GSJ: Volume 12, Issue 8, August 2024, Online: ISSN 2320-9186

www.globalscientificjournal.com

# TOWARDS BETTER CITIES: IMPROVING URBAN WALKABILITY

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## Abstract

Walkable towns and neighborhoods contributes in to achieving sustainability within any area. To ensure walkable neighborhood it should be kept in mind that there is sufficient space and adequate services for the walkers to gait effortlessly and also a relaxed environment for residents to reside. Currently, the main aim of planning and development specialists is to produce walkable societies, where the built-in environment is prearranged in a manner which foster walking and cycling to reach adjacent destinations instead of relying on automobiles. Our country is subjected to swift growth and increased urban population, enhanced pace of development, rural urban migration, amplified urbanization and transformation in infrastructure is causing critical impacts on walkability and thus dispiriting and tumbling its scope. Additionally, due to distended automobile practices and with the improvement and availability of new transport routes in Lahore, does not permits residents to walk. The outcomes of this study would enable the liable authorities to recognize and grasp the locations required for improvement, causes and levels of mutilation of walking routes as well as the pedestrian's specific needs through the systematic and acceptable assessment.

## Introduction

Walkable community or neighborhood is considered a significant component while discussing different urban theories. Globally, numerous sessions have been organized to promote walkability in neighborhoods the most common among them is "21$^{st}$ century walking forward: this session is conducted in various countries every year since 2000 to promote walking. Walkability is an essential component in creating pedestrian friendly environment in developed and advanced countries, while it's been neglected in most of the developing countries. Currently, the planners have shifted their attention towards this laxity area of planning. While,

walking and physical activities are strongly correlated with nearness of public spaces, recreational parks, educational institutes and pathways etc. (Berke et al., 2007; Tucker et al., 2009; Robitaille et al., 2009; Lovasi et al., 2008; Curran et al., 2006). Whereas the accessible distance till 1 km is more suitable for walking rather driving (Vargo et al., 2011). But the developing countries like Pakistan often deprived in the provision of walkable facilities in the residential, commercial and other urban centers (Sallis et al., 1998). Numerous methods exists to evaluate walkability, which differ in nature of qualitative or quantitative computation, sampling, as well as scoring. The utmost used method is by applying pedestrian shed analysis method which have been supported by the Western Australian Livable Neighborhood Code, as an instrument to gauge the walkability of a neighborhood. This technique can also be used to evaluate streets and road layouts for new and existing developments both, for making improvements and to enhance connectivity. GIS offers techniques that assist in developing indices of walkability not only at district or regional level but also to gauge new ecological and policy initiatives (Bauman et al., 2002). Spatial analysis on GIS provide a set of procedures which detect changes when the locality of the object which is being analyzed changes (Longley et al., 2005). The research aims to evaluate the walkability and give suggestions to design the patterns for the pedestrians which effect their attitude and emotions through providing safety. The research aim to identify the walkable areas around the basic community facilities by using Ped shed analysis, that is an area covered by a 5 min walk, research will also find out the perception of residents of the planned and unplanned community by comparing them and applying GIS spatial analysis techniques. The research will propose measures for improving the walkability to accomplish the goals of sustainable towns and neighborhoods.

Walkability based on the provision of soft and hard infrastructure, is being considered as imperative part of urban planning and design of a neighborhood, that yield to sustainable environment. It's been an integral part of smart and sustainable neighborhood. Walkability can be defined as the accessibility of daily amenities and services within one-quarter to one half a mile on the walk of almost 10 minutes (Ewing, 1999). Public friendly infrastructure for walkability in neighborhoods is being considered as focal goal during plan making. To fill the gap, many researchers had shown their interest in neighborhood's walkability, which is now a forefront discussion topic in the urban planning literature. In addition to other issues, urban sprawl is a core planning problem, which needs to be resemble through compact and mix use strategies on which the city planners are being emphasized. (Ewing &Chen, 2003) elaborated the physiognomies of urban sprawls that deterrent the mobility and walking. But in contrast, the compact and mix use neighborhood are more appropriate for walking with the linkages of streets and urban spaces.

Unfortunately, Pakistan the policy guidelines and parameters for the provision of infrastructure and its maintenance to enhance the walkability in the community neighborhoods. Meanwhile, the focus of the developers is to escalate the saleable area with least or no provision of facilities to ensure the walkability. Despite this, the concerned regulations are also silent in this regard except the National Reference Manual (NRM), 1986 which highlight only few point of community facilities. Nonetheless, these guidelines are not followed in true letter and spirit, due to its non-legal obligation. The future public and private sector development in 2nd largest city of Pakistan, Lahore, is not in accordance to the international standards of walkability. The pedestrians often face obstacles during walking on the walkways of planned neighborhood and communities such as broken footpath or manhole, no proper lanes demarcations, water logged etc. Therefore, the general public often prefer to use automobile rather walking in fact for the small space. Hence, this is necessary for evaluating the above session situations evolving in the living area and propose this actions to make it perfect. These efforts might appeal the residents walking on the path. Also, walking is a decent way of doing exercise and for boosting pedestrian's soothing perception. This method must not be interpreted as pedestrian route only but it is to be adopted as a constituent of sustainable urban environment.

**Literature Review**

Many Urban design studies investigate that the pedestrian movement have sufficient correlation among neighborhood level design. The main prominence is placed on the quality of design, which is treated in line with the condition of distinct streets. The street environment observed in many researches ranges from the dimensions of sidewalks to the design of façades of retail, they also prevail ecological comfort that may ultimately encourage pedestrian movement (R. Ewing, & Handy, 2009; Badland & Schofield, 2005). Pedestrian movement is considered as a major element to determine physical activity levels (McMillan, & Alfonzo, 2005). Pedestrian can also be a considered a key factor in defining secure and pleasant neighborhood environment, encouraging walking (C. Brown, Jones, & Braithwaite, 2007). The presence of crossings, eye-catching landscaping, proper signals, aesthetic or security features like cleanliness, fascinating architecture promote walking (Irvin, 2008;Gehl, 2011).The accessibility to leisure facilities, chances for physical activities, and aesthetic features consistently relate to behavior (Owen, and Leslie, 2002) such designing attributes are clearly imperative in forming environment which is walkable. Yet, walking is considered as context reliant activity that needs navigating by spaces, not in the spaces. Therefore, it cannot be explicated on the potential of the specific street secluded from its surroundings. Walking require pedestrians to discover perceptually all accessible networks or links that have been cognitively registered. Similarly, scholars in transportation and urban planning have explained

walkability and characterized it in terms of proximity and connectivity (Frank, 2000), to reveal their connotations with pedestrian movement. Proximity tells the distance in whole trip from origins to destinations. It is calculated by urban form indicators which is compactness of land uses. Density is supposed to figure out by pedestrian activities it can be by bringing various activities close hence, increasing the accessibility from origins (Krizek, 2003). People are ready to walk to cover shorter distances (Marshall & Grady, 2005). The other constituent of proximity is mixed land use, or the distance among diverse sorts of land uses (residential and commercial). Likewise, mixed land use increase accessibility by boosting the number of accessible destinations inside walking range, it also influence and make it convenient to get to work, walk or to shop, having destination within walking distances from origin create the chances of walking (Frank, Handy & Clifton, 2001). Many studies have clearly identified association between walking and connectivity but in some studies association is weak (Handy & Clifton, 2008). This is due to the absence of measures that illustrate that the spatial structures of urban street networks at different scales and spatial structure affect pedestrian movement in space. This research will principally assess the accessibility in selected planned and unplanned towns to propose measures for accomplishment of sustainable town or neighborhood. For this study, planned and unplanned towns are selected as case study areas by applying pedestrian shed analysis. The research study also aim at compare the design and development of both towns for identifying that which neighborhood design and travel pattern among both the towns is more viable, friendly as well as conducive to walk.



### Research Design

For the completion of the project effectively and within appropriate time, it is essential to have a suitable research tactic and a professional approach. This study is based upon the qualitative and quantitative approach of data collection and analysis based on GIS based walkability assessment, field surveys and literature review. The quantitative approach, in this research, was used to show the results in the form of figures/quantities whereas the qualitative approach is adopted to discover the opinions of local residents of selected case study areas. Both primary and secondary sources are consulted to collect the relevant data. The research methodology has been broadly divided into two parts; assessing the walkability of the study areas based on field surveys; secondly, identifying the walkable areas around the basic community facilities, using the GIS spatial analysis and lastly, investigating the perception of the local community regarding the car-free accessibility of community facilities.

## Results

### Spatial GIS Based Analysis for Walkability Assessment

GIS based analysis is the one in which the analysis has been made using the GIS software. In GIS, maps showing the walkable zones of all the neighborhood level services and facilities including schools, mohallah shops/convenience shops, playgrounds/open spaces, and mosques have been generated for both the case studies. These walkable zones have been generated with reference to the guidelines given in National Reference Manual on Planning and Infrastructure Standards (NRM). These maps have been created in order to determine and analyze the areas that are not served with neighbourhood level facilities.

## Spatial Analysis of Garden Town

### *Walkability Assessment for Mosques in Original Master Plan*

The maximum walkable distance for a mosque that has been given in National Reference Manual on Planning and Infrastructure Standards (NRM) is 500 meter. There were three mosques that have been proposed in original master plan of New Garden Town (see Figure). Two mosques were proposed on the Main Boulevard of Garden Town serving Shershah Block, Abock Block, Usman Block, and Babar Block while another mosque was proposed on the Canal road serving Ahmed Block. As per the guidelines of NRM, the Garden Block, Abu Bakr Block, Ali Block, Tipu Block, Atta Turk Block, Tariq Block, and Abadi Devasabad have not been served with any mosque within a walkable distance of 500 meter. The maximum distance which residents have to travel to reach a mosque is 1.75 kilometers which is considered to be neither walkable nor easily accessible. Moreover, one of the mosques proposed on the Main Boulevard Garden Town has not been developed yet and the site of the mosque has been used as a commercial area.

### *Walkability Assessment for Mosques in Existing Development*

The maximum walkable distance for a mosque that has been given in National Reference Manual on Planning and Infrastructure Standards (NRM) should be 500 meter. Currently, ten mosques are present in New Garden Town (see Figure). All these mosques were located in different blocks of Garden Town.

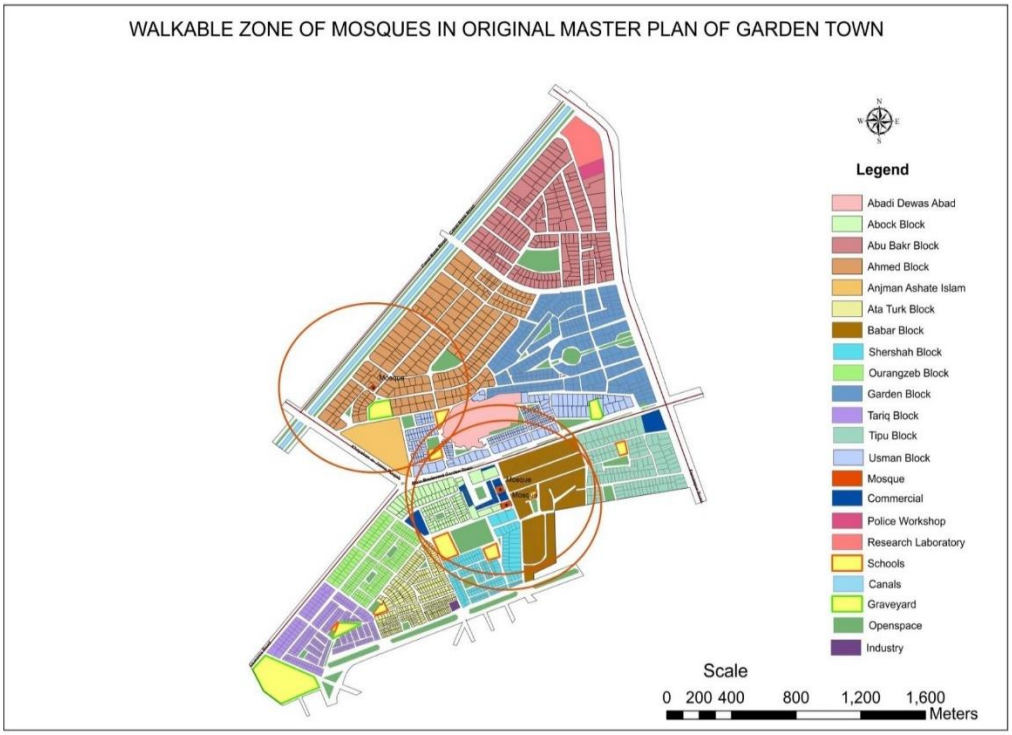



Figure 1 Walkable Zones of Mosques in Original Master Plan of Garden Town

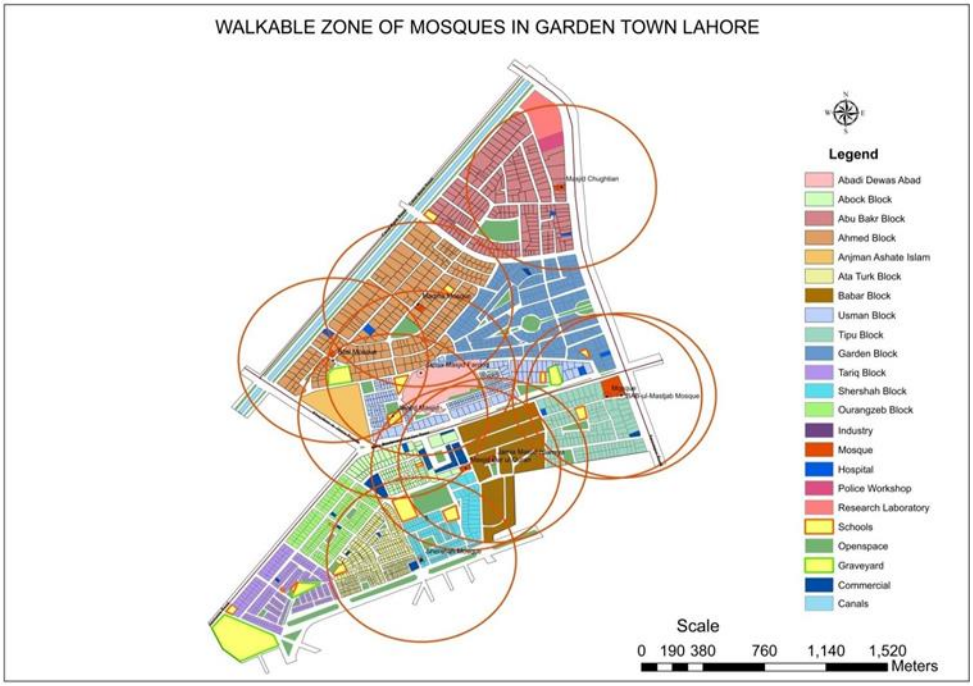



Figure 2 Walkable Zones of Mosques in Original Master Plan of Garden Town

As per the guidelines of NRM, some part of the Garden Block and Aurangzeb Block while the entire Tariq Block have not been served with any mosque within a walkable distance of 500

meter. The maximum distance which residents have to travel to reach a mosque is 0.72 kilometers which is considered to be neither walkable nor easily accessible.

### *Walkability Assessment for Clinics/Hospitals in Original Master Plan*

The maximum walkable distance for a clinic/hospital that has been given in National Reference Manual on Planning and Infrastructure Standards (NRM) is 0.5 kilometer. Only one hospital had been proposed in original master plan of New Garden Town (see Figure). The location for the proposed hospital was Main Boulevard Garden Town serving Shershah Block, Abock Block, Usman Block, Atta Turk Block, and Aurangzeb Block respectively. As per the guidelines of NRM, the Garden Block, Ahmed Block, Abu Bakr Block, Ali Block, Tipu Block, Babar Block, Tariq Block, and Abadi Devasabad have not been served with any clinic/hospital within a walkable distance of 0.5 kilometer. The maximum distance which residents have to travel to reach the hospital is 2.16 kilometers which is considered to be neither walkable nor easily accessible. Moreover, the hospital proposed has not been developed yet and the site of the hospital has now been used for commercial purposes.

### *Walkability Assessment for Clinics/Hospitals in Existing Development*

The maximum walkable distance for a clinic/hospital that has been given in National Reference Manual on Planning and Infrastructure Standards (NRM) is 0.5 kilometer. Currently, nine hospitals exist in Garden Town (see Figure). All these hospitals are located in different blocks of Garden Town serving all the blocks. The residents of Tariq Block has to travel a maximum distance of 0.56 kilometers which is quite walkable.



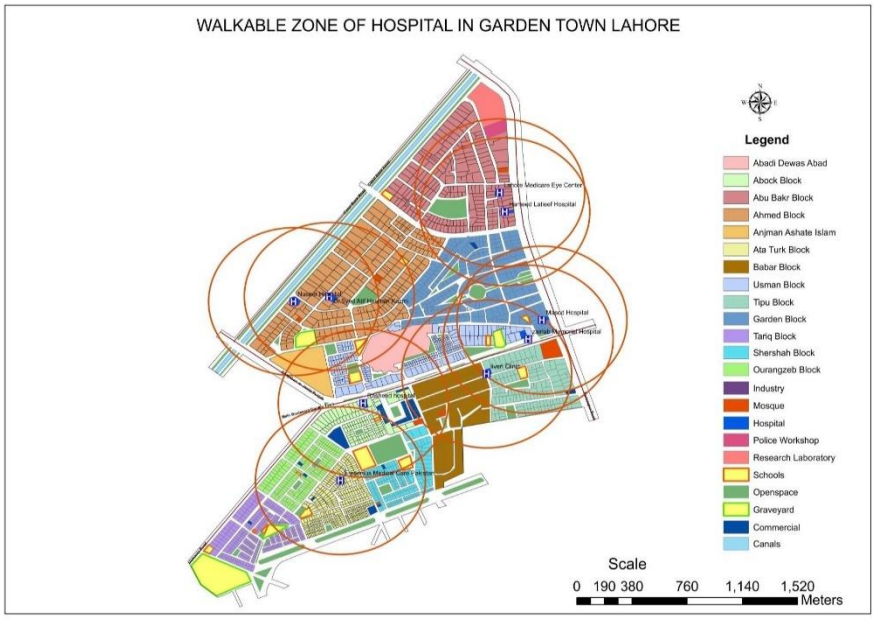



Figure 3 Walkable Zones of hospitals in Original Master Plan of Garden Town

***Walkability Assessment for Open Spaces/Parks in Original Master Plan***

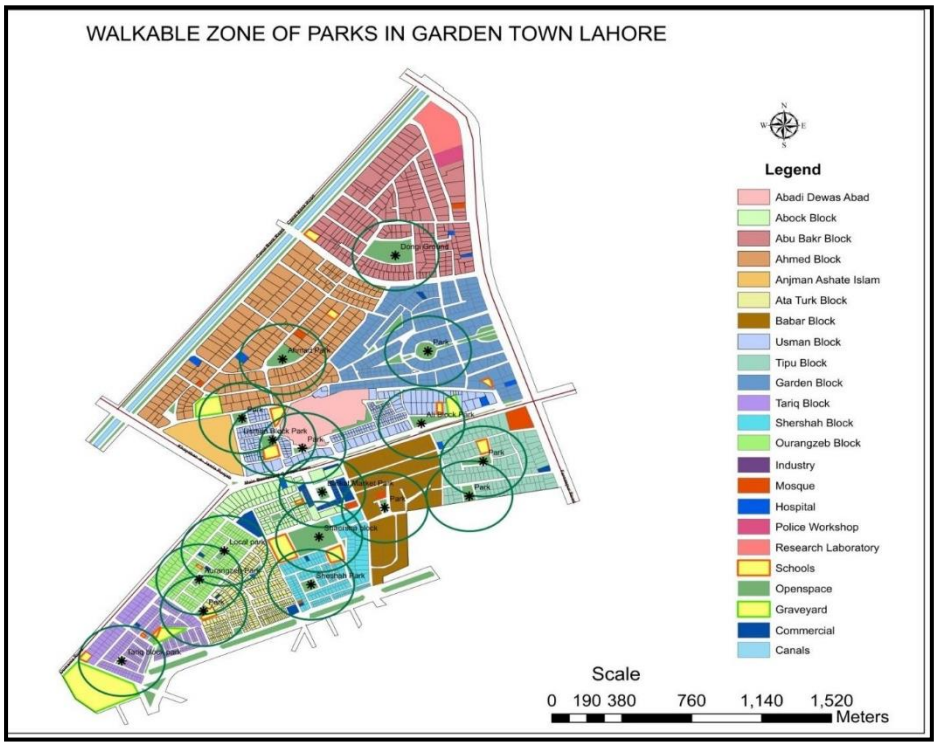
The maximum walkable distance for an open space that has been given in NRM is less than 200 meter. There were seventeen open spaces that have been proposed in original master plan of New Garden Town (see Figure 4.8). All these open spaces were proposed in different blocks of Garden Town and have been used still as open spaces. As per the guidelines of NRM, some part of the Garden Block, Abu Bakr Block, and Ahmed Block has not been served with any open space within a walkable distance of less than 200 meter. The maximum distance which residents have to travel to reach an open space is 0.69 kilometers.

***Walkability Assessment for Open Spaces/Parks in Existing Development***

The maximum walkable distance for an open space that has been given in NRM is less than 200 meter. There were seventeen open spaces that have been currently found in New Garden Town similar as per the proposed open spaces in original master plan (see Figure). As in original plan, some part of the Garden Block, Abu Bakr Block, and Ahmed Block has not been served with any open space within a walkable distance of less than 200 meter. The maximum distance which residents have to travel to reach an open space is 0.69 kilometers.

***Walkability Assessment for Schools in Original Master Plan***

The maximum walkable distance for a primary and secondary school that has been given in NRM is 0.5 kilometer and 1.25 kilometer respectively. There were seven schools that have been proposed in original master plan of New Garden Town (see Figure). All these schools were proposed in different blocks of Garden Town and have been developed. As per the



guidelines of NRM, Garden Block, Abu Bakr Block, and Ahmed Block have not been served with any school within a walkable distance of 0.5 kilometer. The maximum distance which residents have to travel to reach a school is 1.75 kilometers which is considered to be neither walkable nor easily accessible.

Figure 4 Walkable Zone of Parks in Original Master Plan of Garden Town

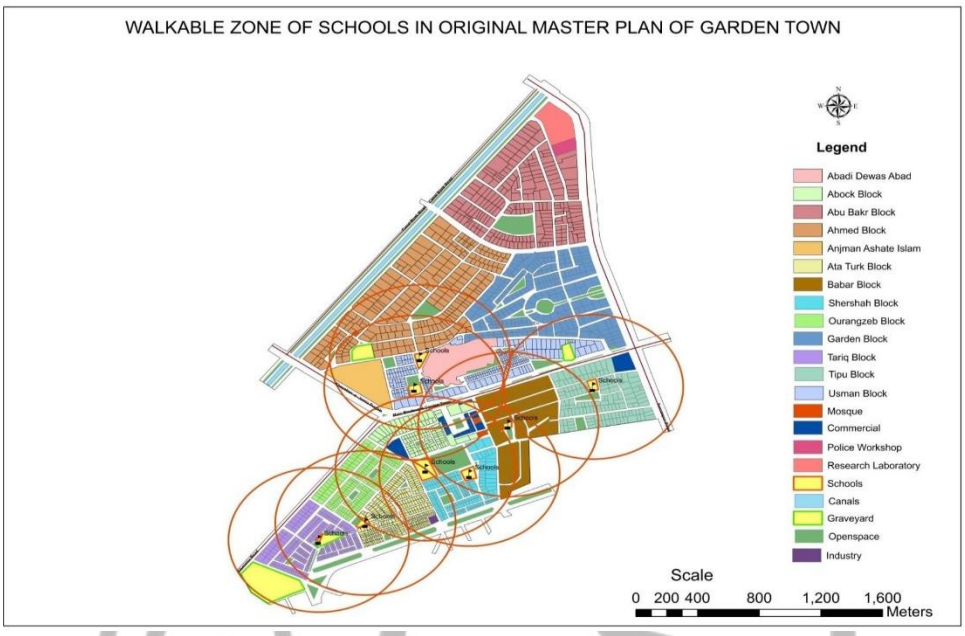



Figure 5 Walkable Zones of Schools in Original Master Plan of Garden Town

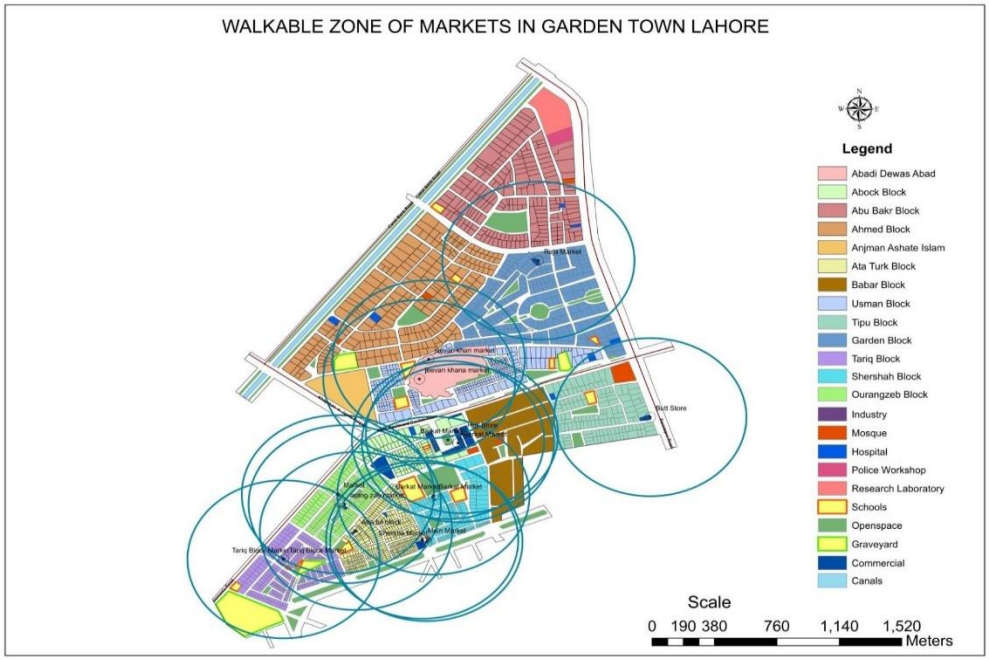



Figure 6 Walkable Zones of Markets Existing Development of Garden Town

## Spatial Analysis of Shalimar Town

### *Walkability Assessment for Mosques*

The maximum walkable distance for a mosque that has been given in NRM is 500 meter. There were four mosques in EME Housing Society, two of the mosques are located in Block H & J Latif Avenue, one is located in Block A residential area, while the Jamia mosque is in Block E, which is a commercial area and is located on the link road between Dolphin Chowk and E-Market Chowk . As per the guidelines of NRM, the block on the southern side of the scheme has not been served with any mosque within a walkable distance of 500 meter. The maximum distance which residents have to travel to reach a mosque is 1.03 kilometers which is considered to be neither walkable nor easily accessible by the residents of the block.

***Walkability Assessment for Clinics/Hospitals***

The maximum walkable distance for a clinic/hospital that has been given in NRM is 0.5 kilometer. There was only one hospital in EME Housing Society namely Saeed Trust Hospital (see Figure) and the hospital is located in Block F Majid Avenue. As per the guidelines of NRM, the blocks A, B and C on the southern side of the scheme have not been served with any clinic/hospital within a walkable distance of 0.5 kilometer. The maximum distance which residents have to travel to reach hospital within the scheme is 1.83 kilometers which is considered to be neither walkable nor easily accessible by the residents of the block.

***Walkability Assessment for Open Spaces/Parks***

The maximum walkable distance for a sub-neighborhood park that has been given in NRM is less than 200 meter. There were total nineteen open spaces in EME Housing Society (see Figure). All of these open spaces were located in different blocks of EME Housing Society. As per the guidelines of NRM, some part of the block C, and block D have not been served with any open space within a walkable distance of less than 200 meter. The maximum distance which residents have to travel to reach a sub-neighbourhood park is 1.42 kilometers which is considered to be neither walkable nor easily accessible by the residents of the block.

**Walkable Zones of Mosques in Shalimar Town**

1) Walkability Assessment for Schools

The maximum walkable distance for a primary and secondary school that has been given in NRM is 0.5 kilometer and 1.25 kilometer respectively. There was only one school in EME Housing Society namely the Lahore Grammar School (see Figure) and is located in Block H. Another school and a college has been proposed in Block C and Block F but has not been developed yet. As per the guidelines of NRM, the blocks A, B, C, D, E and some part of Block F have not been served with any school within a walkable distance of 0.5 kilometer. The maximum distance which residents have to travel to reach the school is 2.19 kilometers which

is considered to be neither walkable nor easily accessible by the residents of the block.

2) ***Walkability Assessment for Markets/Convenience Shops***

The maximum walkable distance for convenience shops that has been given in National Reference Manual on Planning and Infrastructure Standards (NRM) is 0.5 kilometer. There were ten markets in EME Housing Society (see Figure) which were located in different blocks of EME Housing Society. As per the guidelines of NRM, all the blocks of EME Housing Society have been served with markets within a walkable and accessible distance of 0.5 kilometer.

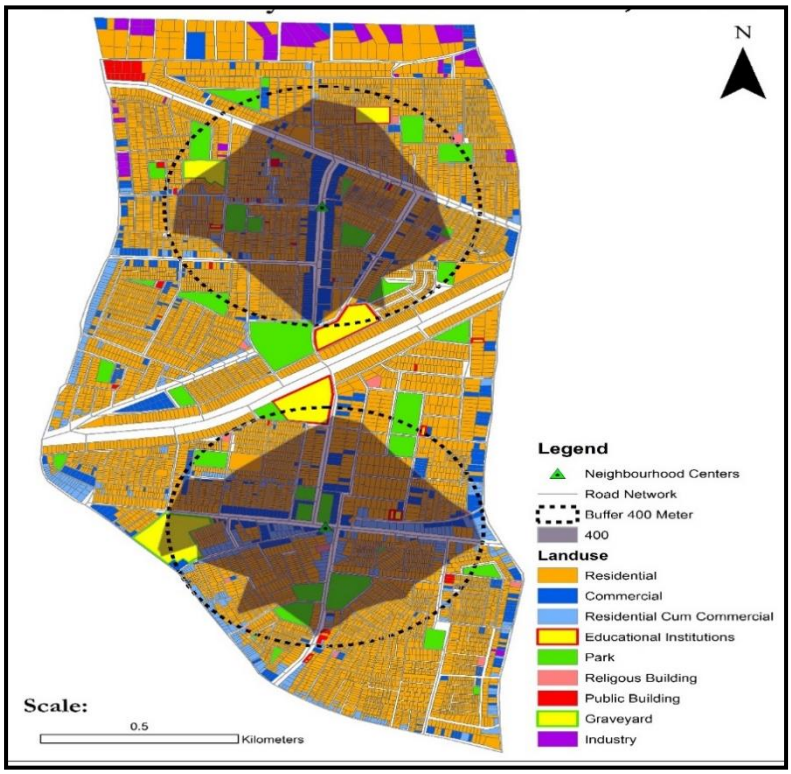



Figure 7

**Calculation of Walkability Index**

As mentioned in the literature review, walkability index can be measured through number of methods. Out of these the most prominent are Walk Score, Global Walkability Index and Asia Index. Walk score was generated online through website. For the calculation of Global Walkability Index and Asia Index, the length of road stretches and the data collected through field walkability surveys and pedestrian count survey was analyzed.

**Walk Score**

Walk score of Garden town has been calculated as 76 while a score of 33 has been calculated for EME Housing Society. On the basis of these score it is concluded that garden town is a very walkable society while EME is a car dependent society. However, these values are dependent only on the availability of community facilities as these are derived from the places marked on

Google Earth. These values do not indicate the quality of infrastructure available for pedestrian movement.

**Global Walkability Index (GWI)**

For the calculation of Global Walkability Index, the pedestrian count has been done on the roads in both schemes and the length of roads surveyed has also been calculated as shown in Table 1. As per the results obtained from the surveys conducted in garden town, it has been observed that commercial areas have the highest pedestrian volume .i.e. 61 pedestrians in 15 minutes with 8.5 kilometers of length surveyed. Residential areas display the second highest pedestrian volume of 30 pedestrian with total length of 5.4 kilometer. Public transport terminals areas have quite less pedestrian volume as compared to residential and commercial areas. The total pedestrian volume in public transport areas was only 25 with a total length of 3.1 kilometer. Educational areas have the least number of pedestrian i.e. 18 with an overall surveyed length of 5.4 kilometers.

The results of surveys conducted in the Shalimar Town, it has been noticed that residential areas have the highest number of pedestrian volume .i.e. 24 with a total surveyed length of 7.2 kilometers. Commercial areas of the town show the second highest number of pedestrians. These areas are 3.7 kilometers in length with only 8 pedestrian. Similar to Garden Town, public transport terminals areas of EME also have a smaller amount pedestrian volume as compared to residential and commercial areas. The total length of public transport areas is 0.9 kilometers with pedestrian count of only 7. Educational areas have the least pedestrian volume of only 6 pedestrians with a surveyed length of 2.3 kilometer

| **Pedestrian Count and Surveyed Road Length** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Case Study Areas** | **Residential areas** | | **Commercial areas** | | **Public Transport terminals areas** | | **Educational areas** | | **Total** | |
| | Pedestrian count (15 minutes) | Length (km) | Pedestrian count (15 minutes) | Length (km) | Pedestrian count (15 minutes) | Length (km) | Pedestrian count (15 minutes) | Length (km) | Pedestrian count (15 minutes) | Length (km) |
| **Garden Town** | 30 | 5.4 | 61 | 8.5 | 25 | 3.1 | 18 | 5.4 | 134 | 22.4 |
| **EME** | 24 | 7.2 | 8 | 3.7 | 7 | 0.9 | 6 | 2.3 | 45 | 14.1 |

Source: Field survey by the Researchers

The nine parameters of Global Walkability Index were calculated and analyzed in selected schemes within different land uses i.e. residential, commercial, educational and public transport terminal areas. The average walkability rating for each parameter within each land use was also calculated as shown in Figure. The dashed blue line and corresponding light-blue box show the average rating with respect to all nine individual parameters.

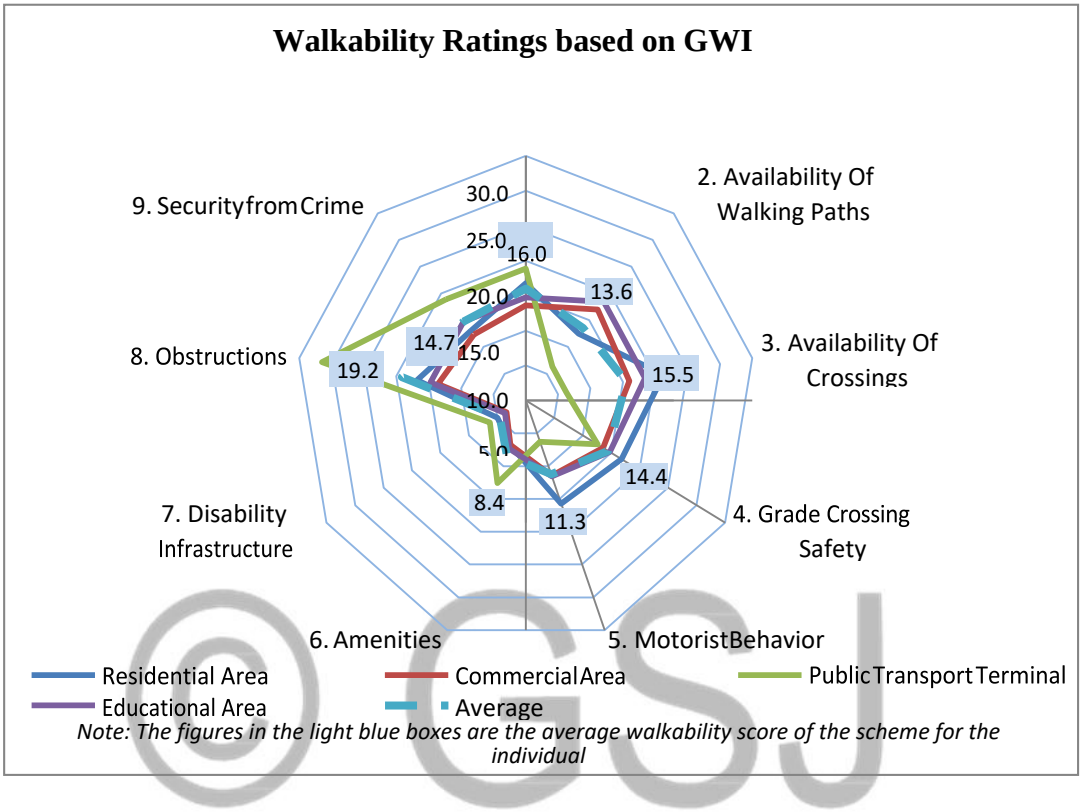



Figure 8 Walkability Ratings of Shalimar Town based on GWI

In case of Garden Town, it is clear that the rating for commercial area is above average for all nine parameters assessed in the field survey. The public transport terminal area also has good overall walkability rating for all parameters. The residential and educational areas have the lowest walkability rating as is evident from the graph. Among the parameters, the availability of crossings and disability infrastructure has received minimum average rating which is 10 and 12.3 respectively. In case of EME, it has been observed that the walkability ratings of residential, commercial and educational areas are quite higher. The public transport terminal area also has low overall walkability rating for all parameters. Among the parameters, the disability infrastructure and amenities has received minimum average rating which is 4.6 and 8.4 respectively. Based on the walkability ratings, the GWI was calculated for each land use as shown in Figure. The average of these individual GWI for different land uses was taken as the average GWI for the whole scheme.

**Asia Index**

Asia index is a modified form of Global Walkability Index. It differs from GWI as it does not document street lengths and pedestrian counts in its analysis and considers only field ratings for nine parameters in the analysis. As in Global Walkability Index, the ratings for all the parameters were noted and analyzed in selected schemes within different land uses i.e. residential, commercial, educational and public transport terminal areas. The average walkability rating for each parameter within each land use was also calculated as shown in Figure. The dashed blue line and corresponding light-blue box show the average rating with respect to all nine individual parameters.

From the results of Garden Town, it has been observed that the commercial and public transport terminal areas show good walkability rating whereas residential and educational areas show low ratings for all parameters. Among the parameters, the availability of crossings and disability infrastructure has received minimum average rating which is 26.2 and 32 respectively.

While in case of EME, it has been observed that the walkability ratings of residential, commercial and educational areas are quite higher. The public transport terminal area also has low overall walkability rating for all parameters. Among the parameters, the disability infrastructure and amenities has received minimum average rating which is 20 and 38.3 respectively.

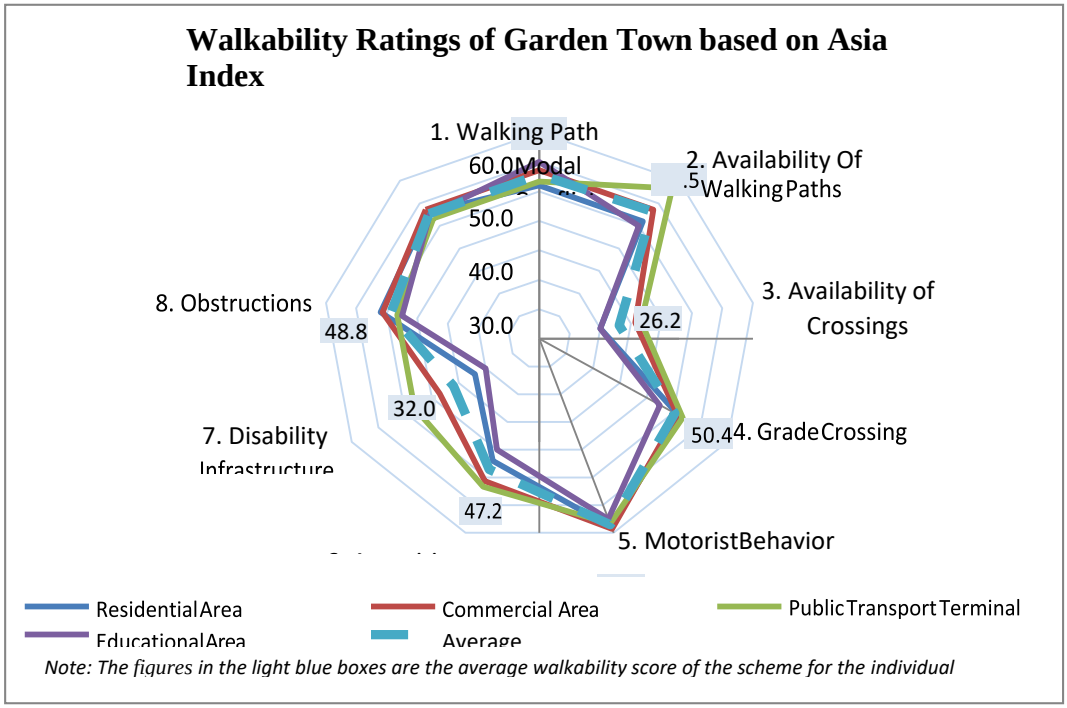



Figure 9: Walkability Ratings of Garden Town based on Asia Index

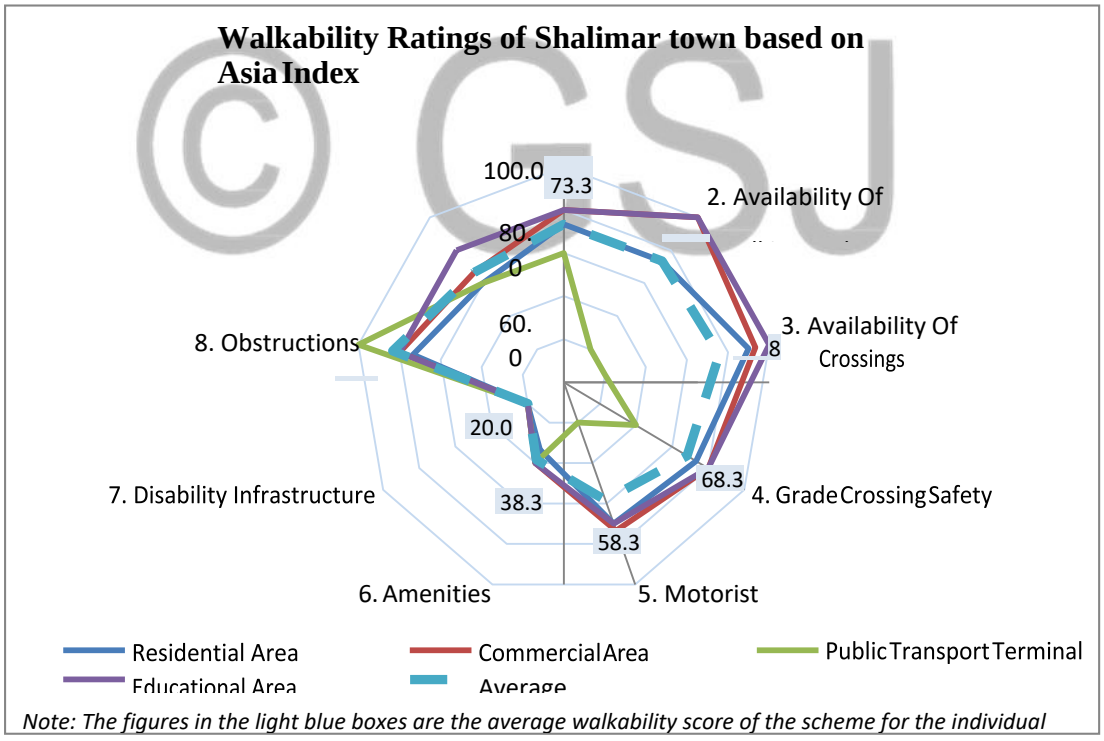
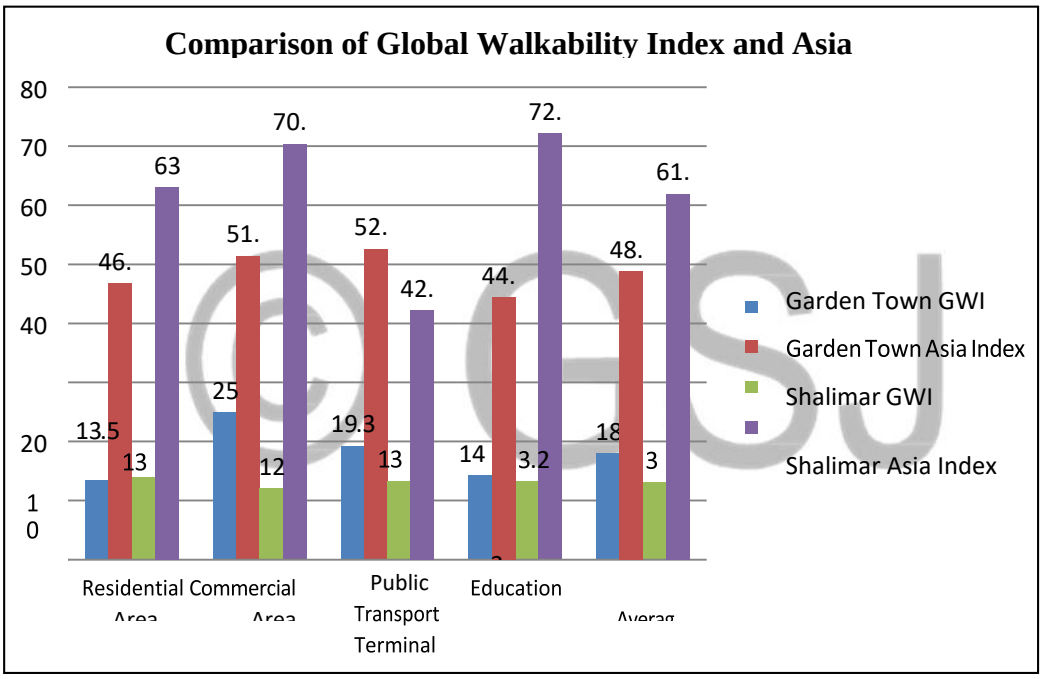



Figure 10: Walkability Ratings of Shalimar Town based on Asia Index

| Table 2: Comparison of Global Walkability Index and Asia Index | | | | |
|---|---|---|---|---|
| **Land use** | **Garden Town** | | **Shalimar Town** | |
| | **GWI** | **Asia Index** | **GWI** | **Asia Index** |
| Residential Area | 13.5 | 46.7 | 13.9 | 63 |
| Commercial Area | 25 | 51.4 | 12 | 70.4 |
| Public Transport Terminal | 19.3 | 52.6 | 13.3 | 42.2 |
| Education Area | 14.3 | 44.4 | 13.2 | 72.2 |
| Average | 18 | 48.8 | 13.1 | 61.9 |




This higher value of GWI in Garden Town indicates more pedestrian movement however its low Asia Index value shows that the quality of pedestrian infrastructure is not good in Garden Town in spite of more number of pedestrians in the area. In Shalimar the value of GWI is low but its Asia Index value is high and indicates that the pedestrian facilities are well provided in Shalimar Town but residents prefer to commute through automobile, therefore the pedestrians in the scheme are very few in number.

## Conclusion

Walkable community or neighborhood is considered a significant component while discussing different urban theories. Globally, numerous sessions have been organized to promote walkability in neighborhoods the most common among them is "21st century walking forward:

this session is conducted in various countries every year since 2000 to promote walking. Walkability is an essential component in creating pedestrian friendly environment in developed and advanced countries, while it's been neglected in most of the developing countries. Currently, the planners have shifted their attention towards this laxity area of planning. While, walking and physical activities are strongly correlated with nearness of public spaces, recreational parks, educational institutes and pathways etc. Whereas the accessible distance till 1 km is more suitable for walking rather driving. But the developing countries like Pakistan often deprived in the provision of walkable facilities in the residential, commercial and other urban centers Numerous methods exists to evaluate walkability, which differ in nature of qualitative or quantitative computation, sampling, as well as scoring. The utmost used method is by applying pedestrian shed analysis method which have been supported by the Western Australian Livable Neighborhood Code, as an instrument to gauge the walkability of a neighborhood. This technique can also be used to evaluate streets and road layouts for new and existing developments both, for making improvements and to enhance connectivity. Spatial analysis on GIS provide a set of procedures which detect changes when the locality of the object which is being analyzed changes. The research aims to evaluate the walkability and give suggestions to design the patterns for the pedestrians which effect their attitude and emotions through providing safety. The research aim to identify the walkable areas around the basic community facilities by using Ped shed analysis, that is an area covered by a 5 min walk, research will also find out the perception of residents of the planned and unplanned community by comparing them and applying GIS spatial analysis techniques.

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