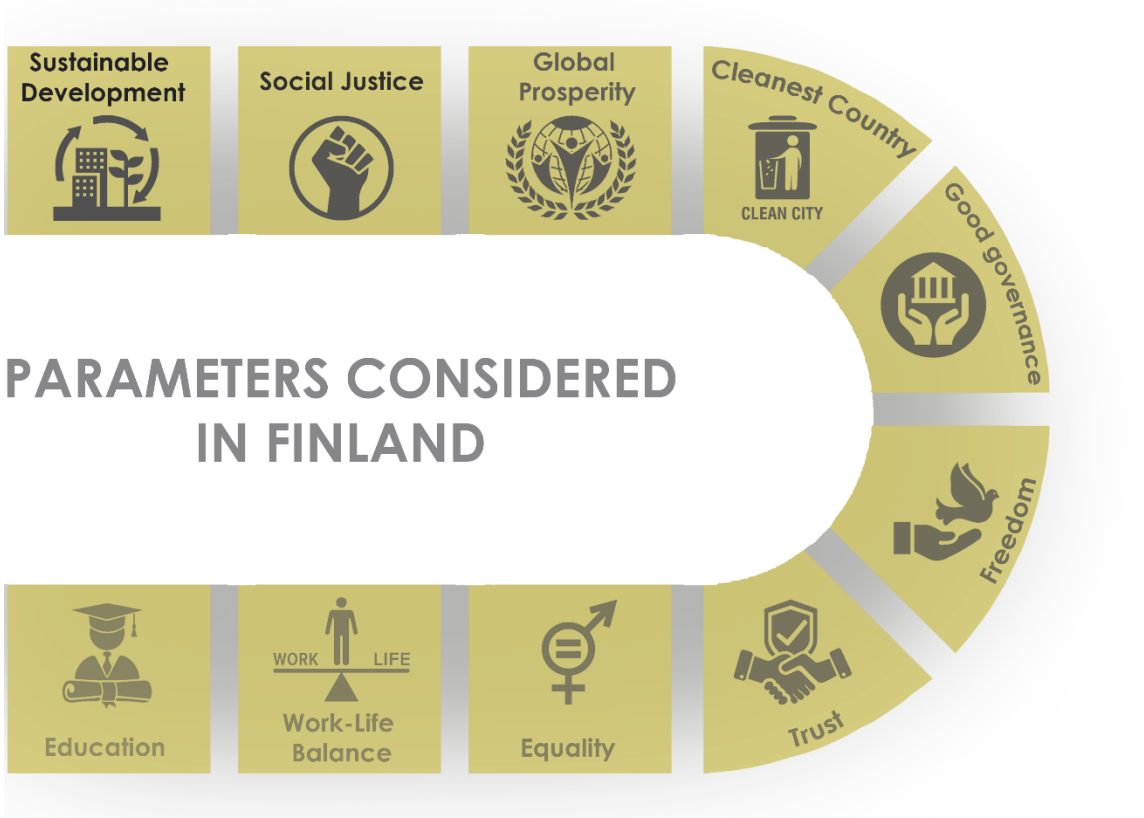

Figure 3. 6 Parameters considered in Finland

Source: Prime Minister's Office, Helsinki 2020. (2020). *Report on the implementation of the 2030 agenda for sustainable development - Finland.*

3.2.4 Finland's Contributions to Happy city

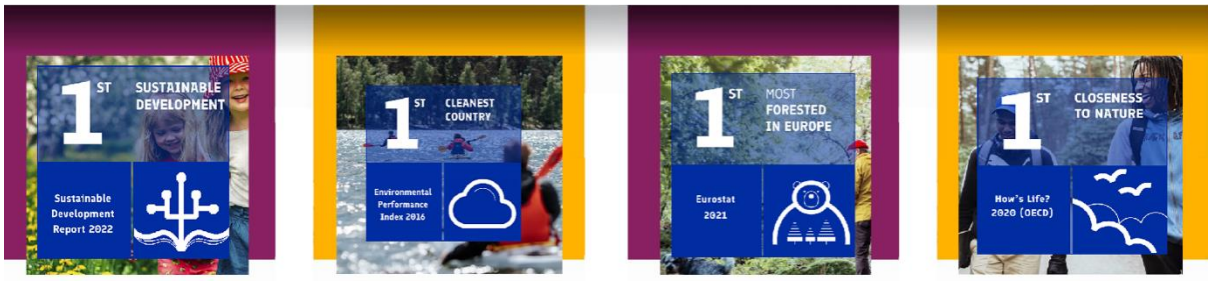

Figure 3. 7 Finland's contributions

Source: Prime Minister's Office, Helsinki 2020. (2020). Report on the implementation of the 2030 agenda for sustainable development - Finland.

Finland assures future happiness, but sustainable development must be prioritised. Clean, affordable energy, responsible consumerism, and climate action are all part of this. Clean water, clean air, and unspoilt nature all contribute significantly to pleasure and well-being. Helsinki, the capital of Finland, offers some of the purest tap water in the world. Finns adore the woods. The forest is essential to more than 80% of Finns. The words most associated with the woods are serenity, security, joy, and vitality. In Finland, nature is never far away. Even if you live in a metropolis, a park or woodland is never more than a 10-minute walk away.

3.2.5 National Transport System Plan: Towards an achievable, sustainable and efficient transport system

The National Transport System Plan for 2021-2032 was approved by the government. The National Transport System Plan attempts to provide a longer-term perspective to the development of Finland's transport system. The goal is for the transport system to ensure accessible to all areas of Finland while also meeting the demands of industry, commuting, and housing. People should be allowed to choose more sustainable forms of transportation, particularly in cities. Furthermore, the goal is to increase the transportation system's socioeconomic efficiency. A long-term development strategy for the overall transport system. The strategy is designed to last 12 years and is modified every four years. The strategy contains an action plan as well as a funding scheme from the federal government. The plan integrates initiatives implemented by both the federal and municipal governments. The Highways Act serves as the foundation for planning. Impact evaluations are an important aspect of the planning process. The initiative will make transit decision-making more knowledge-based.

3.2.6 Urban design of Finland

A possible legacy of the coronavirus pandemic is the acceleration of sustainability goals, most of which should have been addressed prior to the current social upheavals. One chapter in this tale focuses on the "15-minute city" or "neighbourhood" as the future urban development goal. This concept gained traction after Paris Mayor Anne Hidalgo included it in her re-election campaign in early 2020. Since then, policymakers and academics in an increasing number of nations, including Finland, have begun to investigate the concept's potential as a strategic green post-Covid-19 recovery programme. The 15-minute city is a simple and memorable idea for enhancing city life and constructing a more sustainable future.

3.3 Case Study 3: Chandigarh

3.3.1 Introduction to the Study

Chandigarh is an Indian planned city. Chandigarh is bounded to the north, west, and south by the state of Punjab, and to the east by the state of Haryana, for which it acts as the capital. It makes up the majority of the Chandigarh Capital Region, sometimes known as Greater Chandigarh. It lies 260 kilometres (162 miles) north of New Delhi and 229 kilometres (143 miles) southeast of Amritsar. Le Corbusier, the famed French architect, designed Chandigarh. It is regarded as one of India's outstanding twentieth-century attempts in urban planning and contemporary architecture.

3.3.2 Geology

The Union Territory of Chandigarh is located on the northern foothills of the Shivalik hill ranges, which are part of the vulnerable Himalayan ecosystem. It is dominated by alluvial plains. Beds of boulders, pebbles, gravel, sand, silt, clays, and some kankar make up the subsurface structure.

3.3.3 Climate

Chandigarh experiences a chilly, dry winter, a scorching summer, and a subtropical monsoon. Generally, evaporation surpasses precipitation, and the weather is dry.

The region has four seasons: Summer (mid-March to mid-June); Rainy season (late-June to mid-September); Post monsoon season (mid-September to mid-November); Winter (mid-November to mid-March).

3.3.4 The Master Plan of Chandigarh

Le Corbusier envisioned Chandigarh's master plan as a human body, with a clearly defined head (the Capitol Complex, Sector 1), heart (the City Centre Sector-17), lungs (the leisure valley, innumerable open spaces and sector greens), intellect (the cultural and educational institutions), circulatory system (the 7Vs network of roads), and viscera (the Industrial Area).

3.3.5 The concept of the city

It is built on four primary functions: living, working, body and soul care, and circulation. The residential sectors make up the living part, while the Capitol Complex, City Centre, Educational Zone, and Industrial Area make up the working component. The Leisure Valley, Gardens, Sector Greens, and Open Courtyards, for example, are designed to care for both the body and the spirit. The circulation system is made up of seven distinct types of roadways known as 7Vs. This circulation system was later expanded to include a V8 track for cycling.

The Capital complex consists of three architectural wonders separated by vast piazzas: the "Secretariat," the "High Court," and the "Legislative Assembly." The massive metallic sculpture of The Open Hand, the official emblem of Chandigarh, stands in the middle of the Capital Complex, representing the city's ethos of "open to give, open to receive."

Figure 3. 8 Grid iron plan of Chandigarh city.

Source: Google images.

Figure 3. 9 The four major functions based on CIAM theories

Source: Google images.

3.3.6 Chandigarh is the Happiest city of India

In a countrywide study done by LG Electronics and IMRB, this lovely city was rated the happiest in India. The poll, which was done in numerous places throughout India, was based on a variety of variables. The survey's target age group was 18 to 45 years old, and it included both men and women. According to their happiness index score, the top five cheerful cities in India are Chandigarh, Lucknow, Delhi, Chennai, and Bangalore.

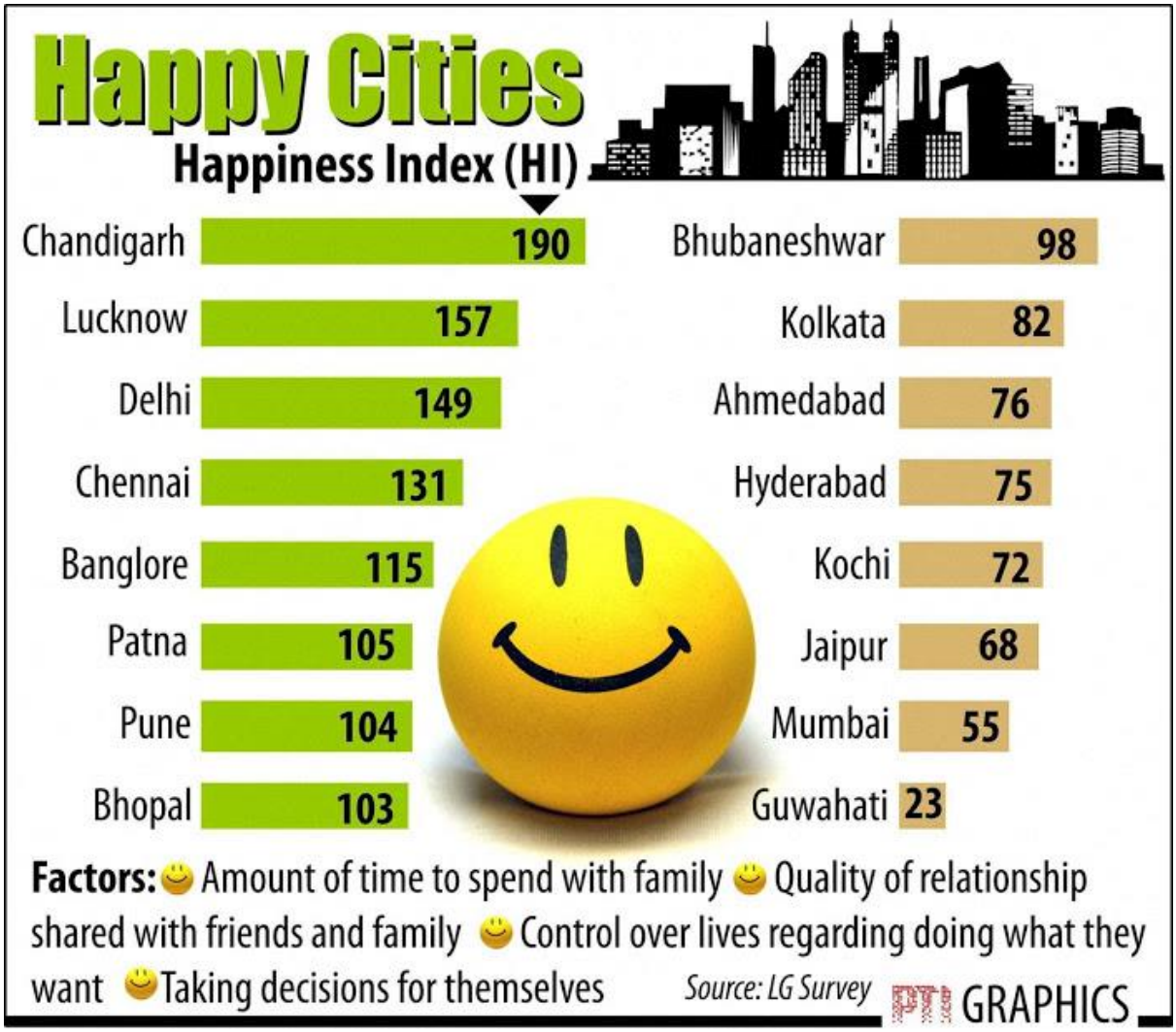

Figure 3. 10 Ranking along with Some factors which were taken into consideration to calculate the happiness index of a city

Source: Deep, A., & Deep, A. (2019, December 5). Cheers! Chandigarh is the Happiest city of India. Chandigarh Metro.

Chandigarh the Happiest City in India to Buy a Home:

According to a new survey, India boasts five of the top twenty happiest places in the world to purchase a property. After sifting through hundreds of geo-tagged postings and assessing the happiness levels in the photographs, UK-based mortgage firm, came up with the list of the happiest areas to purchase a property. Chandigarh was the happiest city in India to purchase a property, ranking sixth on the global list.

How happiness was measured:

In August 2021, hundreds of geo-tagged posts from around the world were collected for the research. The happiness ratings were determined by studying the faces in these posts. The researchers examined images with the Microsoft Azure facial recognition technology. The technology examined each shot and assigned a score based on the predominance of each emotion expressed in the face. Cities were only included for the list if they have at least 100 AI-detectable photographs geotagged there.

In comparison to other cities, Chandigarh has superior water and energy availability. Mobility and associated transportation services are one of the most important factors that help a city grow into a happy city. In Chandigarh city the roads are in good condition. Chandigarh is also India's cleanest city, which helps improve the quality of life and standard of living of its citizens. The settlement has a prehistoric origin. The gradually undulating plains on which contemporary Chandigarh stands was once a large lake surrounded by marsh. The fossil remains discovered at the site suggest that the habitat supported a diverse range of hydrological and amphibian species. The Harappans were known to have lived in the area around 8000 years ago. Chandigarh has ancient beginnings; it was formerly known as the Harappan civilisation's home. Chandigarh is regarded as India's first planned city after independence. The legendary French architect Le Corbusier designed Chandigarh, the dream city of the nation's first Prime Minister, Sh. Jawahar Lal Nehru. It is considered as one of India's greatest attempts in urban planning and contemporary architecture in the twentieth century, and is picturesquely set at the foothills of the Shivaliks.

Chandigarh gets its name from the "Chandi Mandir" temple, which is close to the city's chosen location. The city got its name from the Goddess 'Chandi,' the goddess of might, and a fort of 'garh' that stood outside the temple. The 'Open Hand' symbol of peace and reconciliation is the city's official insignia. It ranks first among Indian states and territorial unions in terms of per capita income. Chandigarh was named the most clean city in India in 2010. LG Electronics named Chandigarh the most happy city in the nation in 2015. Chandigarh was India's first smoke-free city.

3.3.7 Planning of the Chandigarh city

The initial layout was organised into 30 sectors, with the Capitol Complex and Civic Centre serving as focal points. Sector 17 was intended to be the Central Business District, with a greenbelt running across the middle from north east to south west. Wide streets organised in a methodical order lend structure to a well-planned city. Its amenity value is enhanced by landscaped green avenues.

Figure 3. 11 Planning of the Chandigarh city

Source: Google images.

3.3.8 Chandigarh Master Plan 2031

The Chandigarh Master Plan 2031 was created to establish restrictions for development and construction activities throughout the Union Territory of Chandigarh. The planned area is 144 square km. It consists of 60 sectors in the sectoral grid as well as peripheral territories outside of it. Chandigarh is India's most attractive city, with a higher level of living. In comparison to other cities, Chandigarh has superior water and energy availability.

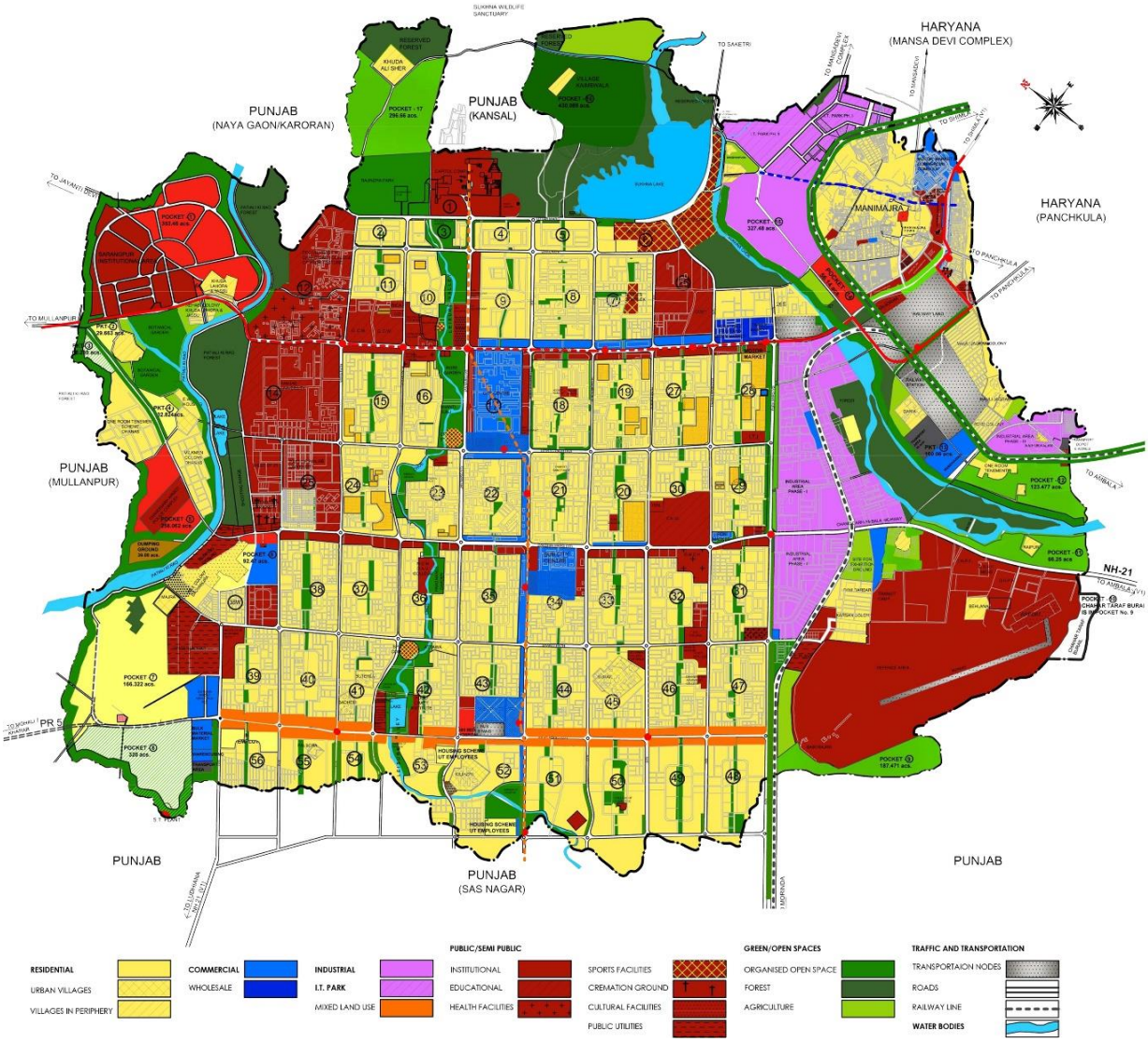

Figure 3. 12 Chandigarh Master plan 2031

Source: Department of urban planning Chandigarh.

Factors considered in Master Plan to improve the Happiness Index:

Climate-friendly policies. Pedestrian-friendly measures, such as bike paths and walking routes. Redevelopment of the city. Improving Public Transportation. Improving the aesthetics. Preventing high-rise building from obstructing views. Mixed-use development. Development of small, medium, and large industries. The city is being landscaped and greened. Increasing forest cover and connecting existing woods. Regional concerns with solid waste management and water supply. Inclusionary design includes night shelters, street selling zones, and the incorporation of low-cost homes for the poor. Low-energy, regionally adaptable materials, labour, and technology are the various factors considered in the master plan of Chandigarh to improve the happiness index.

3.3.9 Sector wise analysis of the planning of Chandigarh

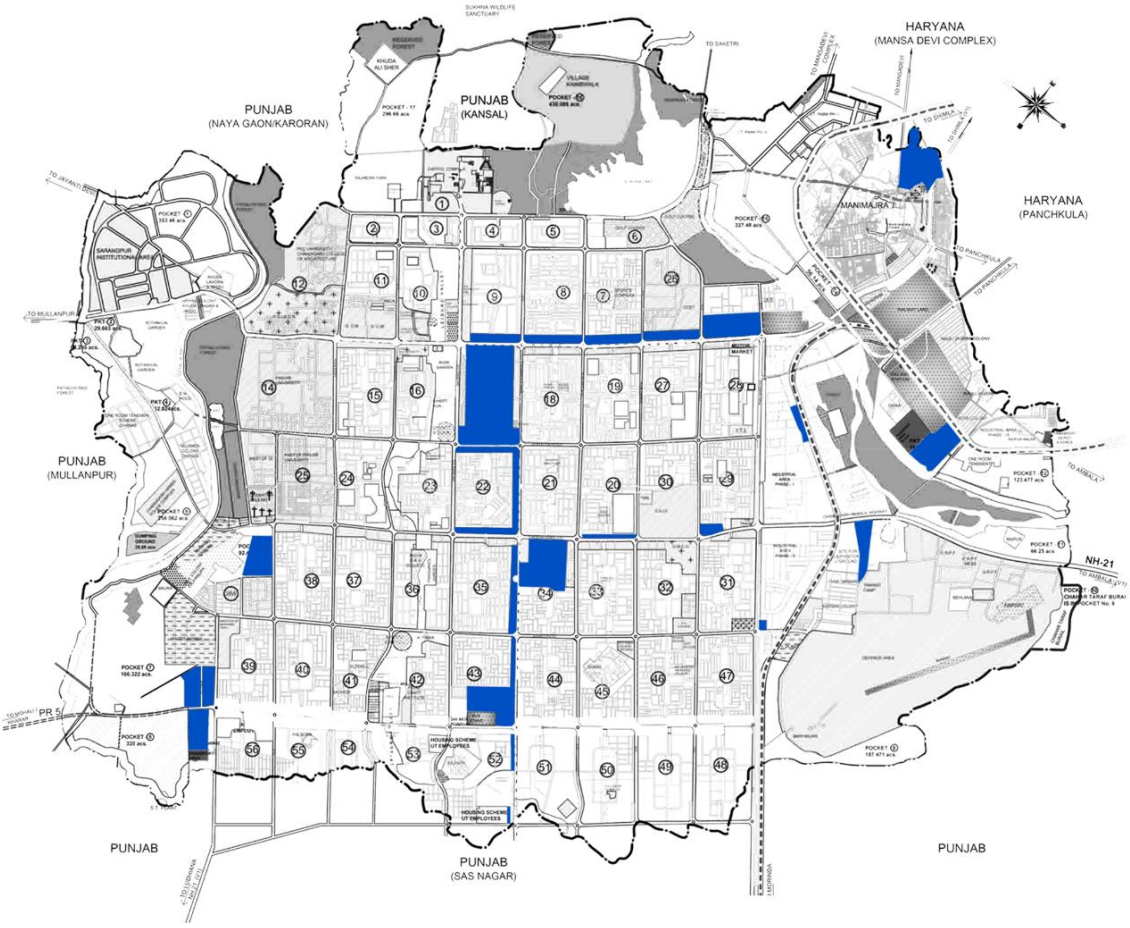

Figure 3. 13 Commercial zones

Source: Author generated with respect to department of urban planning Chandigarh.

Each Sector is designed to be self-contained, with retail and other services within walking distance.

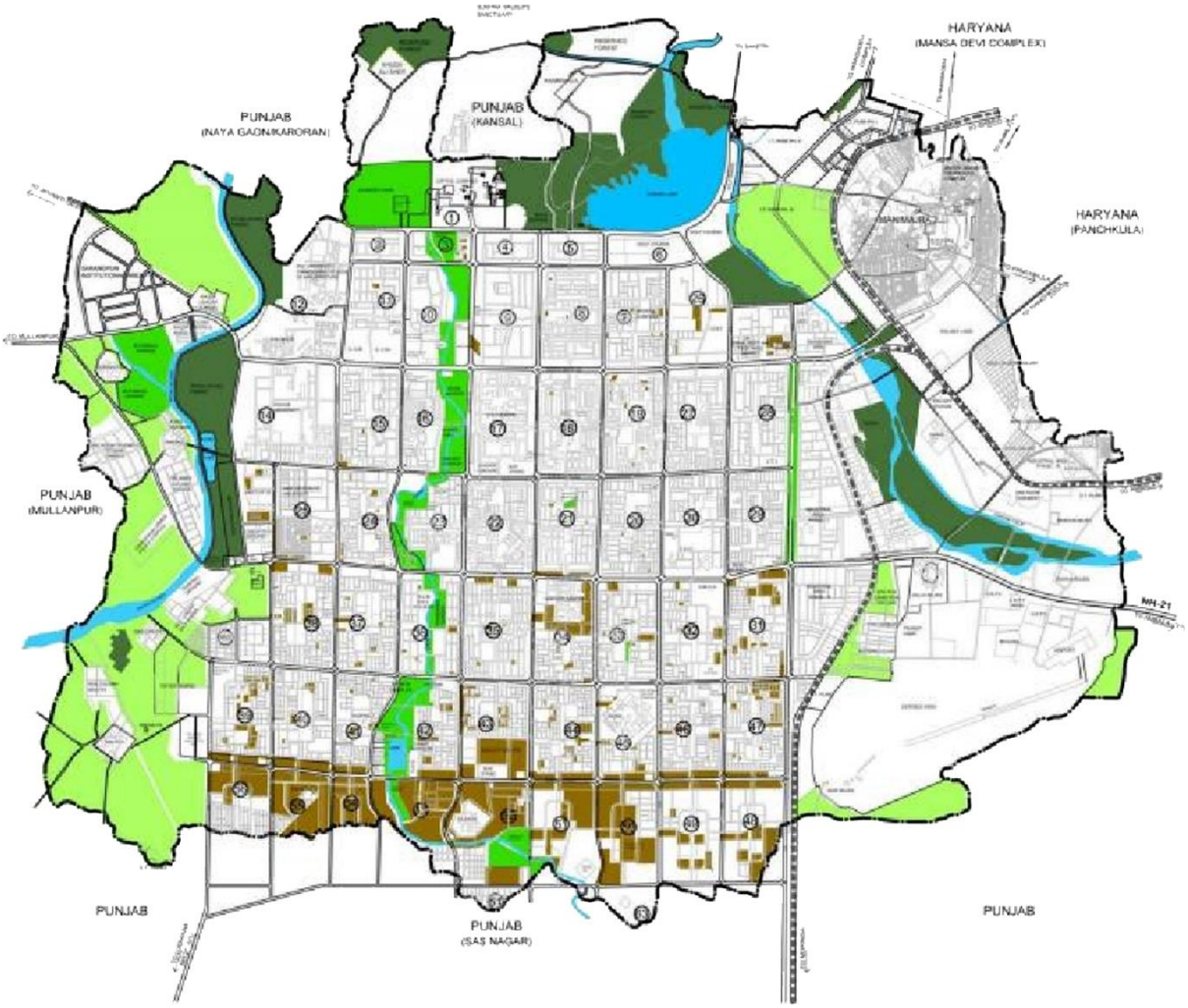

Figure 3. 14 Vacant pockets and agricultural area

Source: Author generated with respect to department of urban planning Chandigarh.

The master design for parks includes plenty of space. Around 2000 acres of the 20,000 acres purchased for the first phase are designated for park development. Tree planting and landscaping have always been an important aspect of the city's Master Plan. To alleviate the difficult environment of the region, including the hot and scorching summers, 26 distinct varieties of blooming and 22 species of evergreen trees (Sing et al., 1998) have been planted along highways, in parking lots, shopping complexes, residential areas, and municipal parks.

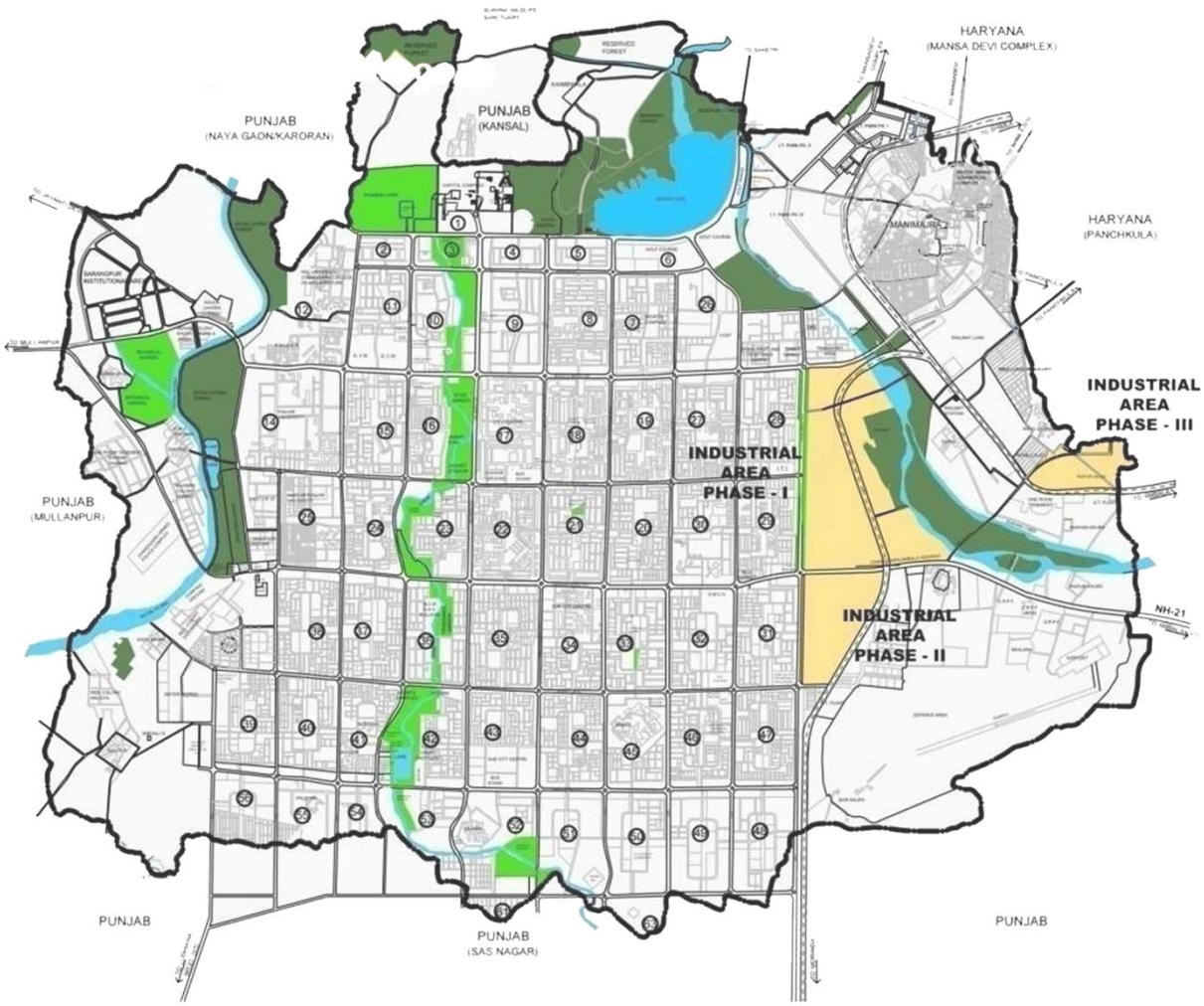

Figure 3. 15 Industrial Zone

Source: Author generated with respect to department of urban planning Chandigarh.

Though educational, cultural, and medical facilities may be found throughout the city, important institutions are concentrated in Sectors 10, 11, 12, 14, and 26. The industrial region is 2.35 square kilometres in size and was designated in the Master Plan for non-polluting, light industry on the city's extreme south-eastern outskirts along the railway line, as far away from the Educational Sectors and Capitol Complex as feasible.

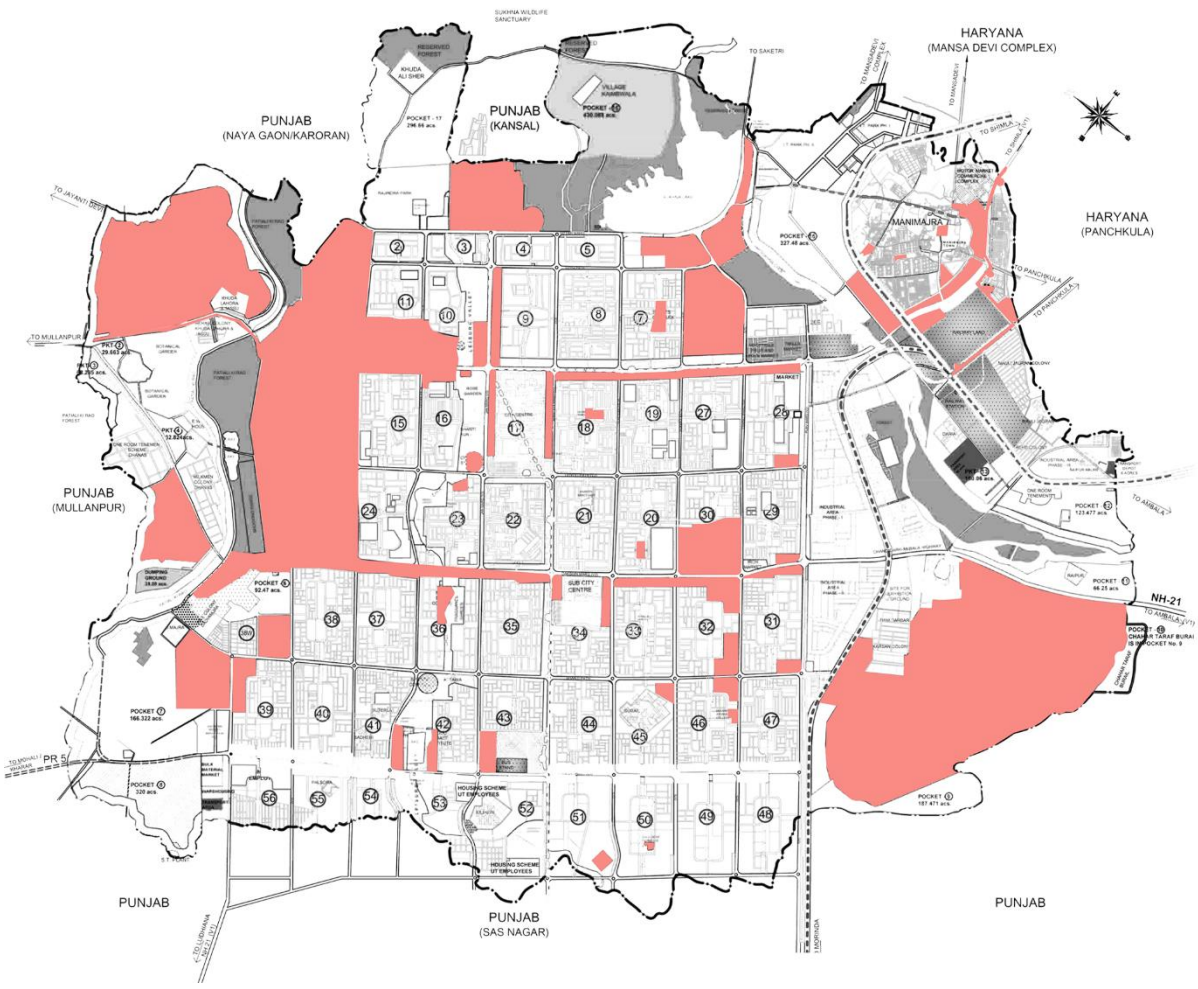

Figure 3. 16 Public and semi-public zones

Source: Author generated with respect to department of urban planning Chandigarh.

Each Sector is designed to be self-contained, with retail and other services within walking distance. Though educational, cultural, and medical facilities may be found throughout the city, important institutions are concentrated in Sectors 10, 11, 12, 14, and 26.

Figure 3. 17 Road Network

Source: Author generated with respect to department of urban planning Chandigarh.

The roads are in good condition. People in Chandigarh have excellent access to the city. The roadways, which are categorised according to their duties, are one of the layout's distinguishing features. To guarantee effective traffic circulation (7'Vs), an integrated system of seven roadways was built. The city's vertical roadways (the 'Paths') run northeast/southwest. The horizontal roadways ('The Margs') travel northwest/southwest. They cross at right angles, producing a grid or movement network. The residential zones are isolated from road noise and pollution. No structures open onto the V-2 or V-3 roadways that ring each Sector. Access from the surrounding roads is only possible at four regulated places, about in the centre of each side. A sector is often split into four halves by a V-4 road running east to west and a V-5 road running north to south.

To satisfy the expected commuter travel demands, RITES has suggested an integrated multi-modal mass transportation system comprising of metro rail, BRT, commuter rail system, and regular city bus system for the Chandigarh Urban Complex and its links to adjacent cities.

Within Chandigarh Urban Complex

• Mass Transport System

• Metro System - 64.3 kms

• Bus Rapid Transport (BRT) System - 144.2 kms

• City Bus System

• Bus Fleet Augmentation

• Bus Terminals

• Bus Shelters

• Additional Depots

• Inter-city Bus Terminal

• Road Infrastructure

• Parking Facilities

• Inter-modal Interchanges

• Integrated Freight Complexes

Outside Chandigarh Urban Complex

• Road Infrastructure

• Bypasses

• Road Widening

• Commuter Rail System

• BRT System

CHAPTER 4 INTRODUTION TO STUDY AREA

This chapter discusses the case of Kochi. The city scores the highest compared with any other city in Kerala in Ease of Living Index. It's one of the fastest-growing and developing cities with a high urbanization rate.

The main port city on India's southwest coast is Kochi, often known as Cochin. The most densely populated city in Kerala is Kochi, which is a part of the Ernakulam district. The Corporation of Kochi is Kerala's largest municipal corporation in terms of both area and population. A harbour, railway junction, airport terminal, naval station, and a variety of enterprises are located in the Corporation's command area.

The Cochin Corporation was finally formed by the merger of three municipalities in the Cochin region, formerly known as Fort Kochi, Mattancherry, and Ernakulam. Ernakulam is home to the Corporation's main office.

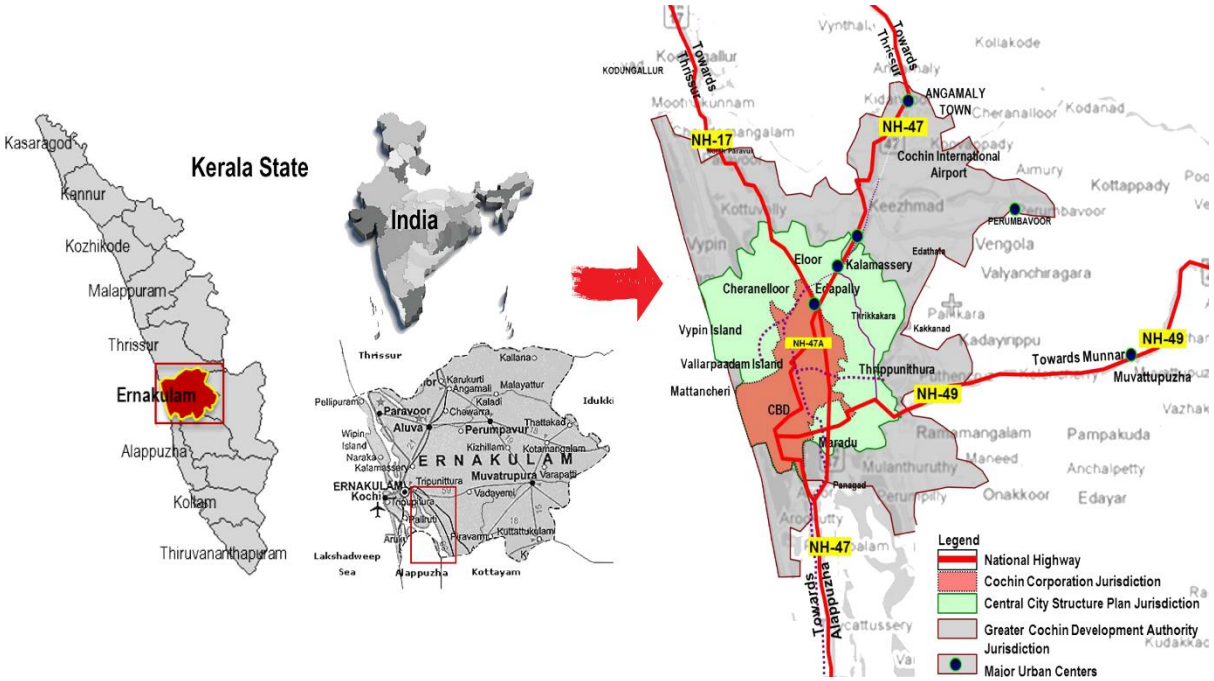

Figure 4. 1 Location of the proposed study area.

Source: Infopark smart space,Kochi 2019.

Figure 4. 2 Location of the proposed study area.

Source: Author generated with respect to census, 2011.

4.1 Connectivity

There are direct flights between all major cities in the United States and abroad from the city's domestic and international airports. Ernakulam Junction, Ernakulam Town, Aluva, and Tripunithura are the four principal rail hubs. connects important cities including New Delhi, Bangalore, Goa, Goa, Amritsar, Mumbai, and Trivandrum. The NH 66, NH 544, NH 966A, and NH 966B all stop at Kochi, which is a significant node on the North-South Corridor.One of the largest ports in South West India, Kochi provides passenger transportation, cargo handling, and bunkering. The city's fast transport system is called Kochi Metro. It has 23 Stations along its 25 km elevated length from Aluva to Petta to SN Junction. The Project is still being expanded, and a different phase of execution is being considered. In India, Kochi is the only Tier-II city with great access to all modes of transport, including the Metro Rail (Phase-I: Aluva to Petta; Phase - IA: Petta to SN Junction). JLN Stadium to Infopark (Phase-II) (Detail Project Report submitted to Central Government). Aluva to Angamaly is the planned Phase-III.

Figure 4. 3 Map showing connectivity of study area.

Source: Infopark smart space, Kochi 2019.

4.2 Growth Zone and City Expansion Trends

The city's physical growth is concentrated along the major thoroughfares (NH-66 and NH-544, state highways, and minor district roads heading towards Kochi City's northern and eastern quadrants). Kochi is one of India's 'Tier II' cities with one of the highest rates of population growth and significant infrastructural growth. One of Kerala's major industrial and commercial hubs has arisen as the city. India's Kochi is a popular tourist destination recognised for its history, culture, and outdoor pursuits. After Trivandrum, Kochi Infopark and Smart City in Kakkanad have helped to make the city an IT centre in Kerala. Due to the expansion of the IT & ITES (Includes SEZs), urban growth in Kochi may be seen to be moving eastward.

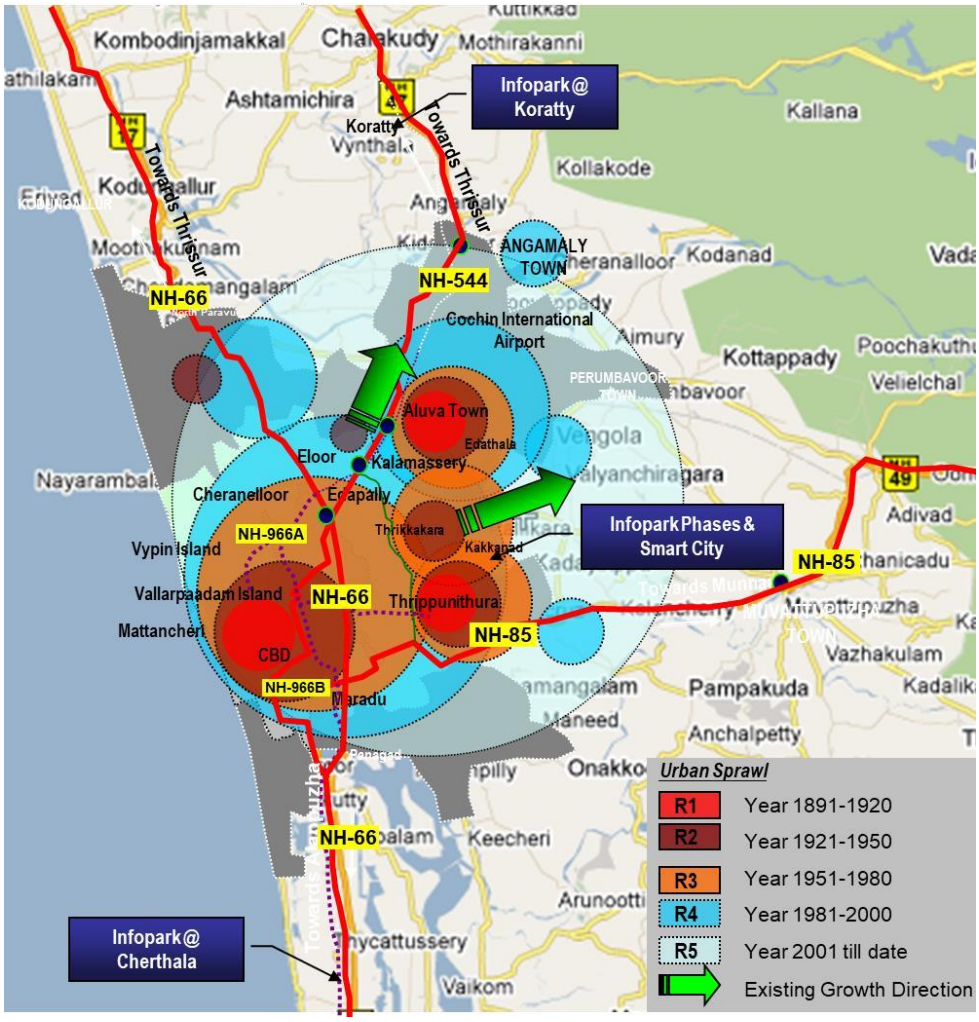

Figure 4. 4 Growth Zone and City Expansion Trends

Source: Infopark smart space, Kochi 2019.

4.3 Demographic and Socio-Economic Profile

According to the 2011 Census, there were 2.12 million people living in the Kochi Metropolitan Region, with a 56.2% decadal growth rate (2001-2011). The city's expansion in IT&ITES and the addition of urban centres to the existing jurisdiction are the key causes of this. SEC A, B, and C households make up almost 76.28% of all households, which is comparable to well-known southern Tier-I Metro Cities.

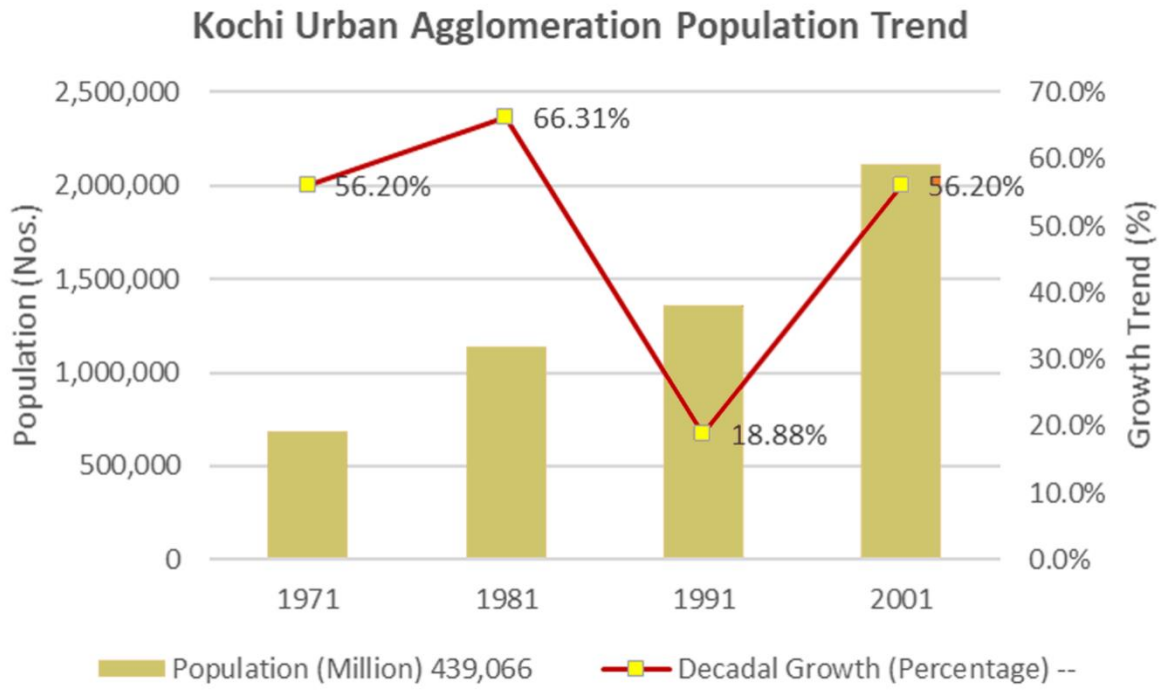

Figure 4. 5 Demographic profile

Source: Infopark smart space, Kochi 2019.

4.4 Kochi smart city

Through Area Based Development (ABD) initiatives, the Smart Cities Mission (SCM) seeks to revitalise the current urban ecology. To "promote cities that provide core infrastructure and give its citizens a respectable quality of life, a clean and sustainable environment, and application of 'Smart' Solutions," is the stated goal of the SCM. The MoHUA introduced the Smart City Mission, a significant infrastructure improvement plan, in 2015.In the initial stage of the Mission, Kochi City was chosen. The city wants to make wards 1, 2, 3, 4 and 5's 1,729.74 acres (6.5% of the city area) into a welcoming, exciting city of opportunity with effective urban services, sustainable growth, and ease of life.

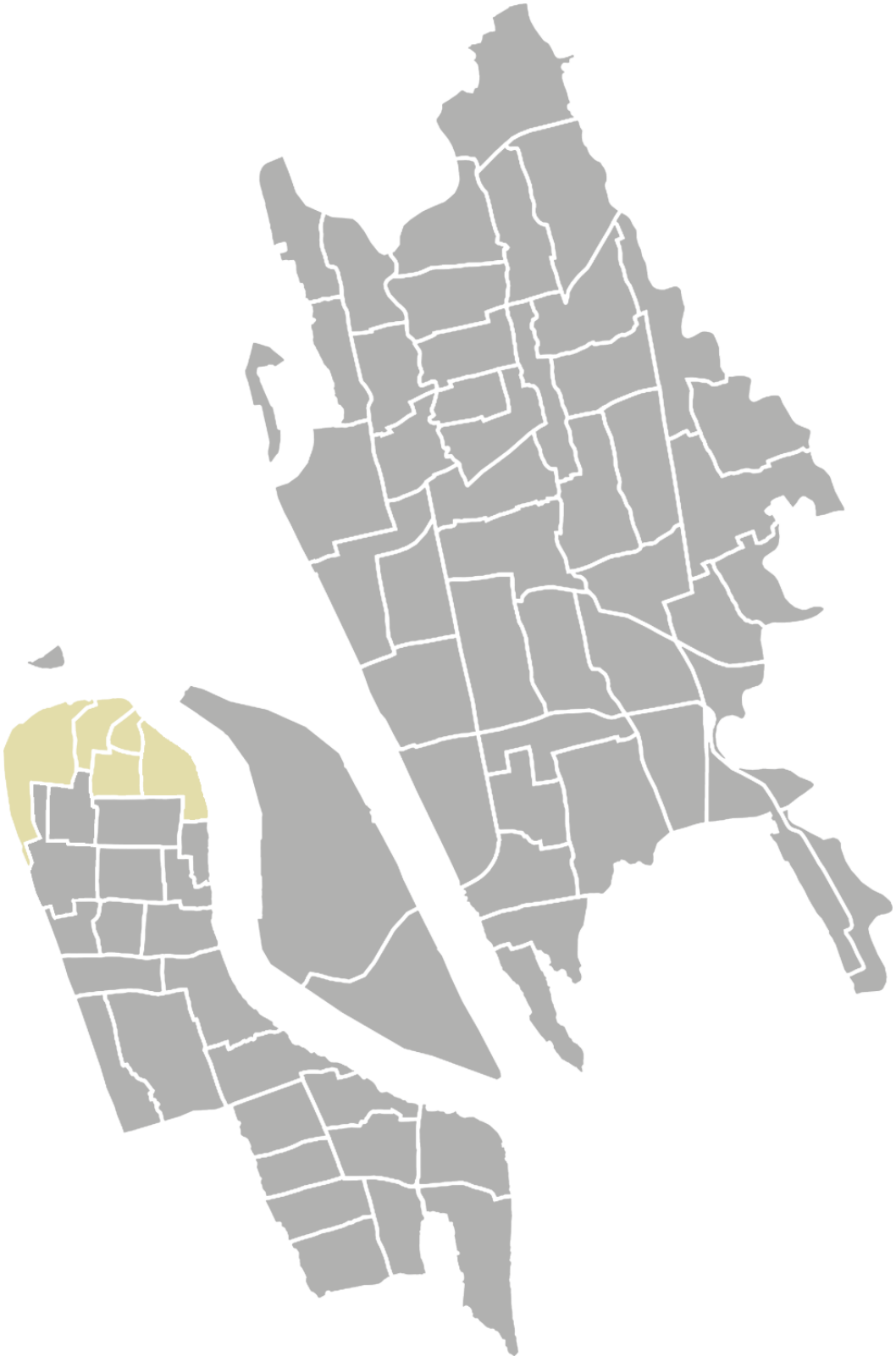

Figure 4. 6 Delineation of study area.

Source: Author generated with respect to CSML.

Figure 4. 7 Delineation of study area.

Source: Author generated

Figure 4. 8 Connectivity of study area.

Source: Author generated

CHAPTER 5 STUDY AREA ANALYSIS

This chapter consist of the detailed study of the Kochi smart city ABD area selected for development, in terms of its natural features, urbanisation rate, regional connectivity, social and physical infrastructure, cultural heritage, housing condition and its coastal zones.

5.1 Kochi city profile

Figure 5. 1 Key map of proposed study area

Source: Author generated with respect to QGIS.

5.2 Natural Features

Kochi is a coastal town with a backwater system that is surrounded on the east by laterite-capped low hills from which a number of streams originate and flow into the backwater system. The area is rich in plains, rivers, sea coast, islands, and other natural characteristics. Kochi has a coastline that spans for around 48 km. The stretch of backwaters and low-lying wet plains is Kochi's distinguishing physical feature. The area is crossed by a number of main and subsidiary canals, some of which are utilised for transportation while others are prone to environmental deterioration owing to garbage dumping in environmentally sensitive parts of the Kochi metropolitan zone.

5.3 Topography and Physical Features

The region is separated into three distinct sections: the highland, the midland, and the lowland, which are comprised of hills and forests, plains, and the seashore, respectively. The low land region accounts for 20% of the overall area.

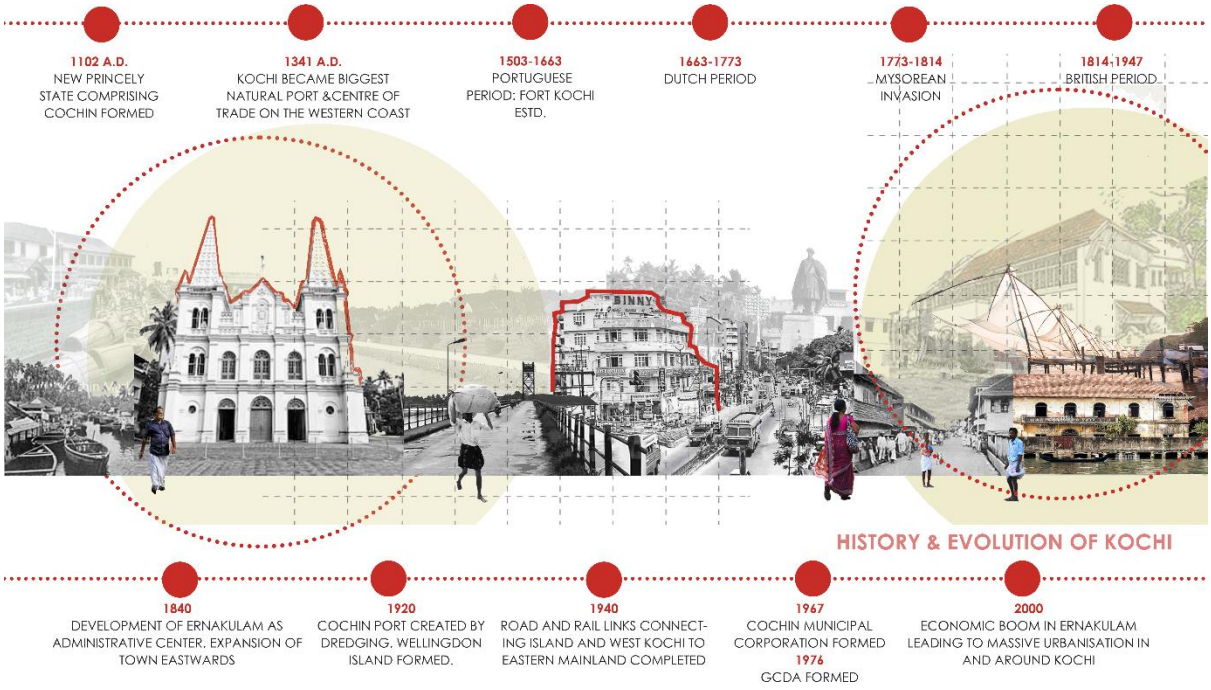

Figure 5. 2 History & Evolution of Kochi

Source: Author generated with respect to QGIS.

Cochin's history begins in 1102 A.D., when the Kulasekhara Empire was broken up and the Cochin state was created. Later, in the 15th century, Portuguese explorer Pedro lvares Cabral founded Cochin, India's first European town. The Portuguese governed Cochin until 1663, when they were deposed by the Dutch. Mysore King Hyder Ali took Cochin in 1773, only to surrender it to the British in 1814. Under the command of Lord Willingdon, the Governor of Madras, harbour engineer Robert Bristow converted Cochin into one of the safest harbours in the Indian peninsula in 1920. When India attained independence in 1947, Cochin was the first princely state to willingly join the Indian Union. Kerala was established in 1956, and Cochin Corporation was established in 1967. Cochin saw enormous commercialization throughout the years and is now one of Kerala's most major commercial centres.

5.4 Urbanization in Kochi

Trends in urban growth point to urban development to the north and north-east. The IT sector and the special economic zone are the primary drivers of urban expansion in the east (Kalamassery area). The emergence of satellite towns such as Aluva and Ankamaly is the primary cause of urban expansion to the north.The majority of the construction is on the west side. Kochi University has the most constituent units (25). The proportion of urban to total population in Ernakulum district is higher than in any other district in Kerala, the state as a whole, or India. The Ernakulum district is densely populated, with Kochi UA serving as a magnet for economic investment in a variety of areas.

5.5 Factors Influencing the Urban Growth

Over the next five years, the Port of Cochin, one of India's twelve main ports, has ambitious plans for infrastructural expansion. The Vallarpadam container terminal, future oil exploration projects, cruise terminals, and other infrastructure will serve as a catalyst for future economic growth. Apart from Mumbai and Delhi, Cochin International Airport is the only airport in the country that can accommodate big commercial aircraft. Three national roads go through or near the city (NH-47, NH-17, and NH-49).

Figure 5. 3 Street view, Kochi

Source: Primary survey,2023

5.6 Road and Water Transportation

Kochi, Kerala's largest agglomeration, is the nerve hub of all commercial operations in the state. Kochi, one of the country's major ports, is well-connected to the rest of the country by all forms of transportation, including road, train, air, and sea. NH 17. Kochi is served by NH 47 and NH 49.

Kochi's roadways are mainly classed as follows: Arterial highways serve as the primary network for through traffic flow, allowing for major intra-urban commuting while also connecting outlying residential neighbourhoods and suburban communities. Sub arterial roads provide the same duties as arterial routes but have a lesser degree of movement. Collector streets transport traffic from minor streets to main roads. Local roadways that provide access to adjoining property and often have a low carrying capacity.

Introduction of Electric Mobility: Kochi Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT)

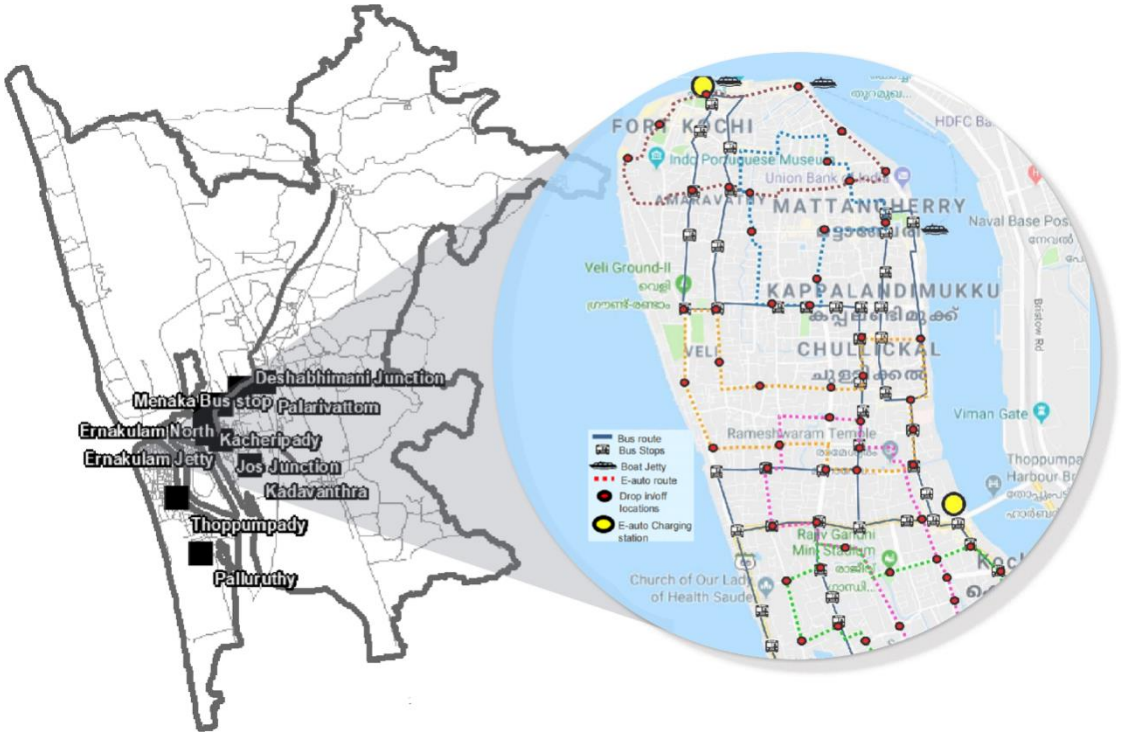

Figure 5. 4 Route of Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT), in proposed study area.

Source: Kochi smart city mission,2023

Criteria for selection of locations for E-Auto charging point

The first step of screening: Important bus stops with high boarding and getting down. The top ten bus stations in the KMC region with the highest passenger traffic were chosen. Additional bus stops within a 2-kilometer buffer zone from metro stations were excluded to minimise duplication with existing E Auto operations. After filtering, the following locations emerged: Fort Kochi, Thoppumpady, High Court, Palarivattom, and Kadavanthra.

Figure 5. 5 E Auto charging point

Source: Primary survey,2023

5.7 Existing Ferry System in Kochi

The water transport in Kochi is managed by the State Water Transport Department (SWTD). SWTD conducts services from the ten jetties / ferry ports listed below. Ernakulam, Fort Kochi, Mattancherry, Embarkation (Willingdon Island), Vypeen, Mulavukadu, Vytilla & Eroor, Kakkanad.

5.8 Detailed Study of Proposed Area for Development

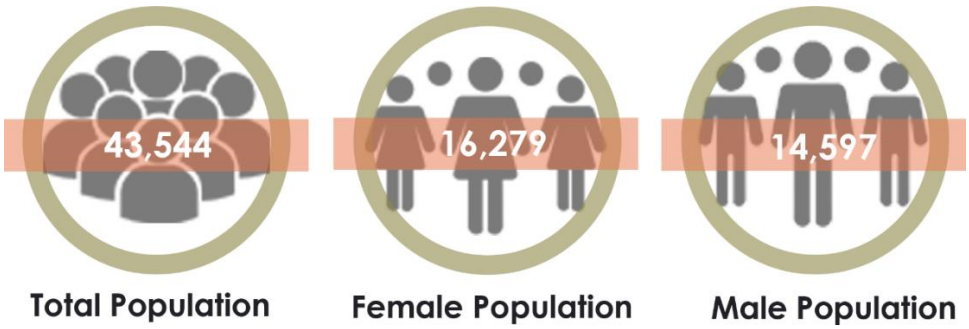

Figure 5. 6 Demography of Kochi

Source: Primary survey,2023

5.9 Weather & Climate in Kochi

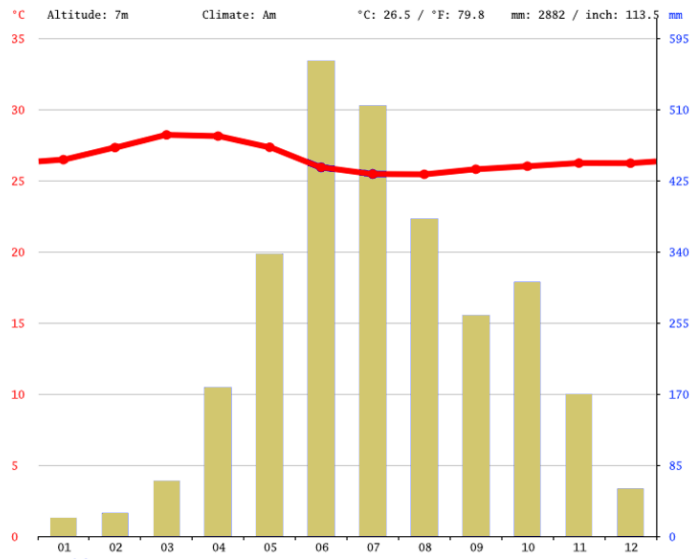

Figure 5. 7 Average precipitation

Source: Kochi climate: Average Temperature, weather by month, Kochi water temperature - Climate-Data.org.

January is the driest month. In January, there is 22 mm of rain. June has the most precipitation, with an average of 568 mm.

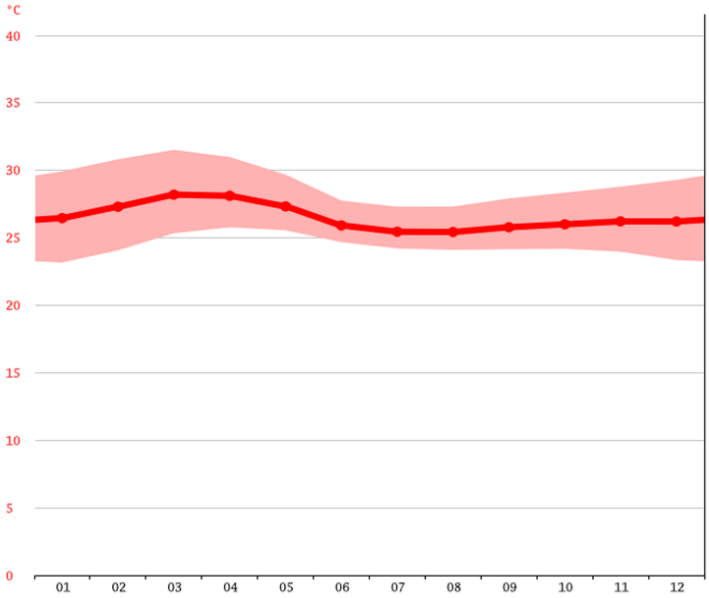

Figure 5. 8 Average Temperature

Source: Kochi climate: Average Temperature, weather by month, Kochi water temperature - Climate-Data.org.

March is the hottest month, with an average temperature of 28.2 °C. The average temperature in August is 25.4 °C. It is the year's coldest average temperature.

	January	February	March	April	May	June	July	August	September	October	November	December
Precipitation / Rainfall	22	27	66	177	337	568	514	379	264	303	169	56
mm (in)	(0)	(1)	(2)	(6)	(13)	(22)	(20)	(14)	(10)	(11)	(6)	(2)
Humidity(%)	75%	74%	75%	81%	85%	89%	89%	89%	87%	87%	84%	79%

Figure 5. 9 Precipitation and Humidity data

Source: Kochi climate: Average Temperature, weather by month, Kochi water temperature - Climate-Data.org.

The difference in precipitation between the wettest and driest months is 546 mm. The average temperature varies by 2.8 degrees Celsius throughout the year. The month with the greatest relative humidity (89.14%) is July. The month with the lowest relative humidity (73.56%) is February. The month with the rainiest days is July (28.73 days). The month with the fewest rainy days is January (5.73 days). The average yearly water temperature at Kochi is 28.20°C. The month with the warmest water is April, with 30.00°C. In July, the lowest water temperature will be 26.20°C. The maximum average water temperature for this area is 30.00°C, which is usually achieved around April 22. The lowest average water temperature was 26.20°C around July 18.

5.10 Topography of Study Area

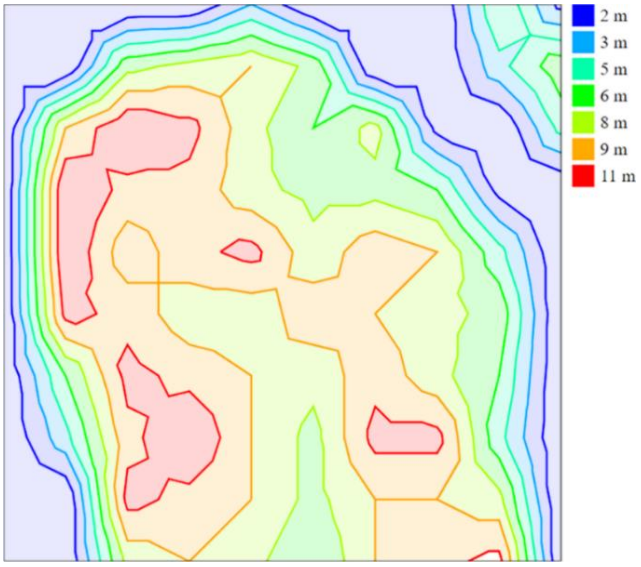

Figure 5. 10 Contour map of proposed area for development

Source: Author generated with contour map creator, 2023

The contour map shows that the proposed site is sloping towards the boundaries, the serving the natural drainage. The area under consideration has a maximum elevation of 11m from MSL and minimum of 2m.

5.11 Digital Elevation Model of Study Area

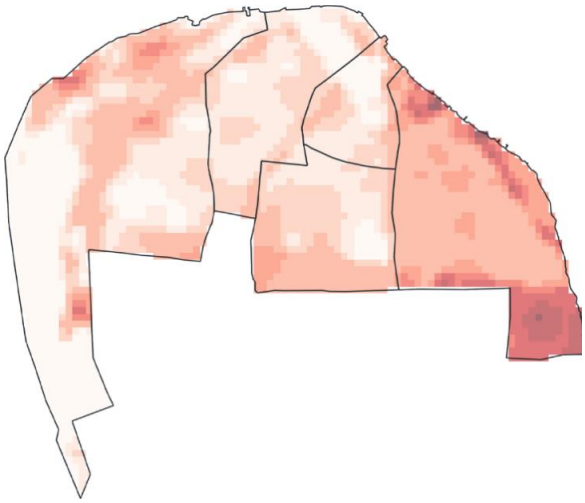

Figure 5. 11 Digital elevation model of ABD Area

Source: Author generated with respect to QGIS,2023.

5.12 Figure Ground Map

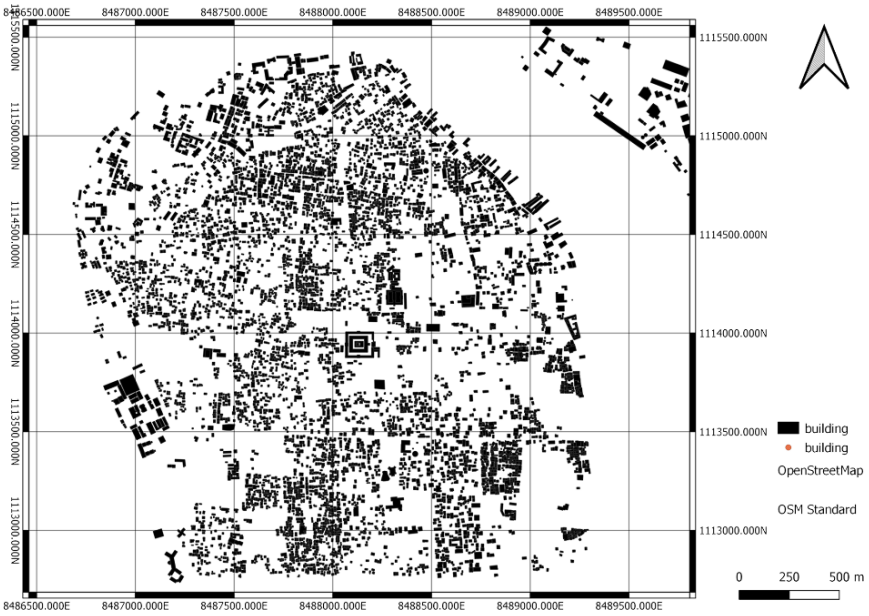

Figure 5. 12 Figure ground map of Kochi ABD area

Source: Author generated with respect to QGIS,2023.

The given figure and ground map shows the relationship between the built and open spaces of the space. The proposed area is mostly built, with the potential for development more efficient open spaces.

5.13 Map Showing Major Recreational Spaces

The above map shows the location of the major recreational spaces within the proposed development area. Ward 1 is found to have ample spots compared to other wards.

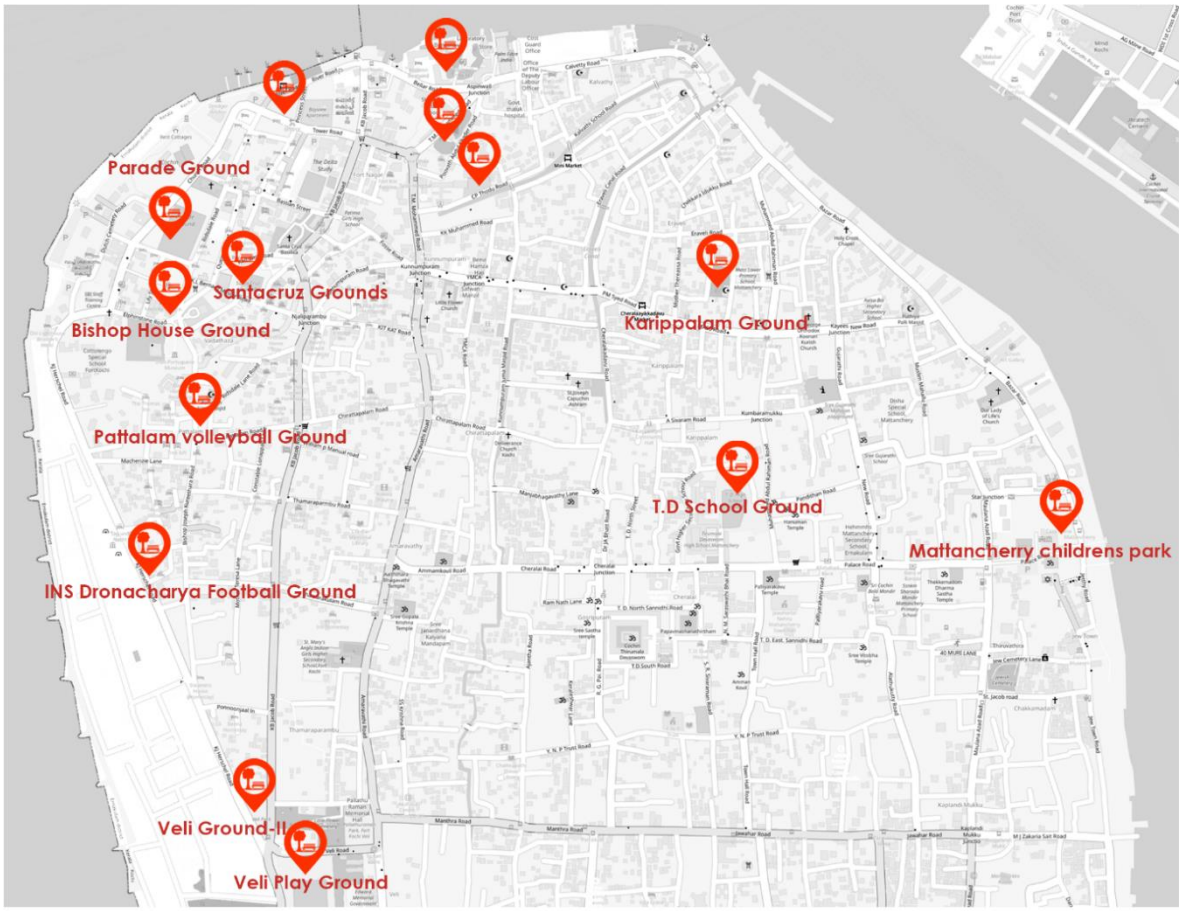

Figure 5. 13 Map showing major recreational spaces

Source: Author generated with respect to QGIS,2023.

5.14 Map Showing Major Institutions and Bus Stops

The above map shows the location of police station, post office and bus stops. Interior wards are found to have lesser connectivity.

Figure 5. 14 Map showing major institutions and bus stops

Source: Author generated with respect to QGIS,2023.

5.15 Map Showing Major Religious Buildings

The above map shows the location of religious buildings, the map indicates good cultural and religious value of the area.

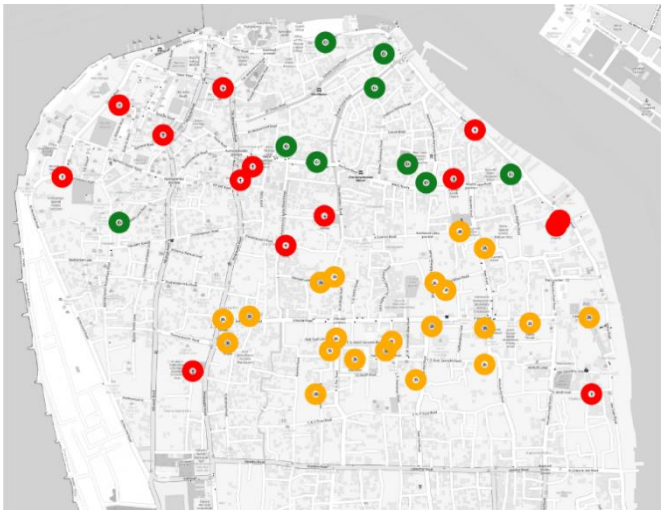

Figure 5. 15 Map showing major religious buildings

Source: Author generated with respect to QGIS,2023.

5.16 Map Showing Major Health Care Facilities

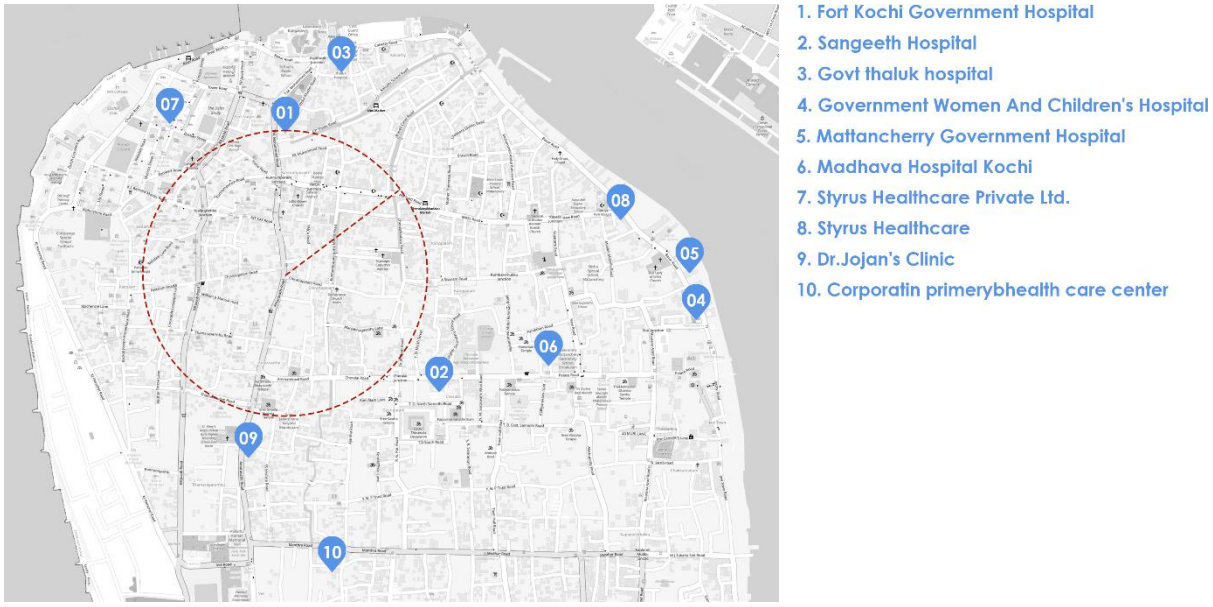

Figure 5. 16 Map showing the nearby health care facilities

Source: Author generated with respect to QGIS,2023.

5.17 Map Showing Major Educational Facilities

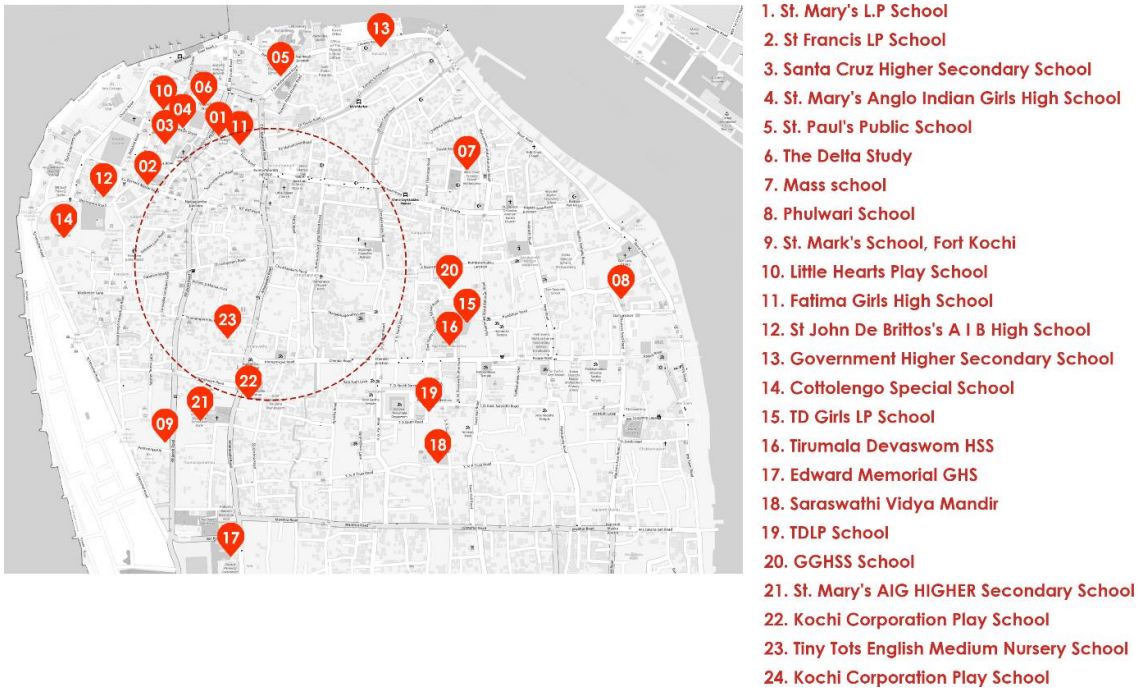

Figure 5. 17 Map showing the nearby educational facilities

Source: Author generated with respect to QGIS,2023.

5.18 Map Showing Major Heritage Sites

The above map indicates the high cultural and heritage value of the proposed development area.

Figure 5. 18 Map showing major heritage sites.

Source: Author generated with respect to QGIS,2023.

5.19 Map Showing Major Nodes

The above map shows the major traffic nodes within the study area special attention needs to be given to reduce congestion of these junctions.

Figure 5. 19 Map showing major junctions

Source: Author generated with respect to QGIS,2023.

5.20 Land use Map of Study Area

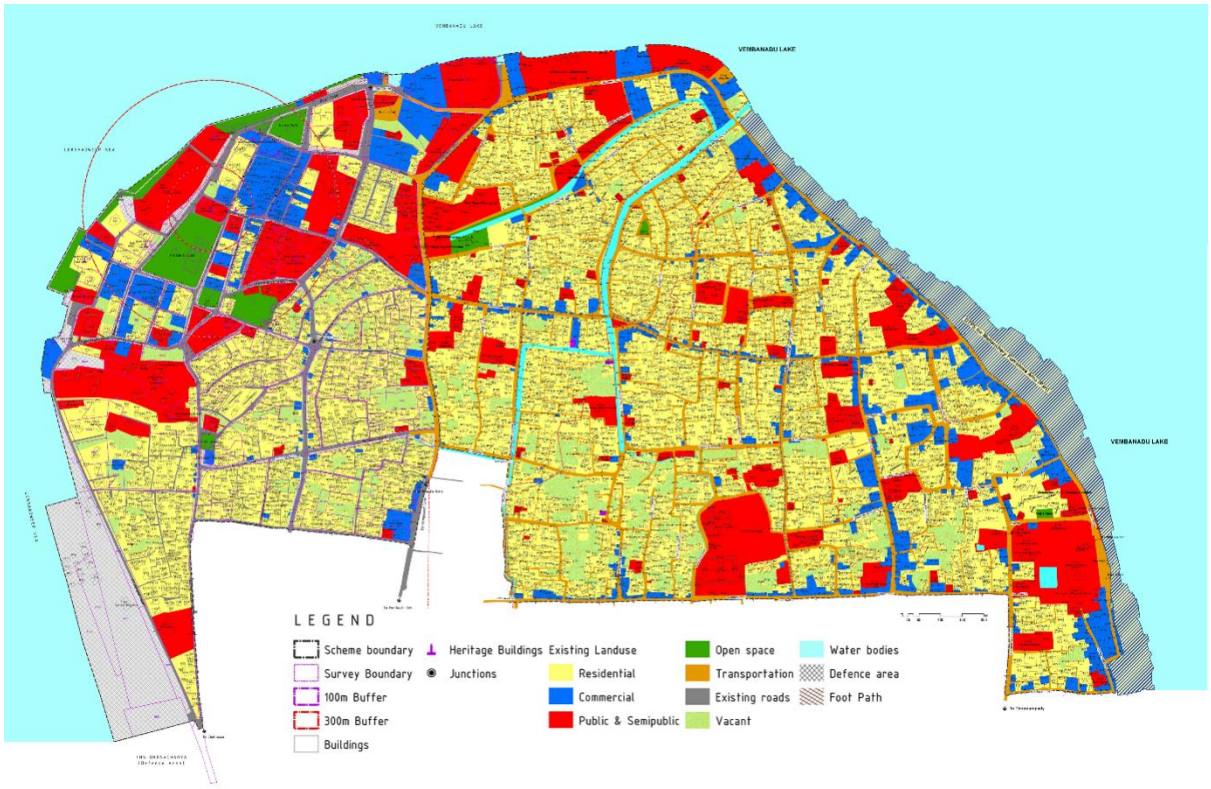

Figure 5. 20 Land use map of proposed study area

Source: Regional planning office, Ernakulam.

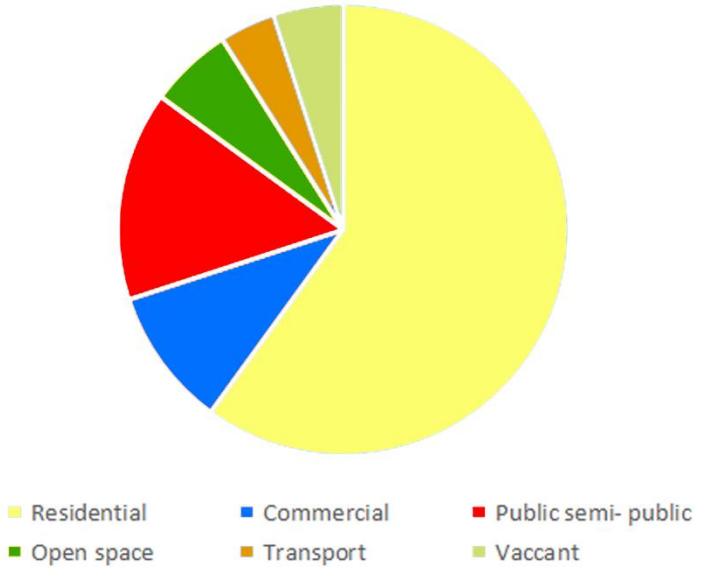

Figure 5. 21 Land use split of proposed study area

Source: Author generated with respect to QGIS.

The proposed ABD area for development mostly consist of residential building, thus it has more residential character. Commercial building also plays a major role. to cater the incoming tourists, because of which commercial buildings are mostly concentrated towards Fort Kochi and Mattancherry. Public semi-public buildings area also concentrated more in these wards. Fort Kochi and Mattancherry has most of the government buildings

Figure 5. 22 Street of Fort Kochi

Source: Primary Survey, 2023

5.21 Culture, Heritage and Tourism

Kochi City, Fort Kochi, and Mattancherry, which are located directly at the sea entrance, have undergone tremendous commerce related activity and have established a rich heterogeneous culture and history that is unique to the historic zone. This is reflected in the area's legacy, which includes magnificent monuments, architecture, and villages of remarkable cultural importance. The sea has also opened the door to numerous new tourist activities, including as cruise tourism and yachting. Biennale, Carnivals (Christmas and New Year), Holi, and other festivals will take place at Fortkochi, and Willington Island will serve as a commercial port. Kochi Muzinis Biennale offers new and diverse audiences, as well as inbound national and worldwide exposure for Kochi.

5.22 Slums in proposed area for development

The Kochi MC region comprises 208 slums spanning an area of 13.958 acres, with 63,324 people living in 12,741 housing units. Latrines are available to just 57% of the overall slum population. In the absence of a sewage infrastructure, the Kochi City Region relies on on-plot toilet waste disposal and open surface drain sullage disposal. Overflow of effluent to drains is prevalent, and the BOD in particular open drains in Kochi is high during the summer. The back waters of Kochi become contaminated as a result of this discharge, and Periyar suffers from comparable discharge from Aluva and other locations near to this river.

This important drinking water source is under threat from a variety of contamination sources, including municipal waste water. The following are the primary concerns that have emerged from the aforementioned situation: The pollution of the earth caused by on-plot systems. The pollution causes health problems in West Kochi's dense metropolitan areas. Contamination induced by the combined flow of sullage and storm water in open drains, canals, back waterways, and rivers. Combined drains are sometimes difficult to manage in flat terrain sections in Kochi City Region. In Fort Kochi and Mattancherry, 74 colonies have been notified on the Slum List. The majority of them or their ancestors worked in the Cochin Port or fishing port, or they were involved in fishing or trading seafood. Women were employed in cleaning, sorting, and packing of export items such as spices, seafood, and so on. However, most of these professions have now been mechanised, and individuals are out of work. This is the current socioeconomic situation of people living in slums.

Table 5. 1 List of slums

Ward Number	Ward Name	Colony Name	Population
2	Kalvathy	CDMA Colony	2672
		Thuruthy Colony	
		Kalvathy Colony	
		Municipal Colony	
		Mehboob Colony	
4	Karippalam	Athikarivalapy	2600
		Chaliparambu	
		Big Ben	
		Irattu Parambu	
5	Mattancherry	Bazar Road	3100
		Kalanattuparambu	
		Ottachal	
		Pallichal	
		Beglavu	
		Pettikaran	

Source: Municipal Corporation, Kochi.

5.23 Coastal Regulation Zone of Kochi

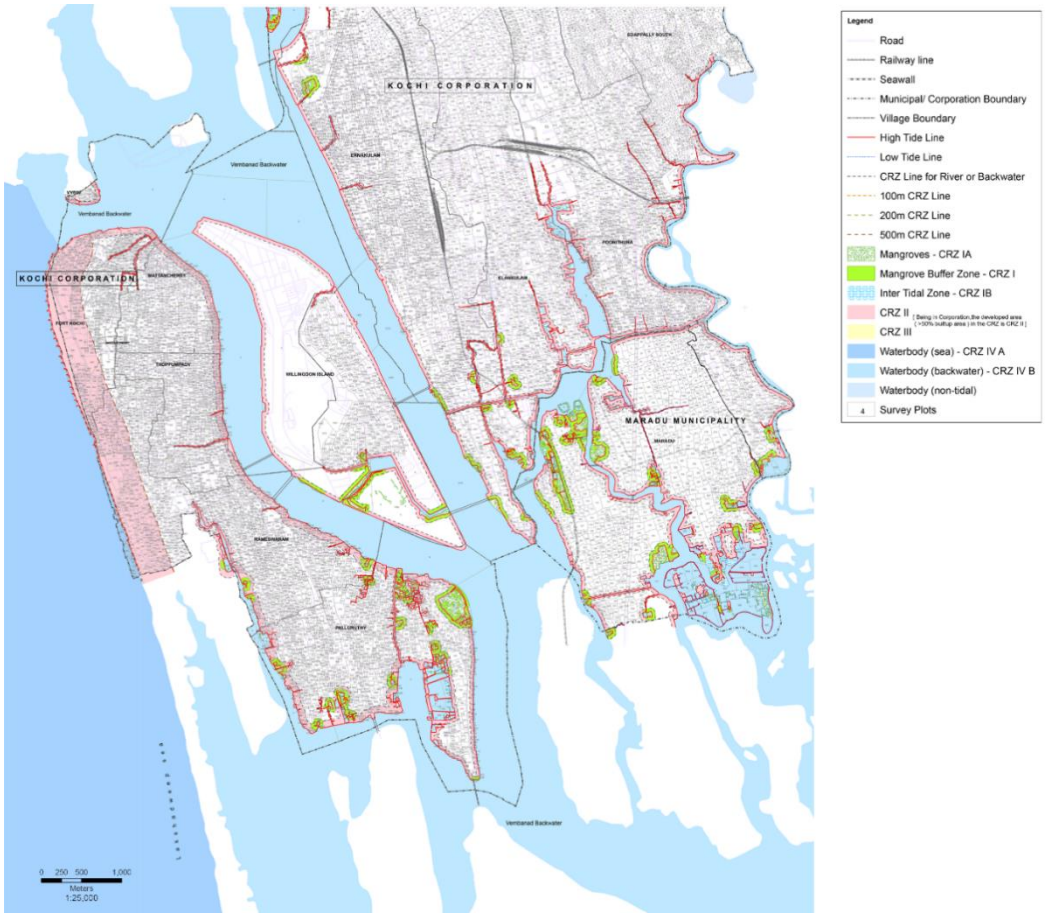

Figure 5. 23 CEZ map of proposed study area

Source: Coastal Zone Management Plan of Kochi Corporation Ernakulam District, Kerala

The Central Government has designated as coastline Regulation Zone (CRZ) the coastline sections effected by tidal action up to 500 metres from the High Tide Line and the land between the Low Tide Line and the High Tide Line. Except for those classified as CRZ I, the CRZs formed under Municipal Corporations and Municipal Councils are classified as CRZ II. Kochi, as a Municipal land, has CRZ II, which has more than 50% built up land.

The suggested research region includes coastal areas as well as wards. Ward 1 of Fort Kochi Ward 2 Kalvathy Earaveli and Ward 3 5 Mattancherry is located in the CRZ II zone.The CRZ II region has already been developed up to or near the beach. For this purpose, a 'Developed Area' is defined as any area within the municipal limits or other legally designated urban areas that is already substantially built up and has drainage and approach roads, as well as other infrastructural facilities such as water supply and sewerage mains.

CHAPTER 6 ANALYSIS AND RESULTS

In this chapter, a framework is developed with the help of the enablers and indicators of happy city, a benchmark based on the indicators developed from best practices in the case of Kochi City through survey, and an observation survey (pilot study). Analysed ward wise how each indicator affected city's ability to attain happiness index.

Figure 6. 1 Creating happy city

Source: Global Happiness and Wellbeing Policy Report 2019

6.1 Relation between placemaking and nature - based aspects

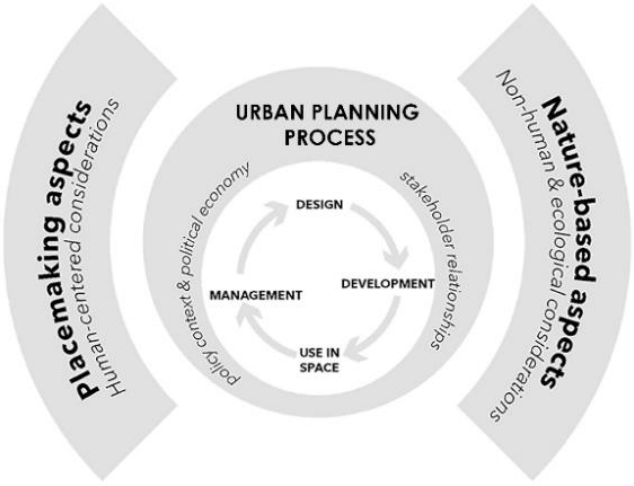

Figure 6. 2 Relating similar enablers of Happy city

Source: Boros, J., & Mahmoud, I. (2021). Urban Design and the Role of Placemaking in Mainstreaming Nature-Based Solutions. Learning From the Biblioteca Degli Alberi Case Study in Milan. Frontiers in Sustainable Cities, 3.

6.2 Parameters Considered for Analysis:

Table 6. 1 Parameters Considered for Analysis

TYPE	Mobility	Place Making and Nature	Other Factors Considered	Enabler
EXTERNAL ENABLERS OF HAPPY CITY	Time taken to travel	The space be used at all times and all weather		Trust
	Satisfaction with available transportation facility			
	Trust the transportation facility			
	Satisfaction with the para transit facilities			
	To cross the road safely	Safety and security of available recreational facility	Physical condition of the house	Safety & Security
	Satisfied with the working and time duration of the traffic signals		Condition of street lights	
	Encountered prior accidents on the road		crime rate of the locality	
	Whether the road is well maintained			
	Foot path width			
	Road width			
	General safety and Security			
	Whether the road has proper barrier			
	Cycle track facilities			
	Does the area have uninterrupted footpath			
	To cross safely			
	Affordability of the preferred mode of transportation	Proximity to the public open space available		Affordability
		Affordability of the recreational facility		

	Crossing time	Successful in Preserve cultural heritage of the region		Tolerance & Inclusivity
	Waiting time	Sufficient urban furniture		
	Does the street hawkers block the footpath	Recreational facility accessible to all		
	Does the node face congestion problem			
	Where the area has inclusive design			
INTERNAL ENABLERS OF HAPPY CITY	Does the area have pollution issues	The area ensures environmental sustainability and protection	Solid waste disposal technique used	Health & Life Balance
		The recreational facility helpful in providing mental well-being	Condition of drinking water	
		Space offer place for physical workout	Presence sewage or septic tank	
		Pollution free		
	Sufficient parking facilities availability	Feel visually connected to the nature		Meaning & belonging
		Satisfaction with the related services		
		Availability of sufficient parking spaces		
		Provide mix of uses and diverse activities		Sociality
		Area has adequate recreational facility		
		Support socialising		
		Availability of multiple recreational options within the walking distance		
			Economic condition	Economy & Skills

Source: Global Happiness and Wellbeing Policy Report 2019

6.3 Ward wise Inference

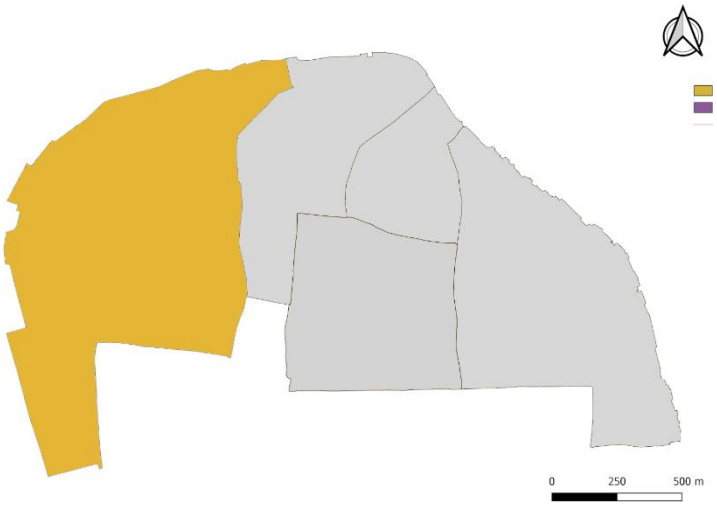

Figure 6. 3 Ward 1 Fort kochi

Source: Author generated with QGIS,2023.

Ward 1 of the ABD area for development is Fort Kochi. It is the largest ward when compared to other wards selected for kochi smart city area-based development. The ward has a total population of 10279, with 3156 female population and 2620 being male population

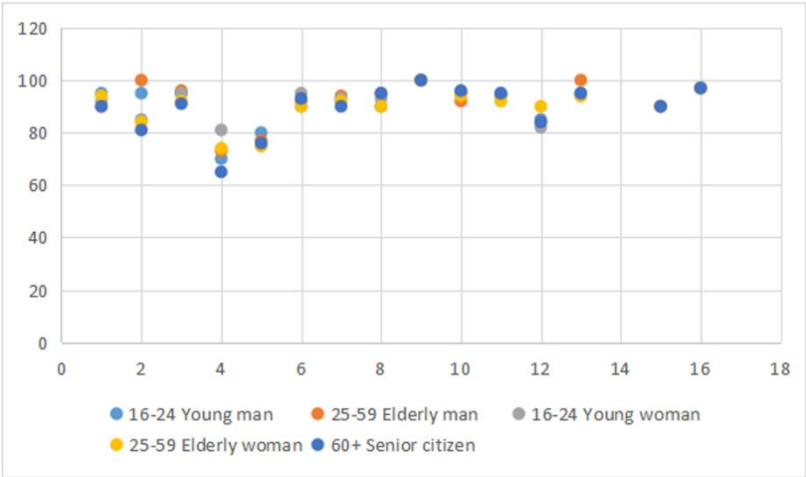

Figure 6. 4 Survey result

Source: Author generated with Excel,2023

Ward 1 Fort Kochi citizens were happy about the sociability of the area of which the senior citizens were found to be the happiest. Citizens trusted the mobility services but were unhappy about the safety and security, women were the most unhappy of the group.

6.3.1 Ward 02 Kalvathy

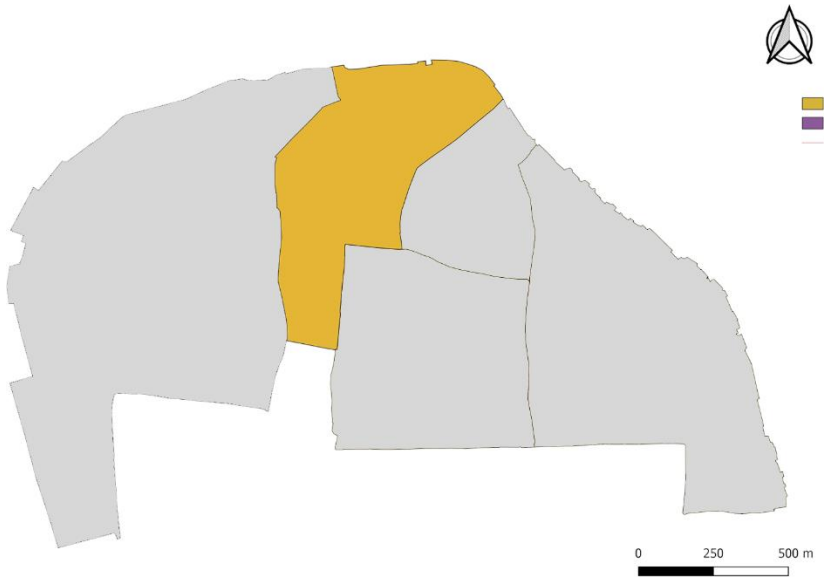

Figure 6. 5 Ward 2 Kalvathy

Source: Author generated with QGIS,2023.

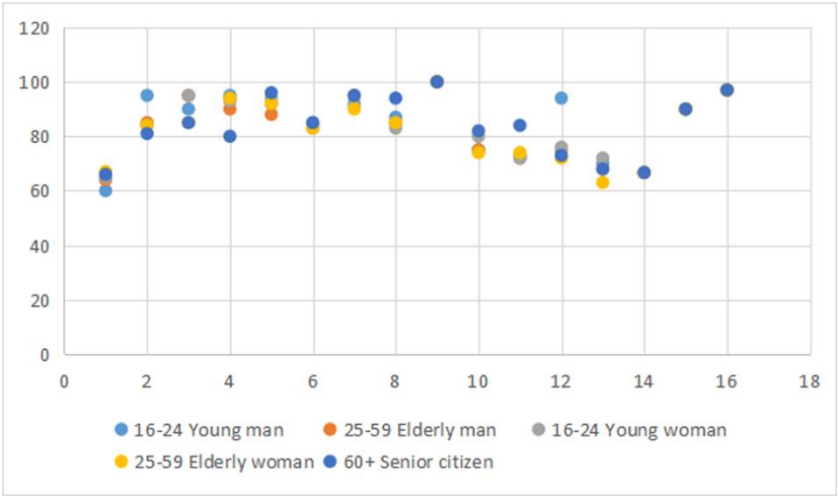

Figure 6. 6 Survey result

Source: Author generated with Excel,2023

Ward 2 of the ABD area for development is Kalvathy. The ward has a total population of 7814, with 3052 female population and 2793 being male population. Ward 2 Kalvathy were unhappy in terms of economy due to the presence of slums. the ward accommodates a slum population of 2672 people. It is another reason that led to the decline of safety and security within the ward.

6.3.2 Ward 03 Earavely

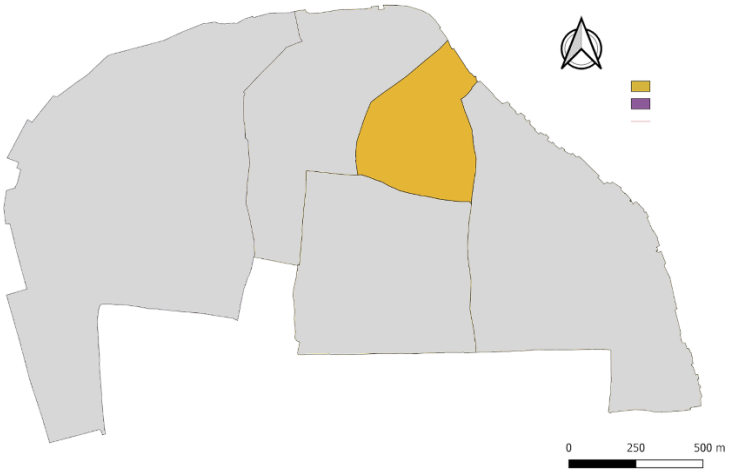

Figure 6. 7 Ward 3 Earavely

Source: Author generated with QGIS,2023.

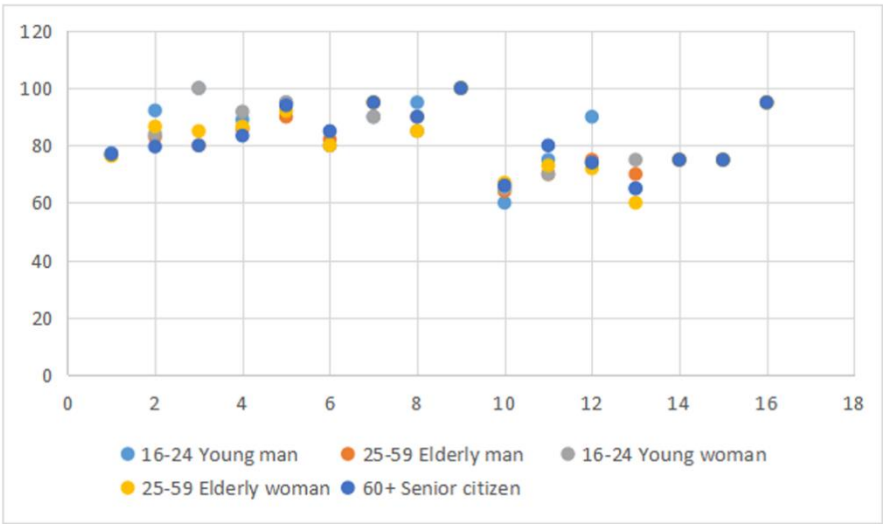

Figure 6. 8 Survey result

Source: Author generated with Excel,2023

Ward 3 of the ABD area for development is Earavely. The ward has a total population of 6425, with 2805 female population and 2584 being male population. All citizens alike in the ward were less happy in trusting the available mobility services as the transportation services were limited in the interior wards. Were happy about the safety and security. The ward faces the issue of unemployment and area unhappy with the enabler economy and skills. There are 1000 APL houses and 300 BLP houses present within the ward. People were less happy about the sociality of the ward due to reduces for socializing.

6.3.3 Ward 04 Karippalam

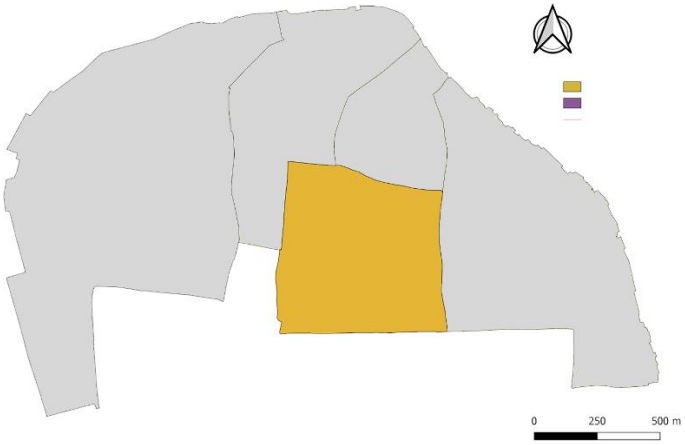

Figure 6. 9 Ward 4 Karippalam.

Source: Author generated with QGIS,2023.

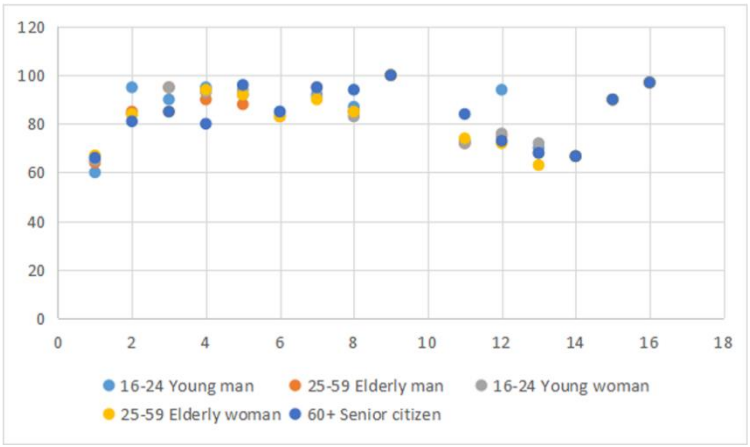

Figure 6. 10 Survey result

Source: Author generated with Excel,2023

Ward 4 of the ABD area for development is Karippalam. The ward has a total population of 8882, with 3289 female population and 3036 being male population. Karippalam ward also scored similar to Earavely ward, here also citizens alike in the ward were less happy in trusting the available mobility services as the transportation services were limited in the interior wards. Were happy about the safety and security. The ward has slums and faces the issue of unemployment and area unhappy with the enabler economy and skills. There are 1600 APL houses and 800 BLP houses present within the ward.

6.3.4 Ward 05 Mattanchery

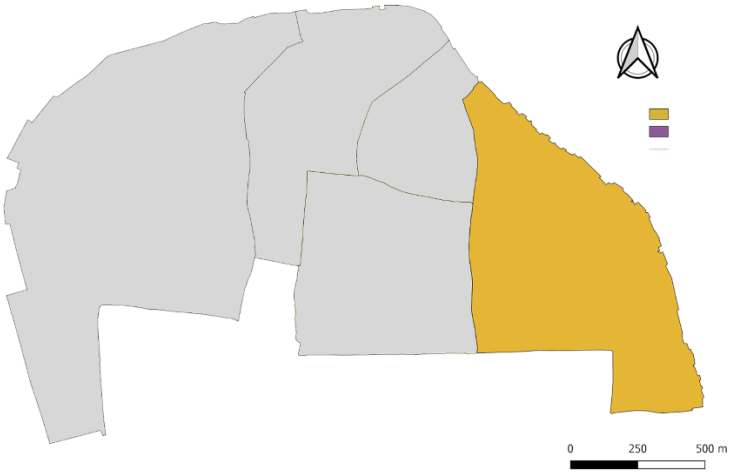

Figure 6. 11 Ward 5 Mattanchery

Source: Author generated with QGIS,2023.

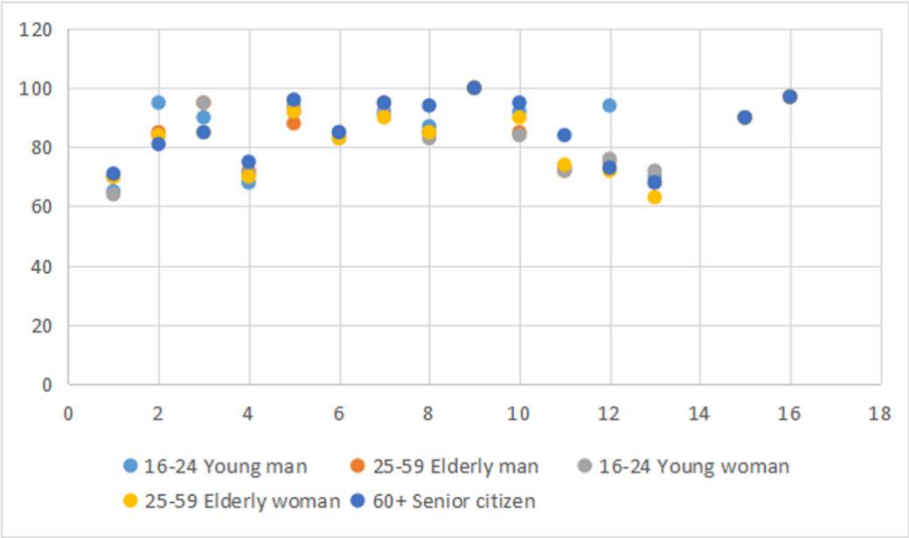

Figure 6. 12 Survey result

Source: Author generated with Excel,2023

Ward 5 of the ABD area for development is Mattanchery. The ward has a total population of 10144, with 3974 female population and 3564 being male population. Mattanchery citizens were less happy in terms of safety and security especially young generation due to intturuption on road and congestion near the juctions and bazar road. This ward also scored less in economy due to large number of slum population.

6.4 Inference

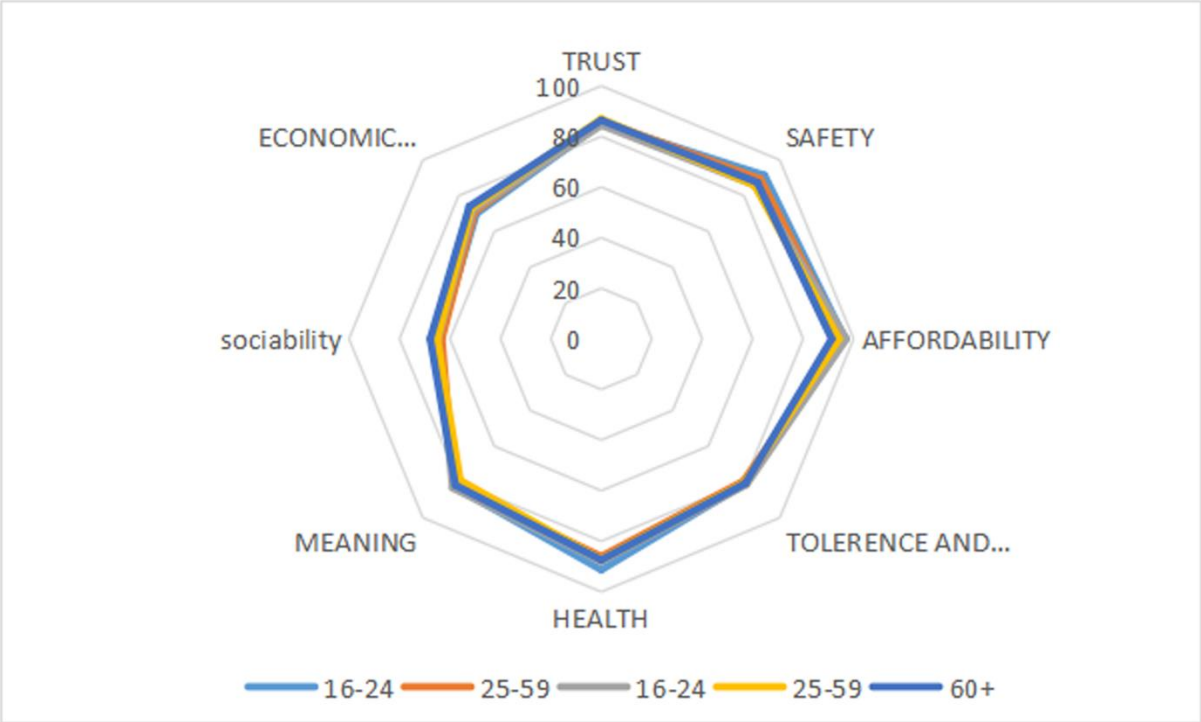

Figure 6. 13 Survey result

Source: Author generated with Excel,2023

The graph shows the final analysis result for the whole proposed development area, special attention needs to be given in improving the sociality and tolerance and inclusiveness of the area. The proposed area also needs improvement in terms of economic development for it to develop into a happy city.

CHAPTER 7 SWOT ANALYSIS AND PROPOSAL FORMULATION

This chapter analyses the study area for its strength, closely observes the regions weakness to identify the area for action, opportunities for development, and observes the related threats that needs remedial actions.

7.1 SWOT Analysis

To gain a rough notion for the proposal, the chosen study area's strengths, weaknesses, opportunities, and threats are examined. Detailed analysis supporting the proposal is done by closely analysing the enablers and other derived indicators that affect the happiness of an area.

7.1.1 Strengths

1. Unique Geography and Location
2. HDI and social indicators
3. Water transport infrastructure
4. Growing IT and services industry
5. Historic value, Tourism hotspot
6. Reflects Heritage value

7.1.2 Weakness

1. Land availability constraints
2. Constrained Public network
3. Poor walkability and street safety
4. Inefficient integration of multi-modal transport systems
5. Poor quality Road surfaces
6. Degradation of Canals and Green Cover
7. Petty Crimes
8. Dilapidated and Poor Housing structures

7.1.3 Opportunity

1. Potential for multi-modal mobility
2. Kochi Biennale
3. Potential for development of pristine
4. spaces around canals
5. Employment generation
6. Houses the commercial hub of Kochi

7.1.4 Threat

1. Increase in private vehicles
2. Climate change
3. Encroachments

7.2 Proposal formulation

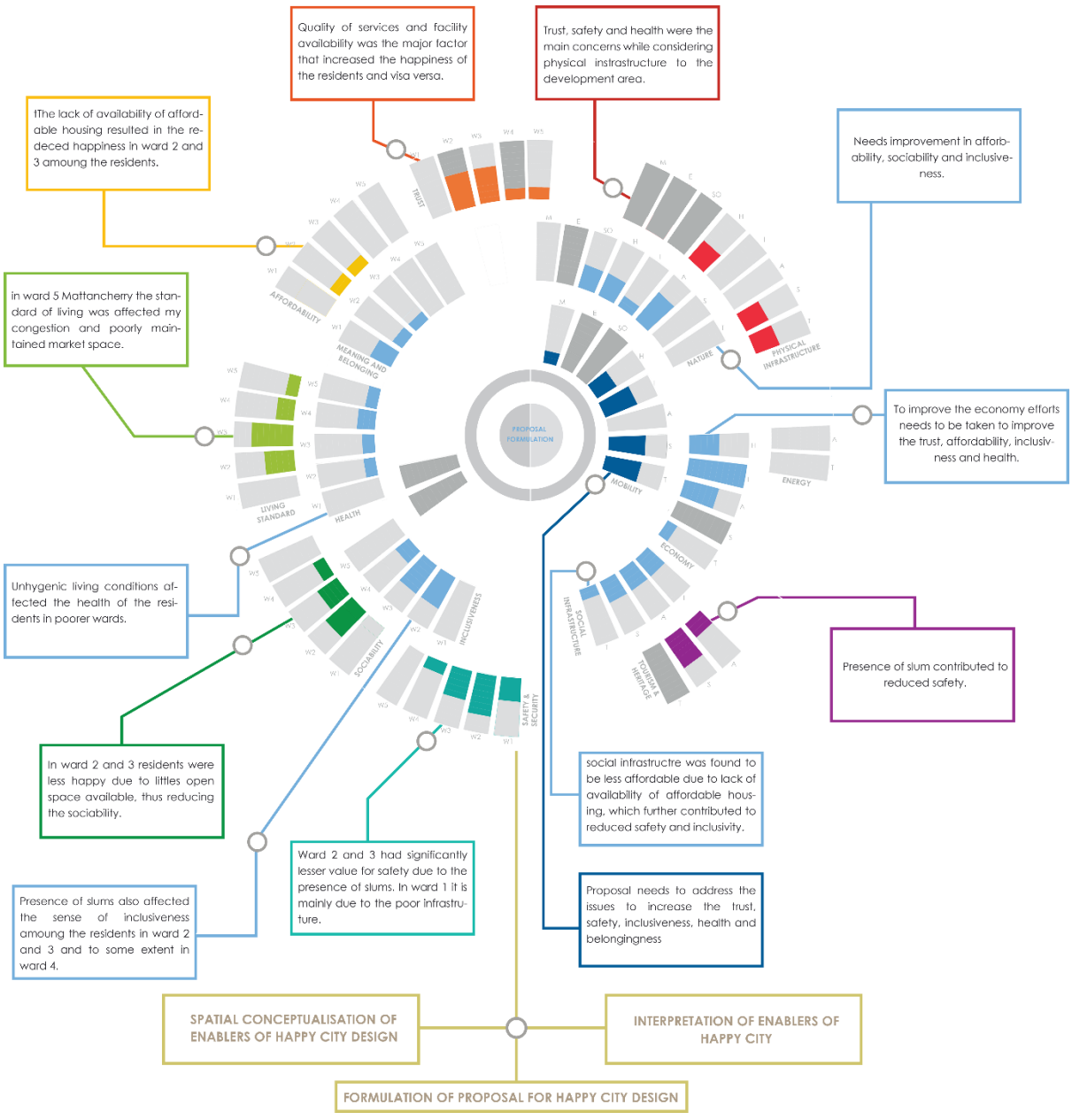

Figure 7. 1 Analysis of primary and secondary data for the formulation of proposals for achieving Happy city in Kochi Smart city ABD Area.

Source: Author generated based on primary and secondary study, 2023.

CHAPTER 8 PROPOSALS

In this chapter the various indicators that hindered the happiness of the people as analysed based on the primary studies are to be solved by providing appropriate proposals and strategies. Thus, improving the happiness index of the area under consideration.

Based on the studies conducted appropriate spatial planning proposals and strategies are suggested to plan for the Happy city in Kochi ABD Area. The basic idea is to plan to improve the various enablers of happy city design. The factors which impacted the overall wellbeing and happiness of the residents the most were identified and rectification measures are proposed.

Figure 8. 1 Proposal for development of Kochi smart city ABD Area, Fort Kochi - Mattancherry Region.

Source: Author generated with QGIS.

Fort Kochi is a harbour and port city on the Arabian Sea in the southern Indian state of Kerala with a rich multi-cultural heritage from the colonial era, and may even date back as early as the 1st century AD. It was inhabited by the Portuguese, the French, the Dutch as well as the British, each of who have left their own indelible impressions on the town, in addition to being ruled by notable Indian kings before that. Having been subjected to callous neglect over the years, the potential of city and surrounding region remained untapped.

Besides conserving the heritage structures and precincts and developing tourist infrastructure around them, the plan captures a vision for the sustainable growth of the city and region, as well as economic development of the locals.

The proposed development plan for Fort Kochi was envisioned in three main parts – the water edge, arrival nodes & street corridors, and heritage districts. The water edge development included the creation of a water-front promenade, restoration of heritage structures and conservation of the unique Chinese fishing nets along the promenade. Three main arrival nodes for tourists were identified for development at various locations around Cochin, and a number of historically and culturally prominent streets were identified to be developed according to their unique heritage characters as street corridors. Further, four sub-regions were identified as heritage districts modelled around their respective cultural, botanical or activity themes. Special attention was accorded to creating night activity zones with a view to keep the city vibrant for tourists even after sun-down.

A dedicated part of the plan covered the development of the Mattancherry region which was again divided into four clusters, viz. canal development, cultural and trade precinct, heritage and recreation precinct, and religious and commercial precinct. This part of the works included dredging of the canal sides to make it navigable, beautifying local streets, developing water-front activities, parks, bazaar streets, restoration & reuse of street corridor, refurbishing the jetty area, developing social circuits.

The Fort Kochi beach area, one of the most popular tourist destinations in the city which has been in a state of neglect for the past many years. The proposal includes developing walkway from Water Metro terminal building to the beach area, restoring the damaged walkway, constructing new toilets, laying new tiles near the beach walkway, constructing wall along the walkway, replacing the old food vending kiosks, renovating. A vast portion of the beach was lost to sea erosion over the past few years. The width of the beach area accessible to visitors is less than 15m. The area lacks basic facilities like public toilets. The beach's miserable condition has already affected the tourism prospects of Fort Kochi. The beach area adjacent to the Water Metro terminal is a safe haven for anti-social elements and visitors are reluctant to visit the region after sunset. The development of the beach with beautiful walkways and proper lighting would add to the tourism prospects of the area. The renovation of the beach can attract more

tourists to the area. The project is expected to resolve the major issues like illegal waste dumping, unorganized fish vending and underutilization of open spaces.

The vision is making study area a quality heritage and cultural town, and a visited sustainable and liveable town. Potential intervention areas were identified through research and analysis which together form a complete tourist circuit containing all the heritage structures and places with historical significance. The idea is to develop this tourist circuit to enhance and improve tourism without disturbing the urban character and life of the residents around.

8.1 Canal Rejuvenation

The canal development project aims to turn the presently unused and decaying canal into an area that can be used as a space for social interactions and reconnect the city. The redevelopment project involves the improvement in condition of the canals passing through ward 2 Kalvathy and ward 3 Earaveli. These canals are surrounded by slum areas. By improving the canals, the cultural and heritage value of the area increase, inviting more scope for tourism and the people of the area gets to socialize. Cycle tracks are provided to promote a healthy life style along with jogging track. Intermediate resting spaces encourage people interaction with each other. This way it improves the overall image of the area.

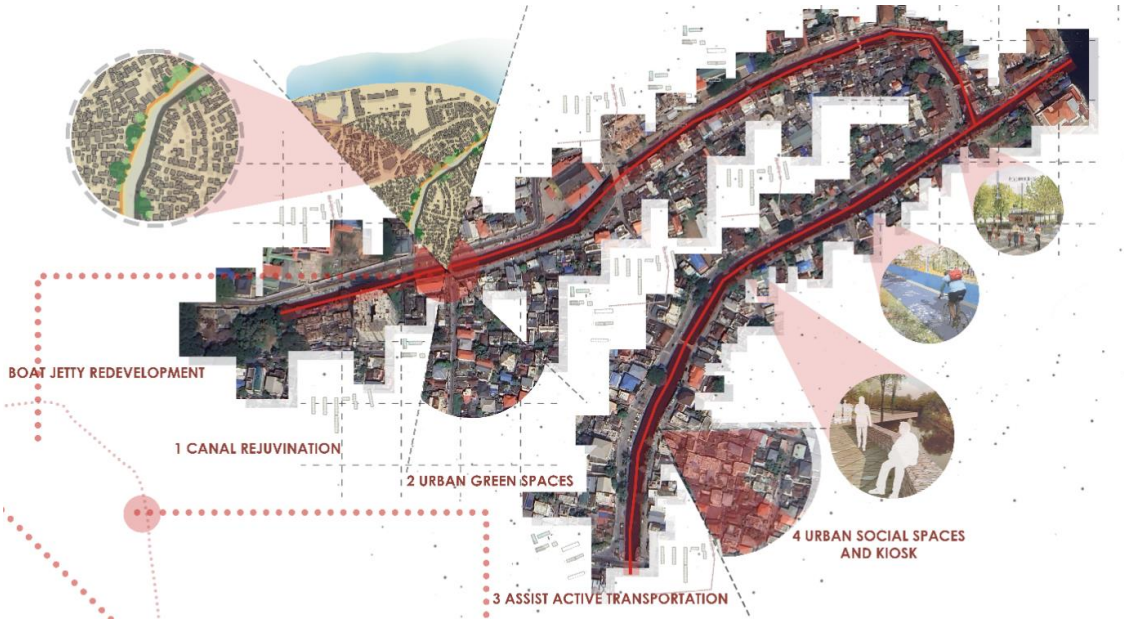

Figure 8. 2 Canal Rejuvenation

Source: Author generated based on primary and secondary study, 2023.

8.2 Slum Rehabilitation

Proposed study area in Kerala is one if the colonial zones in the district of Ernakulam which preserves a lot of its cultural and foreign historic influences. There is another side to the same hippie-touristy site. Though slum per say is not a common site in the state, this area houses numerous slums with large number of families residing in areas like Kalvathy, Eraveli, Koncheri and Thuruthy. Along with the marginalized and the poor, there are the "victims" of urbanization who willingly or unwillingly had to move to these colonies with substandard living conditions. With open drainage, polluted water canals, improper sanitation facilities etc. disease outbreaks here are very common, with increasing crime and illegal activities. Most of the residents of these slums are daily wage earners and fishmongers. Thus, the site for rehab is close to the original space.

Figure 8. 3 A lane from Kalvathy and Thuruthy.

Source: Google Images.

Figure 8. 4 Site selected for redevelopment.

Source: Google Earth, 2023.

8.3 Redevelopment of Fort Kochi

8.3.1 Vending Station

Unauthorised vending affects the image of the city. Proposing a vending zone improves the economic opportunity.

Figure 8. 5 Existing condition of the streets

Source: Primary survey,2023

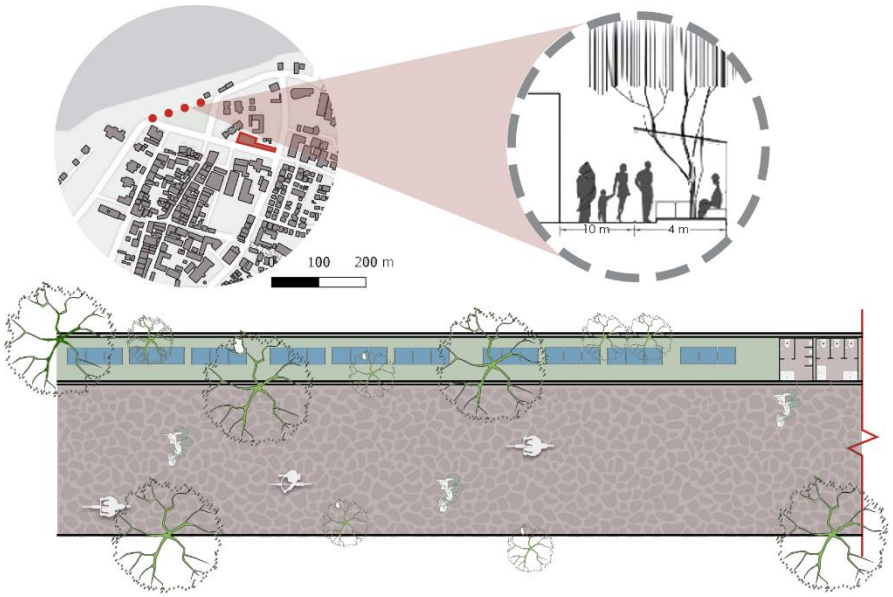

Figure 8. 6 Proposed design for street vending.

Source: Primary survey,2023

8.3.2 Parking Space

Lack of parking space hindered the happiness of the people, MLP is proposed on the government site to address the issue.

Figure 8. 7 Existing Parking condition

Source: Primary survey,2023

8.3.3 Road Improvement

Lack of properly maintained footpath reduce the safety, thus affecting their happiness.

Figure 8. 8 Poor condition of footpaths.

Source: Primary survey,2023.

8.3.4 Bazar Road Decongestion Plan

Proposed one-way along with loading area reduces the congestion in market. The unorganised market road constantly affected the happiness of residents of Mattancherry. The streets also had encroachments on to the road causing the congestion. Pedestrianisation of the main market road reduces the congestion.

Figure 8. 9 Proposed one-way along Bazar Road.

Source: Google Earth Image, 2023.

8.3.5 Boat Jetty Redevelopment

Figure 8. 10 Existing condition of Boat Jetty

Source: Primary survey,2023

The existing boat jetty is redeveloped thus encouraging the use of public transport as a result of improved trust, safety.

CHAPTER 9 CONCLUSIONS

This chapter deals with the conclusion of the entire study. It states that the objectives of the study have been achieved. The way forward for this subject is also mentioned.

Happiness in a city through urban planning depends on various physical factors like urban design, nature, and mobility. Conceptual indicators like service quality, culture and sustainability and partnership. The happiness within a city can be redefined by modifying external and internal enablers of happy cities mentioned earlier. Urban happiness is region specific they can vary depending on the culture and lifestyle of the region. Urban happiness is people specific the happiness of the people belonging to the young men and women category can be different form that of the older generation. Kochi is one of the cities with the quickest growth with high economic growth and supports a large number of working populations, who are the regular users of mobility services and ranks 45th in the EoLI, thus there is an opportunity to make the city more liveable and happier.

Thus, based on the studies conducted appropriate spatial planning proposals and strategies are suggested to plan for the Happy city in Kochi ABD Area. The basic idea is to plan to improve the various enablers of happy city design. The factors which impacted the overall wellbeing and happiness of the residents the most were identified and rectification measures are proposed.

Proposals Improve the legibility of the city to ensure people, especially visitors/tourists, are encouraged to feel safe and can explore the city better, leading to improved happiness. The developments proposed also ensures inclusivity by providing developments accessible to all. By depending on walking and cycling as a reliable and quick method for moving around the city for shorter trips, helping users develop “mental maps” of the city, which is a spatial representation of the place in terms of its locations, landmarks, geography etc. kept in mind. Proposals also promoted active mobility and thereby ensuring increased health benefits and leisure opportunities thus contributing to overall citizen wellbeing and increased happiness.

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ANNEXURE

1. Age Group

   (A) 0-15
   (B) 16-24
   (C) 25-59
   (D) 60 +

2. Gender

   (A) Male
   (B) *Female*
   (C) *Prefer not to say*
   (D) *Other*

3. Occupation/Education ----------

4. Where do you work or study ----------

Mobility

5. Do you think the city is well connected by public transportation.

   (A) Yes
   (B) No

6. Mode of transportation to work/ Education

   (A) Metro
   (B) Bus
   (C) Taxi/Auto
   (D) Ferry
   (E) Private car
   (F) Bike
   (G) Bicycle
   (H) Walking

7. Do you trust the transportation facility?

   (A) Yes
   (B) *No*
   (C) *Maybe*

8. Time taken to travel

   (A) within expected time
   (B) *sometimes longer than expected*
   (C) *mostly longer than expected*

9. Are you satisfied with the available transportation facility?

(A) Yes
(B) *No*
(C) *Not sure*

10. Do you think your transportation mode used is safe?

(A) Yes
(B) *No*
(C) *Not sure*

11. Is the road well maintained

(A) Yes
(B) *No*
(C) *Maybe*

12. Does the footpath have sufficient width

(A) Yes
(B) *No*

13. Does the Road have sufficient width

(A) Yes
(B) No, Needs Road widening

14. Are you satisfied with the working and time duration of the traffic signals

(A) Yes
(B) No
(C) Maybe

15. Are you able to cross the road safely

(A) Yes
(B) *No*

16. Does the area have uninterrupted footpath

(A) Not maintained
(B) Maintained
(C) Interruptions present (for example street hawkers)

17. Does the area have pollution issues

(A) Yes
(B) *No*
(C) *At times*

18. Do you think your preferred mode of transportation is affordable

(A) Yes
(B) No

19. Does the area face congestion problem

(A) Yes, traffic
(B) Yes, pedestrian
(C) No

20. Road Crossing time

(A) *Time consuming*
(B) *Not time consuming*
(C) *Quick Road crossing possible*

21. Does the area have sufficient parking facilities?

(A) Yes
(B) *No*

22. Do need cycle track?

(A) Yes
(B) *No*
(C) *Maybe*

23. Do you find it difficult to enter into the transportation facility?

(A) Yes
(B) *No*

24. Are you satisfied with the para transit facilities available

(A) *Yes*
(B) *No*

Nature, Urban design and Place making

1. Do you feel visually connected to the nature?

(A) Yes

(B) *No*

(C) *Maybe*

2. Is the recreational facility accessible to you?

(A) Yes

(B) *No*

(C) *Accessible to Few*

(D) *Mostly accessible*

3. Do you feel safe and secure in the available recreational facility?

(A) Yes

(B) *No*

(C) *Maybe*

4. Is the public open space available within your proximity?

(A) *Yes, Within walk-able limits*

(B) Yes, with the help of transportation facility

(C) No, Difficult to access

5. Does the area provide mix of uses and diverse activities for public enjoyment

(A) Yes

(B) *No*

6. Does the area have adequate recreational facility?

(A) Is sufficient

(B) *No, needs more recreational facilities*

(C) Better if additional ones are provided

7. Is the recreational facility affordable?

(A) Affordable

(B) expensive

8. Does it have sufficient space to (encourage) socialize?

(A) Yes, encourages public interaction

(B) *No, difficult to socialize*

(C) *Somewhat*

9. Does the area ensure environmental sustainability and protection? (Environmentally friendly building design, landscape strategy and greening to enhance the environmental quality)

(A) Yes
(B) No
(C) Partially depleting the environment

10. Is the recreational facility helpful in providing mental well-being?

(A) Feels good
(B) Not much

11. Does the space offer place for workout?

(A) Yes
(B) No

12. Are you satisfied you with the related services? (washroom, cool bar, cycle rack)

(A) Yes
(B) No, more facilities needs to be implemented

13. Do you have multiple recreational options within the walking distance?

(A) Yes, within walking distance
(B) No, not available
(C) Yes, within automobile travel distance

14. Is the area Successful in Preserve cultural heritage of the region?

(A) yes, preserves the cultural heritage
(B) No, is causing harm to its heritage
(C) Neither harmful nor conserving

15. Does the area have sufficient parking spaces?

(A) Yes
(B) No

16. Does the area have sufficient urban furniture?

(A) Yes
(B) No

17. Can the space be used at all times and all weather?

(A) Yes
(B) No

18. Is the area free from pollution?

(A) Yes
(B) No, needs more waste management strategies

Household survey

1. Economic condition

(A) BPL

(B) APL

2. Number vehicles owned

(A) Car

(B) Bike

(C) Other

(D) Nil

3. Physical condition of the house

(A) In good condition

(B) In moderate condition

(C) Dilapidated

4. Solid waste disposal technique used

(A) Own land

(B) Dumping in public land

(C) Harithakarmasena

5. Condition of drinking water

(A) Good quality water available

(B) Water needs future treatment before usage

(C) Poor quality of water, can't be used for drinking

6. Presence sewage or septic tank

(A) Closed and well maintained and present at adequate distance from the well

(B) Closed but close to the water source

(C) Not closed or not present or not in good condition

7. Condition of street lights

(A) Present and working

(B) Present but not working at all times

(C) Not present