

# Making Bhaktapur Walkable Again – Can we reverse it back to the Ancient Walkable Town?

Rojita Sharma <sup>a</sup>, Sudarshan Raj Tiwari <sup>b</sup>

<sup>a, b</sup> Department of Architecture, IOE, Pulchowk

Corresponding Email: <sup>a</sup> sharmarajita93@gmail.com, <sup>b</sup> srtiwari@ioe.edu.np

## Abstract

The quality of the pedestrian environment has been an important consideration in transportation planning and design during the last decade. Walking is a sustainable means of transportation since it is both healthy and environmentally friendly. The purpose of this study is to look into the elements that influence walking and bicycling in Bhaktapur, the oldest city in the Kathmandu Valley. Bhaktapur, like many other old Nepalese cities, was never designed for automobiles, but the cultural city's uniqueness is being jeopardized by increased vehicle and motorcycle ownership. The chosen street in Bhaktapur (Bharbhacho to Chyamasingh) was evaluated on four criteria: comfort, connectivity, pleasantness, and safety. Because people's readiness and attitudes cannot be studied in isolation, this study will gather representative viewpoints from key informants, locals, and visitors as they travel across the case area's territory. The findings point to the importance of taking into account urban expectations and facilities (such as public transportation, parking, and lighting) while implementing walkable guidelines. Bhaktapur's main thoroughfare (Bharbhacho – Chyamasingh) has been given the required suggestions to increase walkability.

## Keywords

Sustainable transportation, walkability, Bhaktapur, ancient walkable town

## 1. Introduction

As worldwide awareness of environmental conservation rises, people are becoming more concerned about sustainable transportation. "Sustainable transport is transportation that meets the current needs without compromising the ability of future generations to meet their own needs." [1]

The transportation sector not only supports the country's economic sector, but it also remains at the forefront of political and scientific discussions about sustainability. Sustainable transportation also contributes to the advancement of a new and modern scientific revolution in the field of transportation. Transportation has a significant impact on people's lifestyles, not just in terms of the environment, but also in terms of social and economic factors. Walking environments have received increased attention in recent decades as part of sustainable transportation planning and design. Maintaining pedestrian and bicycle friendly roads from local streets to regional arteries is a bigger task to carry out because sustainable development is one of the challenges of

the current generation, and transportation carries a huge burden to be controlled and managed according to sustainable planning [2].

### 1.1 Walkability

The walkability of an area is a measure of how conducive it is to walking. Walking provides advantages in terms of health, the environment, and the economy. The presence or absence of footpaths, sidewalks, or other pedestrian rights-of-way, traffic and road conditions, land use patterns, building accessibility, and safety are all factors that influence walkability. In sustainable urban design, walkability is a key idea[1].

One proposed definition for walkability is: "The extent to which the built environment is friendly to the presence of people living, shopping, visiting, enjoying or spending time in an area" [2].

## 1.2 Scenario of Kathmandu Valley

In the Kathmandu valley, car and motorcycle ownership is quickly expanding. According to the Department of Transport Management, 1.2 million automobiles were registered in the Bagmati zone alone till September 2019. A million motorcycles, cars, and jeeps were registered. This shows that the number of private vehicles on the road is significantly more than the number of public vehicles, which make up 92 percent of the total[3]. People are forced to buy private autos due to the poor and dangerous public transit system.

According to a report published by the Metropolitan Traffic Police Division, the total length of the road is 4.5 million feet whereas the length, when all the vehicles single-queued, would cross 7.2 million feet. This shows that if all the vehicles were to be single-queued, their total length would exceed the total length of the road[4].

## 2. Rationale

Bhaktapur is one of the medieval town-states in the Kathmandu Valley. It is located about 13 kilometers from Nepal's capital Katmandu and has always been described as the well-preserved historic town of the country. The research done by Asian Development Bank about Walkability in Asian Cities: Assessment of Pedestrian Infrastructures and Services in Four Areas in Bhaktapur City in June 2010 shows that the walkability index of Bhaktapur is 309 [5].

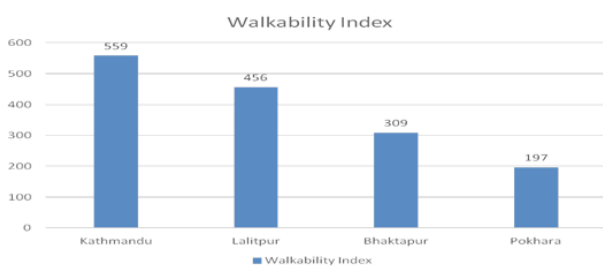


Figure 1: Walkability Index [5]

Regulations such as car restrictions and vehicle-free ideals are significant steps forward in a community. The Bhaktapur Municipality has done an outstanding job in implementing such policies. However, haphazard parking intruding on historically significant public spaces has had a negative impact on people's lifestyles and visually pleasing views.

This study emphasizes the importance of promoting a walkable environment in Bhaktapur in order to

accomplish sustainable transportation goals. This study is required to draw a line to realize the goal of making Bhaktapur a walkable town, as it was in the medieval period, taking into account both medieval and modern cultural and social values.

## 3. Problem Statement

Despite the rapid development in motorization, research suggest that walking is still the most popular form of transportation in the Kathmandu Valley. Walking's mode share fell to 40.7 percent in 2011 from 53.1 percent in 1991, and cycling's share fell from 6.6 percent to 1.5 percent, while the percentage of motorbikes climbed nearly thrice, from 9.3 percent to 26 percent. This indicates that motorbikes have largely replaced walking and cycling [6].

According to a survey conducted by the Asian Development Bank on Walkability in Asian Cities: Assessment of Pedestrian Infrastructures and Services in Four Areas in Bhaktapur City in June 2010, at least 54 percent of the 202 respondents said they spend at least 15 minutes walking in one direction to get to their destination. While the majority of pedestrians walk less than 3 kilometers, the majority of the sample in Bhaktapur is made up of choice transit users who can drive and do have a vehicle but prefer to walk from their home to their main destination. 20 percent of captive transit riders do not own a car or are unable to drive [5].

In the case of Nepal, understanding of sustainable transportation and exploration of its requirements is severely lacking. While an urban area like Bhaktapur is increasingly becoming automobile dependent, an examination of community attitudes and cultural dynamics toward walkable cities is also required to understand the viability. This study is the first of its kind in Bhaktapur, and it attempts to fill a research gap in the area of Bhaktapur's readiness to become a walkable metropolis like it was in the Medieval Era.

## 4. Research Questions

### Main:

- What factors influence the walkability?

### Specific:

- What are the measures to solve parking problem?

- Can a city's lifestyles, attitudes, and habits move from motorized to walking for short journeys without compromising quality of life?

### 5. Limitation

The study's scope is limited to the main street in Bhaktapur's core area, which runs from tole Chyamasingh (Suryamadhi) to Bharbhacho. The purpose of this study was to focus on the elements that determine the attractiveness of walking and bicycling among locals, rather than on the tactics for building a sustainable transportation system. The appeal of walking and bicycle can only be realized if we are aware of how prepared the urban community is to transition its lives, attitudes, and habits from motorized to walking without compromising quality of life. Study was done to see how street characteristics, infrastructure, and urban shape can assist people change their minds about how they travel. Bicyclists' unique demands are not addressed in this study.

### 6. Methodology

With the ontological claim that the urban community can only shift its lifestyles, attitudes, and habits from motorized to walking for short trips without sacrificing quality of life if their urban demands are considered and modified, a methodology was developed to find the epistemological reasoning through a thorough review of published articles, meticulous observation, and interviews. The research's central theme is subjective reality. Because people's preparation and attitudes cannot be measured in a single reality, this study intends to collect representative perspectives from key informants and other people living in the area. Using the constructivism research paradigm, this study examines the attitudes of residents in Bhaktapur regarding their readiness to transfer their habits of driving to walking and cycling, at least for short trips.

The chosen street passes through six of the 10 wards. While being observed, each ward is assessed on four criteria: comfort, connectivity, pleasantness, and safety. On a scale of one to six, these factors are scored as follows: awful = 1, many problems = 2, some problems = 3, good = 4, very good = 5, excellent = 6 [7].

Questions on the four parameters are also posed to

locals and stakeholders. Strengths and weaknesses are identified through interviews and observation. There is a discussion of the positive and negative factors that influence walkability. The necessary guidelines for achieving walkability are highlighted after that.

## 7. Literature Review

### 7.1 Pedestrians

Pedestrians are those who walk from place to place or move at a slow speed. A pedestrian is a person who travels on foot for various reasons such as job, recreation, social interaction, shopping, and so on, whether walking or running. This includes physically challenged, visually impaired, elderly, and very young people [8].

### 7.2 Walkability

The level to which the built environment supports and encourages walking by providing pedestrians with comfort and safety, linking destinations in a fair amount of time and effort, and giving visual interest during journeys is referred to as walkability. For all, including the elderly and differently abled, a highly walkable environment enables access to frequently visited areas concerning safety and comfortable streets [9].

### 7.3 Design Principles for Pedestrian Network Plan

The following are important principles for a pedestrian-friendly design:

- Routes should lead directly and safely to pedestrian infrastructure.
- Pavements should be built to be attractive and comfortable to walk on. Sidewalks should be inspected on a regular basis to ensure that they are in good working order, particularly in the case of slick or damaged surfaces and impediments.
- Adequate pedestrian network lighting improves road safety while also implying a certain level of security against criminal attack and enhancing pedestrian comfort.
- Pedestrian pathways to public transportation stops must be accessible and connected [9].

## 8. Case Area

Bhaktapur is the Kathmandu Valley’s oldest city. Bhaktapur’s key attractions include the amazing architecture, magnificent woodcarvings, and metal artistry, including the Pottery Square, the Palace (Durbar) Square, which dates back to the 12th century and where devotees still celebrate their centuries-old festivals, and the colorful temple squares. The Durbar Square is one among the valley’s UNESCO World Heritage Sites [10].

The Bhaktapur Municipality covers a total area of 6.56 square kilometers. The transportation sector emits a total of 3,310 tons of carbon dioxide per year. The average annual energy demand was found to be 33,044 Giga Joule (GJ), with the smallest truck accounting for 33 percent of total energy demand, the highest of any vehicle, followed by a pickup [11].

Motorized vehicles were never planned to accommodate in the old city Bhaktapur. In 1993, the Bhaktapur Municipality designated Bhaktapur Durbar Square as a free vehicle (two and four wheeler) zone in the heart of Bhaktapur town. Vehicles were not allowed in the town from 8:00 a.m. to 8:00 a.m. in 2011, from Taumadi square to Dattatreya square (where Nepal’s highest five-story temple, Nyatapola, is located) (Chyamasingh Gate). Unfortunately, there are still too many cars parked in the historic town’s ancient areas. These public areas were created with a social, cultural, recreational, and political purpose in mind for city people. The old town’s encroachment of such places by vehicles is now severely harmed [12].

### 8.1 Structure of Bhaktapur

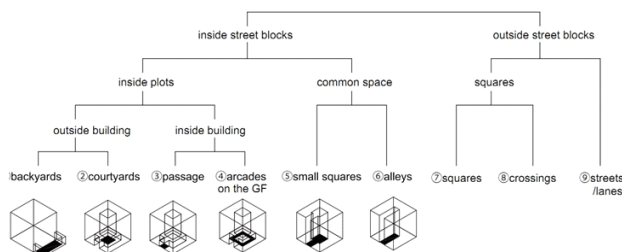


Figure 2: Typology of Public Space [13]

Houses in Bhaktapur, like those in other Newari settlements, have a courtyard through which each household’s entrance door connects to the streets and lanes outside. Within an urban block, there are networks of interconnected courtyards. Classification of outdoor community space is done in and around

dwellings, as well as typical public space such as squares, crossings, and streets [13].

## 9. Findings and Discussion

Bhaktapur municipality is divided into ten wards, six of which border the main street that runs from Bharbhacho to Chyamasingh (Suryamadhi), namely Bharbhacho, Tekhacho, Nhesa: twa, Bulcha, Nasamana, Taumadhi, Kwachhen, Tibukchhen, Inacho, Layaku, Golmadhi, Tachapal, and Suryamadhi.

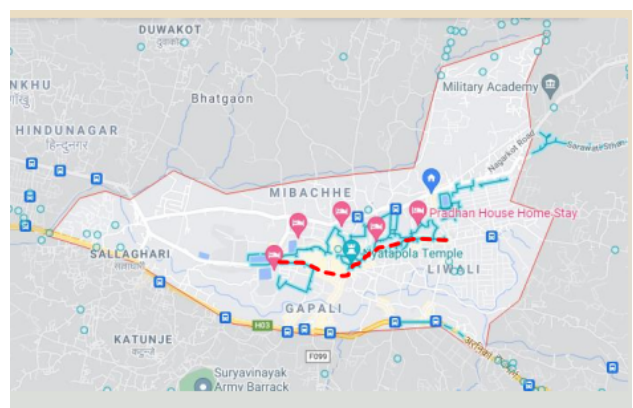


Figure 3: Chosen Street

### 9.1 Comfort

#### 9.1.1 Cleanliness

The garbage is collected outside their home and the municipal vehicle picks it up every day. However the absence of dustbins encourages locals to litter in the street.

#### 9.1.2 Surface

The municipality has completed laying stone on the road surface of the main street in 2019 AD. The newly stone laid road surface is more convenience and safer to walk. There is presence of speed breakers at several places which is also likely to reassure the increasing number of use of vehicles.

Niraj Shrestha, the shopkeeper of the clothing store said, “Before laying stone in the street, it was very uncomfortable to move even for a short distance and used to be full of dust and dirt. After stone laying, this street’s quality has become more comfortable and better for the pedestrians.”

### 9.1.3 Engagement

The engagement of street is mainly defined by the activities and flow of occupancy. The morning and the evening activities include traditional rituals (Bhajans, puja), grocery market and loading and unloading of goods for shops. The footpaths and traditional paatias are invaded by the grocery vendors. The street is overcrowded with people rushing to go for job, shopping for grocery and religious purpose. The street is occupied with more number of vehicles during rush hour. However, the street is quiet less active during afternoon whereas the number of pedestrians and vehicles flow are almost 1:1 ratio. Paati is mainly occupied by the senior citizens gossiping. The squares and chowks, during night, are occupied by the vehicles parking by the locals.

P5: “The main junctions are full of traffic during the rush hour. It takes me more than 10 minutes to cross the road at that time.”

### 9.1.4 Familiarity

Comfortness is assured within the circumstances of how much familiar one can get with the street pattern. The route chosen, being the main street and jatra route, is familiar with the people living and using it.

### 9.1.5 No Travel Cost

The main street connects to the various streets and lanes which meets to the main highway which can be reached within 5-15mins from their home. Therefore, people prefer to walk for a short distance and minor tasks.

P1 said, “There is no public vehicles available during early morning and late night. Since time consumption and travel cost is mainly calculated to make any journey, the unavailability and high price of public vehicles of various routes at any time is a major factor for me to choose to drive motorbike rather than walking.”

### 9.1.6 Mix land use

Pedestrians prefer eating, shopping and resting while commuting. The combination of shopping and eatery often provides comfort while walking. Since the main street is amalgamation of various traditional and modern activities, the pedestrians find comfortable and easy to walk.

## 9.2 Connected/Accessibility

Walking is preferred only when basic amenities are at easily reachable places. The basic amenities are available within the walkable distance or could reach using public vehicles. However, the working place and education institutes being outside Bhaktapur, for many people living here, needs to own their own vehicles.

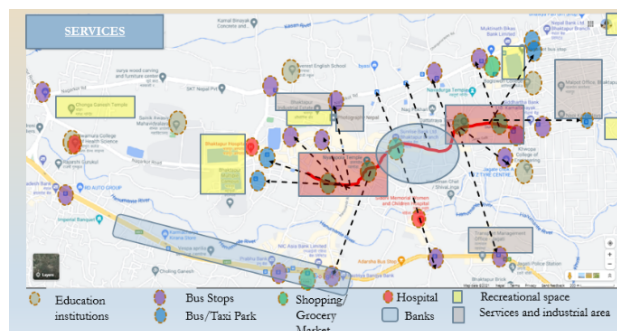


Figure 4: Accessibility to various Amenities

### 9.2.1 Distance

The influencing factor for people to walk is the distance they need to make to carry out certain task. While interviewing with locals, it is found that people prefer walking only if the route is short.

### 9.2.2 Street Pattern and Connectivity

The streets in study were found to be well connected for pedestrian movement. The main streets were intersected with several secondary streets. Some of the secondary streets would lead to residential squares. These routes are mostly navigated by the residents of the area. There were many alternate routes for the pedestrians to choose while walking.

P14: “I prefer walking because the market places, public spaces, recreational zones and basic services (doctors, dentist, police station etc.) are easily accessible. The bus and taxi stops are in five minutes in distance. So, overall walking is better from my home.”

### 9.2.3 Accessibility and availability to Public Transport

The close proximity of the Bhaktapur bus stop, Kamalvinayak bus stop, and Chyamasing bus stop is a major motivator for people to walk. However, the lack of bus service on various routes, as well as the limited number of public vehicles, are deterrents to walking. Similarly, unsafe public transportation and a lack of public transportation during late nights and early

mornings have been identified as dissuading factors in people's preference for walking.

P5 said, "The planning of the city was designed so as to create difficulty in invading the city. The settlement is on the top. While to get to the home, one has to walk along the steep street which is difficult for the senior citizens. If in case, provision of special system is created for the senior and disabled people, the city would have been more comfortable to walk."

Parking is the main problem in many Newari settlement, let alone Bhaktapur, as the area of home is designed for the accommodation of people not vehicles.

Nawal Rajbhandari, the owner of Bhadgaun Guest House said, "Many local entrepreneurs have migrated to the outskirts of the city because of less accessibility and no provision of parking."

However, the municipality is planning to construct parking lots on the entry points of the city; Siddhi Smriti, Brahmayani, River corridors of Hanumante Khola, Upa Mayor Ar. Rajani Joshi said, "The city should prioritize the concerns of the pedestrians while the increasing number of vehicles alarmed us to construct parking lots immediately. We are planning to construct them as soon as possible."

### 9.3 Pleasantness

#### 9.3.1 Structures

The structures constructed in the Malla period are still eye-catching. For instance, Nyatapola temple, Barahi temple, Dattatreya Square, Bhairabnath temple, Daurbar Square and paaties and sattal. Similarly, presence of dabali, paati and staircase of temple supports the local events that are carried out on daily, monthly or annually depending up on the type of cultural, social, commercial and religious events like, Bisket jatra, Gai jatra, bhaktapur mela/mohatsav, Gunla, Buddha Jayanti, Daily evening Bhajans, Yomari Punhi, Dashain, Krishna janmastami, Gathamanga, Sakimana Punhi and many others.

#### 9.3.2 Events

The walking will be more pleasant only if various engaging events are happening in the main market places. Evening bhajans and jatras are the cultural events which take place more often. However, daily evening bhajans have involvement mostly senior citizens as audience and participants. Similarly, less

involving activities for youths has increased anti-social activities in dark and isolated places discouraging people to use the street or place for the next time.

Sumit Bala, the president of Cycle Connect Bhaktapur, said, "There are many programs going on and about to happen for cycling. The youths are attracted towards cycling these days. Such events are the attraction point for the local as well as the visitors. Cycling and walking have more health benefits too. Our team will help to connect with various people from numerous occupations making cycling as a pivot."

#### 9.3.3 Economic Activities

The shopping option on the way makes the place to be pedestrian friendly. People are found more on the economically busiest market place like Taumadhi, Sukuldhoka and Bansagopal area for grocery and clothing. However, the street vendors invading the footpaths are creating chaos in pedestrian movements.

P2: "Street vendors should be abolished as they are creating chaos while walking."

#### 9.3.4 Community Attachment

Sentimental and emotional attachments with the community they live in, create a possibility to choose walking over riding a vehicle. The social connection or community attachment leads to people choosing their route. This creates a jovial group of people sitting and talking with a cup of tea/coffee in a corner shop or outdoor shop, therefore forming a community. This can be found more during jatras and festivals when people residing in the outskirts of the city come to their place and interact with their peers.

P8 said, "Places like Chiya Bhatti and Aalucha should be constructed more mainly for the youths so that they would find pleasantness during their travel."

### 9.4 Safety

Safety of street refers to the freedom to walk without getting into trouble and accidents. The modern street is occupied with clamorous traffics which affect in walking. The measures of safety in this research are mainly in four areas as: traffic, street light, signage and perceived security.

**9.4.1 Traffic**

The street chiefly occupied by motorbikes and scooters. Vehicles are parked just in front of the shops by the shopkeepers and their customers. Although the municipality has a speed limitation provision which is up to 20km/hr, locals, mainly youths were seen riding vehicles vigorously crossing the designated speed limit. Therefore, senior citizens and children are found to be vulnerable.

Niraj Shrestha said, “The youths drive aggressively. The street is also comfortable for motor riding after stone pavement. Is this material used to encourage people to drive vigorously?”

P11: “Traffics can be reduced by declaring one-way route policy and time limit for the heavy load vehicles.”

**9.4.2 Street Lights**

During the planning of the city, people used to have very less or zero night life. With modernization, the street was accommodated with solar lights. However, due to low maintenance, the street is not well-lit as most of the street lights are not working which has direct impact on demand of night life of youths which ultimately discourages walking but encourages antisocial activities during night.

P1 said, “The main street is not well-equipped with enough street light. There are street lights in some places but not well-maintained encouraging anti-social activities around and within the streets during nights making walking uncomfortable and unsafe.”

**9.4.3 Signage**

Though the main street touches many toles, there is no proper signage of name, direction and information of that place provided. This would create haywire among the visitors, though not the locals. The absence of proper signage of traffic rules has encouraged the locals to be less careful about rules creating chaos in the streets.

Prabhas Dhaubanjari said, “Bhaktapur is a friendly place. People take you to places without hesitation. However, there is no signage besides no parking where everyone parks. Ironically, there is no “parking” signage.”

**9.4.4 Perceived Security**

The systematic planning system has provided perceived security for the people, however modern

lifestyle has changed the need of such vacant spaces, using them for parking purposes. Illegal parking, and riding vehicles in maximum speed has obstructed the available perceived security.

**Table 1: Total Overall Ratings**

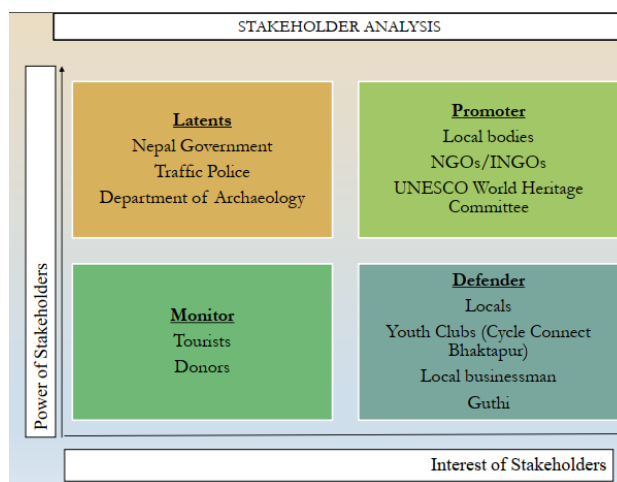
Parameters	Wards					
	1	3	4	5	7	9
Comfort	2	3	2	2	5	3
Accessibility	5	4	5	2	3	5
Pleasantness	4	5	4	5	4	5
Safety	3	3	3	3	3	2
<b>Total Rating</b>	14	15	14	12	15	15

The overall rating of the four categories yields mixed results. There are some benefits to being active and healthy, but there are also some gaps.

**10. Analysis**

**10.1 Participation Analysis**

This step of the analysis presents an overview of all persons, groups, organizations, institutions, sector, region, etc., involved in or influenced by the project.



**Figure 5: Stakeholder Analysis**

- The stakeholder analysis shows that Nepal Government, Traffic police and Department of Archaeology have high power but less interest.
- Local bodies and UNESCO WH committee are found to have high interest and power.
- Tourists and donors are found to have less power and less interest.

- Locals, youth clubs (Cycle Connect Bhaktapur), guthis are found to have high interest and less power.

### 10.1.1 Encouraging and Discouraging Factors

Bhaktapur municipality is formulating plans and policies to maintain the walkable characters of Bhaktapur since 2050 B.S. Gradually, the locals are getting aware about the same although there were some difficulties while carrying out the plans in the process. While the modernization and motor dependency is increasing rapidly in the city, pedestrians are in the most vulnerable stage recently. The mostly affected people are the senior citizens, disabled and the children. While observing the movement in the street, it is found that mainly youths having driving license are using vehicles. The younger people are more aggressive while driving resulting uncomfortable and harsh walkable environment.

The discouraging are:

- There is very less public vehicles available during early morning and late nights. Similarly, the public vehicles do not take them in time to the destination because of traffic jams and unmanaged system of the vehicles itself, therefore, encouraging youths to own vehicles.
- Though the street is accessible to the near bus stations, the unavailability of various routes in public vehicles results in ownership of vehicles.
- There are very less youth oriented events happened routinely.
- There is no provision of parking system resulting unmanaged and risky parking.
- The main street is unsafe for pedestrians (mainly children and old people) because of the high speed motorbikes coming on their way.
- The vendors are equally making the street busy and chaos leading their travel uncomfortable.
- The children has less outdoor playing space as most of the chowks are used for parking space.
- The lighting system is very poor leading to uncomfortable and unsafe walk during nights, especially for women.
- The main street is unsafe during night because of the precarious street dogs.

- Though the street is easily accessible to facilities, the narrow gullies are creating obstruction during emergencies.

- There is no proper signage leading the visitors being confused on traffic rules and parking facilities.

- Interruption during travel because of beggars and hand-sellers.

On the brighter side, there are encouraging factors that may help to enhance walkability. They are: Structures from the medieval period are well-maintained and managed with regular maintenance.

- Maintaining carfree zone and vehicular restriction policy by the municipality.

- The streets are well-managed by laying sustainable and vernacular materials.

- Daily ritual bhajans are still given handover to the generations.

- The street is accessible and within a walking distance to various infrastructures and facilities.

- Municipality encourages students and researchers to study about culture, history, planning of the city.

- Recently, youths' inclination towards cycling shows readiness and alertness towards maintaining and enhancing walkability.

## 11. Conclusion and Recommendation

The main research objective was to find out the influencing factors for walking and cycling. This qualitative study has highlighted some key factors for the same, mainly walking, both in negative and positive way investigating the motivation and barriers to walking. The findings served as the basis to contemplate the needs of modern society while increasing walkability. The study was designed and administered in observation and talking with the general public and municipal heads of Bhaktapur municipality. Direct observation and interviewing to the key informants helped in exploring the area of concentration that need to be looked for.

The theory and signs of a walkable city approve Bhaktapur as a walkable town because the city was planned for human and chariot movement. The chosen street is convenient to services, nice to walk down, and safe which is encouraging factor. However, the modern lifestyle and ever-changing needs are causing managers to be perplexed. There is a



significant difference between people's perceptions and the government's targeted area. Though the tourism sector stands to gain more by pursuing a walkable environment, it would be inconsequential if they failed to consider the needs of indigenous people who live in the area that makes it livable.

While observing and interviewing people, it was found that the urban community might shift its lifestyles, attitudes, and habits from motorized to walking for short trips without jeopardizing the quality of life only if their urban demands are fulfilled with necessary rules and infrastructures. The main problem was seen in public vehicles as there are no vehicles for the various routes. Similarly, the public vehicles are not available or likely to have more passengers' number during early morning and late nights. It was found that the public accepts the pedestrianization and vehicle restriction while they demanded for the access during emergency. One of the informants has recommended for one-way vehicle route. Similarly, they have a high demand for parking facilities. If parking facilities being manifested, there would be less vehicles parking on the side of the street.

Finally, though enhancing walkability could be a laborious process, it is necessary to maintain it especially in the ancient places like Bhaktapur. The city needs to be conserved considering the lifestyle of the people. The planning of the city wasn't done for the vehicles. Thus, it is a high time to be aware and change the mindset of the people. The city would be as similar as in the ancient time only when the civills are aware about its importance. As walkability has been a subject of debate in planning of the city, it is our duty to maintain the characteristic of the place which is already a walkable town. Studying its features could help in designing a modern walkable city.

The possible solutions are:

- Encouraging shared pedestrianization in the chosen street as it is a mixed zone, automotive mobility is required for the delivery of commodities for business purposes.
- Efficiency and reliability of public transport has to be improved.
- Availability of taxis in the near bus station could help locals for easy long route transportation and local taxi driver for their job security.
- Effective speed limitation and no horn rule for the vehicles.
- Time limitations for the entry of vehicles for the shops and grocery.
- Allotting the parking spaces on each entry points and city infringes.
- Available parking spaces should be reconstructed and made available for the local.
- Free overnight parking services in the public spaces like; party palace, public schools and colleges, hospitals, malls etc.
- Side parking in the highway
- Designating the one-way routes for the vehicles.
- Street sellers, on the other hand, should be located in such a way that they do not obstruct traffic movement. Time could be set aside for street vending at specific times of the day.
- Adequate lighting during nights for safer travel.
- The historic important amenities like ponds, dhungedhara and jahru can be revived for drinking and ground water recharge.
- Organizing street events from time to time like street festivals, Flash Mob, Photo Exhibitions and Documentaries could promote pedestrianization and make people aware of the benefits of pedestrianization.
- Create and assess a local marketing effort to encourage individuals to walk and bike more frequently.
- Providing a cycle lane (Sallaghri – Byasi – Kamalvinayak – Chyamasing – Jagati – Suryabinayak – Chundevi – Sallaghari) can reduce the use of vehicles for the short routes within the circuit. This will encourage people to use bicycles when walking consumes more time.
- Explore opportunities for new technologies (e.g. Intelligent Transportation System products) to be deployed for the benefit of bicyclists and pedestrians by promoting campaigns that target dangerous driving behavior (e.g. speeding, pedestrian and bicycle right-of-way violations, aggressive driving) that endangers bicyclists and pedestrians.
- The locals are highly dependent upon the government bodies even for the smallest of the things. The time has come to handing over the “culture of feeding” to

the youth clubs and tole sudhar community.

- Place-making the adjacent streets to strengthen the sense of place. For examples events, paintings, crafting etc.

### Acknowledgments

The authors would like to thank Bhaktapur municipality including Mayor Mr. Sunil Prajapati, Deputy Mayor Ar. Rajani Joshi, and administration head Mr. Damodar Suwal for their valuable input and consultation during the course of completing this research. The authors would also like to thank Mr. Shail Shrestha from Digo Bikas Institute, Ar. Kriti Pradhan, Er. Sumit Bala and Mr. Girish Raj Sharma for their important piece of advice while completing this research.

### References

- [1] William R. Black. *Sustainable Transportation Problems and Solutions*. Guildford Press, 1st edition, 2011.
- [2] Ilaria Henke, Armando Carteni, Clorinda Moliterno, and Assunta Errico. Decision-making in the transport sector: A sustainable evaluation method for road infrastructure. 2020.
- [3] Why are kathmandu's traffic jams notorious?
- [4] Road expansion not the only solution to traffic jams: Report.
- [5] Charina Cabrilo. Walkability in asian cities - assessment of pedestrian infrastructures and services in four areas in bhaktapur city. 2010.
- [6] MoPIT/JICA. Public transport survey report. 2012.
- [7] Walkability in survey monkey.
- [8] Omanwa Paul Angwenyi. Study on the adequacy of street infrastructure in the use of urban space in kimathi street, nairobi central business district. 2016.
- [9] Michael Southworth. Designing the walkable city. 2005.
- [10] Bhaktapur.
- [11] Prasadha R. Neupane, Iswor Bajracharya, Bhai R. Manandhar, Meera Prajapati, Hishila Sujakhu, and Pramod Awal. Estimating emission load from road transportation within the bhaktapur municipality, nepal. 2020.
- [12] Saroj Shrestha. Let's make bhaktapur a pedestrian friendly town. 2014.
- [13] Anri Kido, Naohiko Yamamoto, Maraya Masui, and Yasushi Takeuchi. Study on formation of urban tissue in bhaktapur in kathmandu valley, nepal. 2011.