REDEFINING TRANSPORT SCAPE SYSTEM FOR SPRAWLINGCITIES "A CASE STUDY OF ABBOTTABAD"

Ar. Muhammad Faisal Rehman[1], Dr. Ghousia Saeed[2], Dr. Qandeel Fatima Gillani[3]

Original Article

1. Assistant Professor, Department of Architecture, University of Engineering and Technology Peshawar, Abbottabad Campus.

2. Assistant Professor, Department of Architecture, University of Engineering and Technology Peshawar, Abbottabad Campus **Ghousia@uetpeshawar.edu.pk

3. Lecturer, Department of Civil Engineering, COMSATS University Islamabad, Abbottabad Campus

Abstract

Growing sprawls generally covered hilly topographical landscapes with concrete residential and township masses, the catastrophe and anomaly that applies to the correct distribution of land usage within communities with natural landforms for the developed regions. The public's dogmatic mannerism of not reacting sensibly to this relevant topic frequently inflames the ongoing proliferation of mushrooms and uncontainable sprawl inside urban settings. This not only causes the severe infringement of the right of way assigned to sewers and natural drains, but also encourages the citizens to be the landgrabbers of public property. This problem escalates massively to the point of blocking the drains with rainwater and makes it possible for water to reach public properties, homes, as well as main transit roads along with secondary and tertiary routes. Apart from the megacities of Pakistan smaller cities and towns are also significantly affected by these issues. Its magnitude is obvious considering swift, unchecked cycles of mushroom development by preordained urbanization. That, in effect, expresses the consequences by catastrophically rising motorization and problem-stricken automobile transports through cities and small towns. This paper discusses urban sprawl and amalgamation of the city of Abbottabad and suggests that these can be controlled by redefining the transport planning strategies with new suggested approaches synergizing multidimensional attributes towards cityscape.The focus of this article is the possible solutions that could be proposed for the predominant problem of upsetting vehicle flow through Abbottabad. This study suggests that for cities having inherited organic character, like Abbottabad, a context-sensitive transport substructure system should be devised.The solutions were achieved through retrospective/prospective typology of research design.The literature review catered the understanding of urban design, Urban sprawl and urban growth, Urban Transportation system, building skyline and city elevation, Urban scape systems for organically significant cities and Inter-relationship of attributes within perspective of urban scape system, that was elaborated with the help of international case studies having relevant research scope and perimeters. Observation Performa was also used as the major research tool for the collection of primary and secondary data.

Keywords: City Skyline, Transport Scape, Urban Design Strategies, Urban Landscape, Urban Sprawls

4. INTRODUCTION

Scientific research is taking interest on urban growth now (Egidi, Cividino, Quaranta, Alhuseen, & Salvati, 2020). Urban growth mechanisms are generally dual-faceted, because of their concurrent development in vertical and the horizontal directions. In this growth, arterial connections hold quite an implication. Evolutionary patterns of these arterial connections help in the formulation of urban form in z-axis by maintaining the flow within the cityscape. Therefore, design aesthetics and cities' geometry are significantly reliant upon the decisions about urban road network systems which help in control and flow of traffic influx to and from the city.

Traditionally, the ideas of efficiency and efficacy in terms of eco-friendliness, user-friendliness and technological advancement are focused while conducting the analytical study of urban transport systems. However, it doesn't depict the complete picture apropos to urban circulation patterns and their impacts. Therefore, public infrastructures – transport scape for example – cannot be comprehended in isolation. It must evolve from the inclusive master plan of the city owing to its inherent connection with the horizontal growth system, and it must also be treated as an integral factor in redesigning the urban master plans. Just as importantly, owing to its vital link to the urban skyline, it must be comprehended with immense diligence (Brink, Bruns, Tobi, & Bell, 2016).

Nevertheless, inclusive transport scape of a city should dictate the development mechanism for physical fabric and related infrastructural services which generally should be in immediacy. A thorough conception of the complexities of inter and intra-city travel as an assortment of the urban environment will pose itself as a helpful aid in preventing haphazardly planned short-term construction schemes such as underpasses, flyovers, as well as needless procedures for road-widening. In the case of developing countries, such projects are merely utilized to quench vested interests and political agendas of a handful of individuals instead of looking at long-term strategic development and benefits of the city (Burton, 2001).

City skylines are a vital part of urban visual aesthetics (Karimimoshaver, Parsamanesh, Aram, & Mosavi, 2021) and they should always be encompassed in urban beautification projects as a primary focus. Diligent efforts should be made to further the assimilation of natural landscape with city skyline to enhance the urban setting. An urban landscape encompasses more than providing green spaces and planting trees, especially for the cities containing surreal organic nature built in their development and growth sequence. For such cases, merely small-scale interventions may cause in either degradation or elaboration of the entire city skyline and architectural vocabulary affecting the overall visual aesthetics of urban setting. Owing to their exceedingly organic character coupled with a substantial influx of in-migrants and tourists, cities like Abbottabad face an unadorned circulatory challenge. Therefore, such cities require cautious assimilation of intra-city and inter-city plans which would also affect the overall city skyline (Lingras & Mountford, 2001).

There is a dire need for conceptualizing and devising suitable mechanisms which must encompass the urban setting as an inclusive system in which every entity of the city setup should be in close proximity and highly reflexive to the context of overall urban design of the city. It should also be considered how transportation infrastructures and skyline would impact such a system. This is imperative for the cities with inherent organic character encompassing vast natural landscapes as a part of overall urban design language.

For the cities encompassing inherent organic character, an integrated and theoretical architectural framework is a necessity for having context-sensitive transport network. The objective of this paper is conceptualization of an important procedural mechanism idealizing contextual receptive transport scape model for city with urban sprawl and amalgamation.

5. SIGNIFICANCE OF THE STUDY

This research study will be an opportunity to serve as a roadmap for urban designers and planners, and it would work as a catalyst for both the students and prospective researchers by establishing new insights in terms of research and development. This will prove to be a transformative concept in articulating an amalgam on a larger and conceptual basis for the qualities of architecture, spatial planning, and urban setting.

The research will help in culminating and refining the idea of coordinated strategies for transport management and strategic traffic systems as well as frameworks for executing them. This would help in providing comprehensive guidelines for furthering local area development plans for urbanscape of a similar nature throughout the globe with slight modification or development.

3. ASSUMPTIONS

The city skyline is aligned with the city's contextual responsiveness and the infrastructure utilities are aligned with the building regulations and rules in Abbottabad City's urban set-up. The traffic plans are created and operated according to the design of the public transport scape.

Inter- and intra-city transportation modes of the city rely on cycling, motorcycle and automobile traffic systems. The city skyline implies a harmonized sequential scheme concerning building heights and the apparent architectural vocabulary on building façades, which portrays the cityscape’s face for the city.

4. RESEARCH DESIGN

The research was designed adopting the Retrospective/prospective system, the main objective was the magnificent transformations in transportation systems and forecasting the impact assessment on the urban landscape of organically significant urban cities primarily focussing on Abbottabad. The idea was toanalyse the present scenario and forecasting the futuristic dichotomy towards ideal transport scape analysing the impacts on the overall urban systems, targeting buildingfacades, skylines and ancillary physical fabrics.

The literature review carried out, inculcated the understanding of urban design, Urban sprawl and urban growth, Urban Transportation system, building skyline and city elevation, Urban scape systems for organically significant cities and studying the connection having urban design and planning attributes within perspective of urban scape which was elaborated through international case studies having relevant research scope and perimeters.Review of the international relevance of the case were undertaken to shore up the study's inspirational quality. The compilation of data involved both primary as well as secondary data sets which were obtained using the methods of quantitative and qualitative data collection. Collected data was analysed, interpreted, summarized, and presented guiding our way towards establishing hypotheses and furthering suggestions for our research and eventually helping to establish step-by-step protocols for conceptualizing a concrete system of

receptive transport scape for cities with an organic character. Ultimately a finalized developed framework for context responsive transport scape for organically significant cities was determined (Kumar, 2018). When the data was collectedand analysed, several diversified and unique attributes of that data were sorted out. They were then amalgamated and synchronized in an intelligent manner and smart approach which ultimately derived the conclusions and recommendations (Faisal, 2015)

5. UNDERSTANDING URBAN SPRAWL AND URBAN GROWTH

A successful alternative to urban sprawl will require the creation of future housing developments which are attractive, affordable and sustainable – socially, economically, culturally and environmentally (Arbury, 2005). On the contrary, urban sprawl is an unregulated and unplanned phenomenon that may result in the deterioration of the community's economy, culture and the climate. Major drivers of urban sprawl include household income rise, population increase, infrastructure construction subsidization such as highways, unsustainable expansion, inadequate land-use, feeble land policies and social problems. The antithesis of smart development is urban sprawl. The idea of smart growth is focused on efficient urban land use. Smart growth “consumes less land for roads, houses, and commercial buildings” and “channels development to areas with existing infrastructure”. The principle of smart growth emphasizes the need to limit the outward expansion, promote mixed-use zoning, promote higher density development, revitalize older areas, maintain open spaces, and minimize private vehicle traffic (Bekele, 2005). Figure 1 illustrates population development and the expansion of chosen European cities built-up areas from the mid-1950s until the late 1990s (Agency, 2009). Figure 2 demonstrates the emerging impact of transport technology on the architecture of the city (Arbury, 2005).

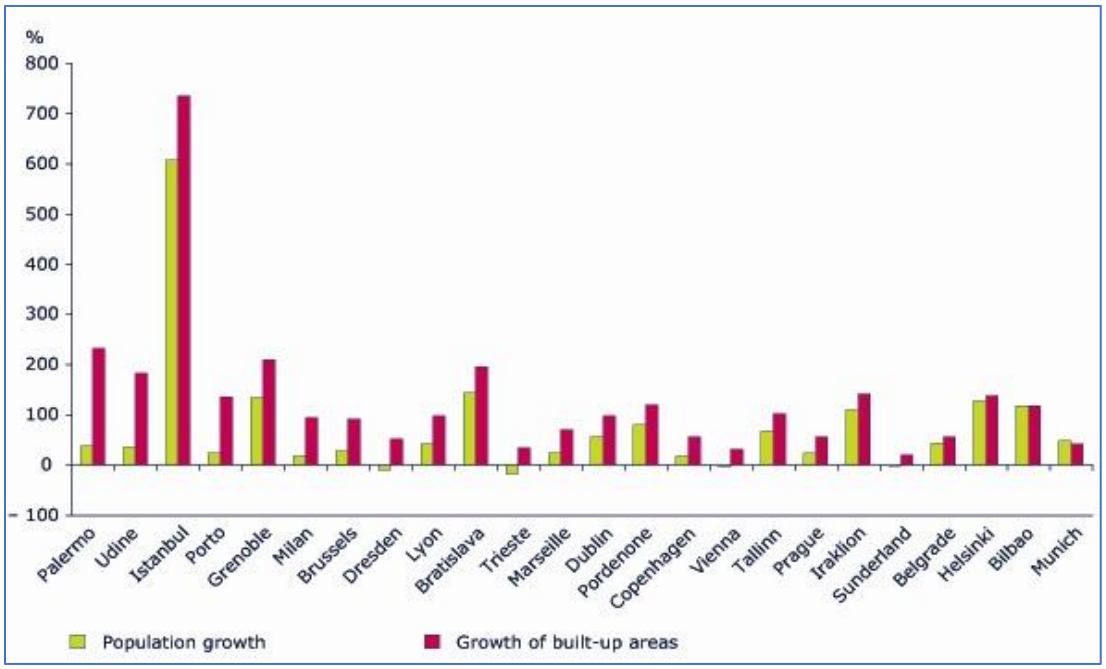

Figure 1: Population Growth and the Growth of Built-up Areas (The mid-1950s to Late 1990s), Selected European Citie

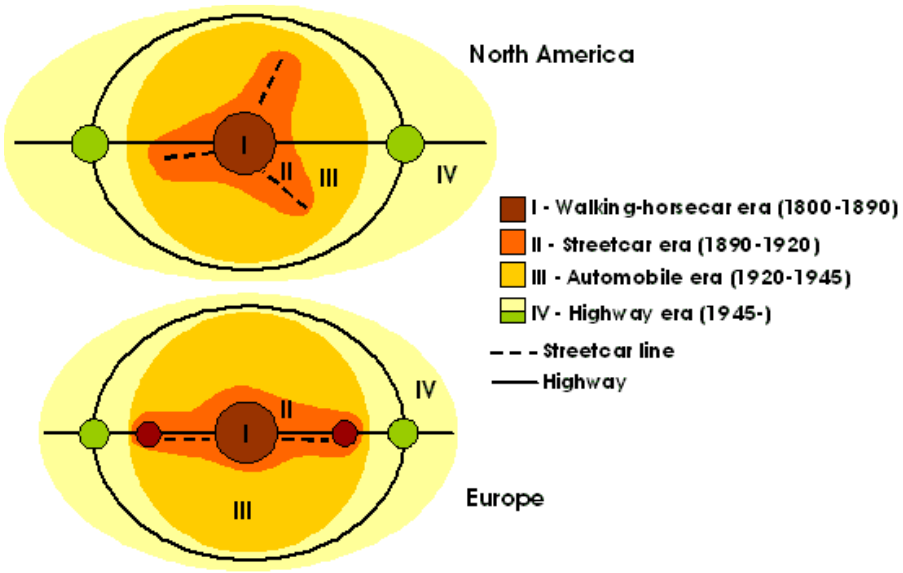

Figure 2: The Effect of Evolving Transportation Technologies on City Form

6. URBAN SPRAWL IN PAKISTAN

City's spatial structure takes inspiration from societal responsive spatial planning processes, which are dependent on the cultural sense and developmental variations. A society that encourages sprawl instead of proper urban growth procedures would easily welcome social and moral evils such as slums and squatter settlements.That would be in response to socio-spatial patterning for a specific urban system and would lead an evident way for the evolution of a city's spatial structure (Yu, Yao, Yang, Wang, & Vejre, 2019).

The urban infrastructural attributes of transportation and subsidiary typologies, when synchronized with the physical fabrics, ultimately the urban landscape systems are strongly influenced by urban agglomerations at multiple diversified mannerisms (Karoń & Mikulski, 2012). Rejuvenating the ideology of smart growth and an intelligent version of Transit-Oriented Developmental (TOD) attributes can play a vital role in the manifestation of this research study. This might lead towards a toolkit for managing and controlling the urban sprawls and squatter settlements resulting through the evolution of urban clusters at fringes of urban territories. These play a vital role in governing the unidentified, disfigured and confusing spatial structure and city's formwork (Heaton & Parlikad, 2019).

The infrastructural systems may be utilized as a resource to redefine the conceptual interpretations of urban agglomerations as a milestone towards the development of a strategy in conceptualizing city's spatial structures and its architectural character at an ideally standardized level and would become a paradigm shift in defining architectural vocabulary and the urban symphony of today's urbane.

In developing countries such as Pakistan, transport is also the key driver in the spatial development of urban agglomeration. Similarly, in Pakistan, residents have migrated from rural areas to the country's megacities in search of employment and a better standard of life. This activity not only created physical challenges for the construction of urban structures but also resulted in administrative

conflicts between various authorities. Contiguous built-up town areas have spread to those of a neighbouring Union Councils. The Union Council is reluctant to abandon its land and require the municipality's borders to be expanded, contributing to other problems such as waste collection within the built-up area. Figure 3 illustrates the patterns in urbanisation, composition and expansion of urban and rural communities in Pakistan (Waqas, 2012), - the urban and peri-urban make up to 68% of the population. More peri-urban residents developed in these areas as population expanded, and improved access to urban centres also led to a higher percentage of the population in agglomerated areas.

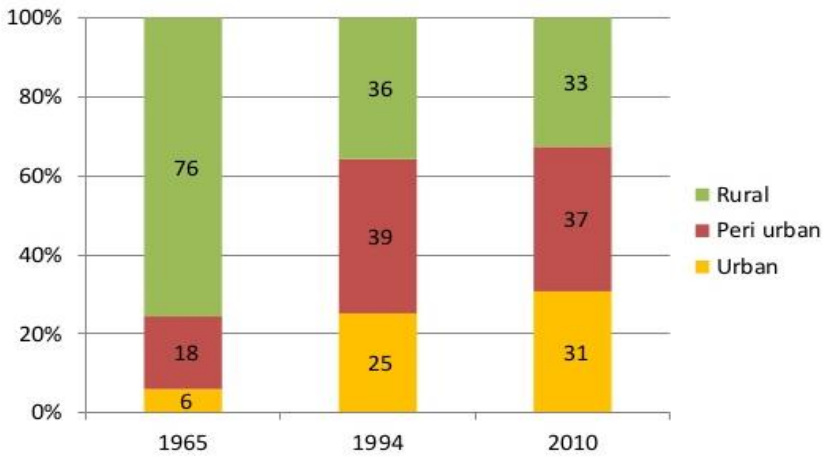

Figure 3: Urbanization growth rate of population in Pakistan
(Source: Muhammad Faisal, 2015)

7. MAJOR URBAN CHALLENGES OF ABBOTTABAD CITY

The Abbottabad is in Khyber Pakhtunkhwa, Pakistan. Abbottabad town was founded in 1853 and now has a total population of 208,491 according to 2017 figures. Owing to the rise of urban sprawls, the city is overpopulated almost 5 times more than its original potential. During its expansion, the city underwent a ribbon sprawl. Later on, other villages found on its periphery were also assimilated into the city. However, the city has undergone substantial development since its growth and incorporated educational, commercial and residential land uses culminating its spatial structure.

At present, Abbottabad's economy is found to be primarily focused on natural resources and tourism as it is a major pivotal transit point for all major tourist regions of Pakistan such as Naran, Ayubia, and Nathiagali (Wikipedia). Designed purely with strategic and administrative tenacities, Abbottabad is among cantonment towns of Pakistan. It encompasses a narrow valley having sole major transit route heading roughly in the north-south direction.

One of the biggest challenges and issues faced by the urbanscape of Abbottabad city are overpopulated roads with traffic. Parking facilities parallel to highways and inside city centres are often undermined as resultant of urban sprawl. Defining secondary and tertiary path intra-city and its maintenance is now becoming a colossal concern. Abbottabad city environments are robbed of quality residential services as the rise of urban sprawl stimulates the proliferation of slums and

squatter settlements. Related shopping centres are facing the rise of mushrooms and independent shopping spaces are now unfeasible. This spatial growth not only undermined the infrastructure but also had a detrimental impact on the city's aesthetics. The town's historic character and the landscape are currently at its worst.

8. SOLUTIONS TO CURRENT URBAN SITUATIONS OF ABBOTTABAD

The current problems faced by the city of Abbottabad can be solved through the implementation of standardized land use plans as the first step where the location of diverse building typologies is based on defining the specific zone allocation. The second step should involve the development of a 50-year structure plan by the government to devise various designing strategies for the urban and architecture domains in the Abbottabad city (including continuous evaluation and monitoring at 15-year intervals). A viable solution to redefine the city's urbanization trend lies in the development of a 15-year consolidated master plan with constant evaluation and monitoring performed every 5 years. A greater focus on the strategic approach must be placed during the definition of management and transportation policies. Finally, the development of well-structured and elaborative water supply and sanitation system plan as part of standardized infrastructure utility services designs should be in place as well. The growth trend of the city for the period 1950-2018 has been illustrated in Figure 4.

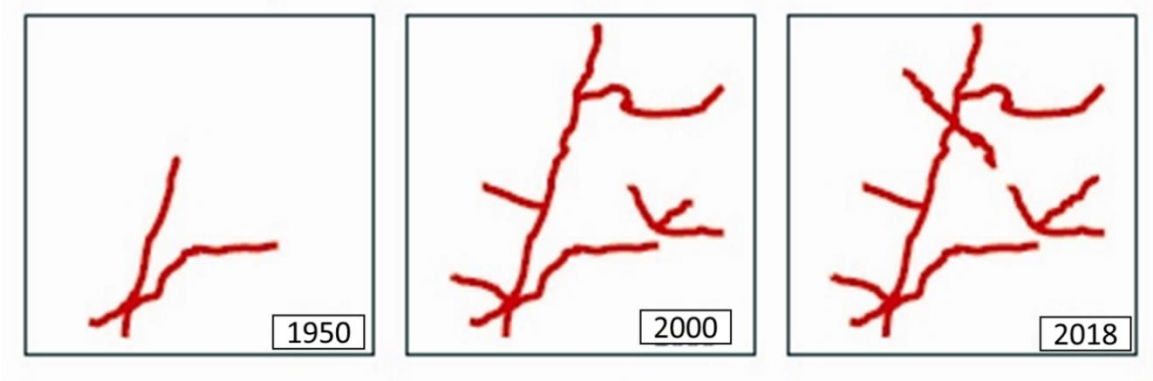

Figure 4: The growth pattern of Abbottabad from 1950 to 2018
(Source: Author* Muhammad Faisal, 2015)

9. SOLUTION FINDING APPROACH WHILE CONSIDERING URBAN SPRAWL AND MUSHROOM GROWTH OF ABBOTTABAD

The recommendations in the special case of Abbottabad would primarily be based upon the combination of a strategic long term and immediate remedial short-term strategy to overcome the issue of a mediocre transportation system running through the city. The initial focus would be on redefining the present Karakorum Highway **(**KKH) main highway road, where the right way for traffic direction must be respected following the removal of illegal encroachment as per the new rules set by the National High Authority (NHA). The latest rules state that the road shall be increased on the width to 65 ft. from the central median based on its traffic influx from both intra-city transit and intercity traffic using the road as a primary transportation medium for travel across the city which includes a diverse flux of vehicles from private sedans and motorbikes to public transport like buses ending with logistic transfers through trucks.

Following this step, an adequate management plan for standardized transport can be designed considering the intercity and intra-city traffic fluxes. The primary routes within the city centre can be reserved for a corridor which includes cable car system, tram systems and the development of an effective Bus Rapid Transit (BRT) system. Such a plan will ensure long term sustainability for traffic fluxes within the city. A dual freeway system adjacent to the BRT shall also be constructed to cater for the high-speed intercity traffic system through the city. The integration of service roads with such a system would ensure optimized flux control for intra-city traffic. Effectively designed overhead bridges and underpasses would act as connecting systems for the service roads and freeways. To ensure smooth flow of traffic without interruption, specific interchanges and link roads would be constructed with full-fledged underpasses which are a very sustainable, cost-effective and strategically advantageous addition attributed to the rippling topographical landscape of the city which supports an efficient functioning of the underpasses.

Solutions for short-term issues have been highlighted in the previous paragraph. Strategizing a long term solution includes the development of an expressway bypassing the urban population of Abbottabad connecting the KKH leading up to China's border. The proposed expressway will begin near Burhan Interchange E-35 Hazara motorway, located in Hassanabdal with the route passing through the village of Paniaan and the outskirts of Havelian and Haripur regions. The road would cross the Manshera city through a way behind Shimla Hills. The proposed expressway shall also possess an interchange in Abbottabad which will be constructed at Salhad at the entrance of Abbottabad, another near the outskirts of Mangal village and then at Mansehra Suburbs primarily at the outskirt region and one would serve main Mansehra city. The expressway will, therefore, lead to China's border connecting through the main KKH via the regions of Balakot, Kaghan and adjoining areas.

The dependence of the transport system of the Hazara region on the proposed expressway makes it inevitably of great significance. However, the construction of interchanges in the Mansehra and Abbottabad regions cater way for the development of an efficient mass transit system based upon the relative Receptive behaviour of the city's landscape coupled with the sustainability of the proposed system. The factors mentioned in the latter part must be addressed with the highest priority and focus due to their greatest role in the subsistence of the road network and transport infrastructure which would otherwise be in danger. The growth and development speed of urbanization in the city would fall to ruins as well.

The Architectural vocabulary is another significant concerning point attributed to the soaring concrete encroachments with increased commercialization and the urban fabric which has completely transformed the green landscape into a concrete jungle. Therefore, the return of the city's enchantments and lost perspective contradicts with the paradigm for the redefinition of the city's skyline greatly converging on commercialized construction which seems to lead to an alien symphony at present. The city shall be transformed considering its inherent architectural character during the redefinition by restructuring the anterior facades and building elevations adjacent to the KKH i.e. Mansehra road realizing the city's rejuvenated inherent architectural and urban character. The target area is shown in figure 5. The redefinition of the building skyline proposed for the current KKH Mansehra road has been presented in Figure 6.

The paper is integrated into a form of a proposal including the strategic measures, technical operation and framework optimization for the conceptual realization of Abbottabad's transport infrastructure.

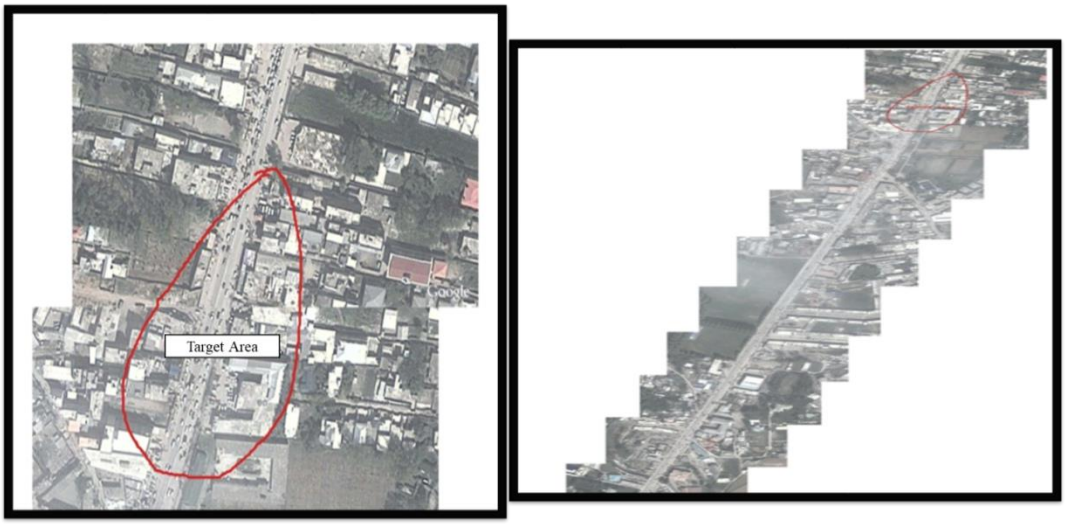

Figure 5: Target Area, Abbottabad (Source: Author* Muhammad Faisal, 2015)

Figure 6: Proposed redefined building skyline of existing KKH Mansehra road
(Source: Author* Muhammad Faisal, 2015)

10. CONCLUSION

Urban sprawl and amalgamation of Abbottabad city can be controlled by redefining the planning strategies with new suggested approaches synergizing multidimensional attributes towards cityscape.

Taking into consideration the unique and serene nomenclature of Abbottabad, the suggestions and recommendations shall encompass the short- and long-term strategic systems in connection to address the issues persistent to the transport infrastructure within the city's boundary. The recommendations include, redefinition of existing KKH road, The ROWs Right of ways shall be religiously adopted, encroachments shall be demolished as per governmental rules and policies.

This would lead towards developing a standard TMP Transport management plan which would encapsulate the attributes of both inter city and intra city transportation systems. Reiterating the plethora of TOD Transit Oriented development, along the central transport corridor consisting of tram

systems, cable car system and an efficient BRT (bus rapid transit) and LRT (light rail transit) system, the freeways and no signal corridors shall be developed. This will further dissect the major traffic flows towards secondary and tertiary road networks through service roads at appropriate spatial parameters. After analysing the short-term ideas, the long-term strategic decisions would idealize heavy efficient and sustainable transport infrastructure systems, this would include, MRT (Mass rapid transit), Elevated Rail systems, sustainable and efficient railways system etc.

The architectural language, building vocabulary and city's skyline shall be taken into special consideration while deciding appropriate short- and long-term perspective goals as far as city's architectural character is concerned (Faisal, 2015)

How this transportation approach will affect the city's Historic Building landscape would be very important and needs to be addressed. This seems to be an essential demand and will prove to be a practical and enduring innovative problem-solving process based on vision, a probable solution and architectural character enriching mechanism for cities like Abbottabad and a daunting trait regarding socio-economic needs and climate tectonics.

REFERENCES

Agency, European Environment. (2009). Population growth and the growth of built-up areas (mid 1950s to late 1990s), selected European cities. Retrieved April 30, 2022, from https://www.eea.europa.eu/

Arbury, Joshua. (2005). From Urban Sprawl to Compact City - An analysis of urban growth management in Auckland.

Bekele, Haregewoin. (2005). Urbanization and urban sprawl. *Royal Institute of Tecnhology: Stockholm, Sweden*.

Brink, Adri, Bruns, Diedrich, Tobi, Hilde, & Bell, Simon. (2016). *Research in Landscape Architecture – Methods and Methodology*.

Burton, Simon (Ed.). (2001). *Energy-efficient Office Refurbishment Designing for Comfort* (Ist ed.). London: Routledge.

Egidi, Gianluca, Cividino, Sirio, Quaranta, Gianni, Alhuseen, Ahmed, & Salvati, Luca. (2020). Land mismatches, urban growth and spatial planning: A contribution to metropolitan sustainability. *Environmental Impact Assessment Review, 84*, 106439. doi: https://doi.org/10.1016/j.eiar.2020.106439

Heaton, James, & Parlikad, Ajith Kumar. (2019). A conceptual framework for the alignment of infrastructure assets to citizen requirements within a Smart Cities framework. *Cities, 90*, 32-41.

Karimimoshaver, Mehrdad, Parsamanesh, Mastooreh, Aram, Farshid, & Mosavi, Amir. (2021). The impact of the city skyline on pleasantness; state of the art and a case study. *Heliyon, 7*(5). doi: 10.1016/j.heliyon.2021.e07009

Karoń, Grzegorz, & Mikulski, Jerzy. (2012). Modelling of Transportation Systems in Agglomerations for ITS Solutions. *IFAC Proceedings Volumes, 45*(4), 74-79.

Kumar, Ranjit. (2018). *Research methodology : a step-by-step guide for beginners*.

Muhammad, Faisal. (2015). Development of Framework for Context responsive transportscape for cities of organic significance, Case of Abbottabad, An MSc./ MPhil Thesis approved in 2015.

Lingras, Pawan, & Mountford, Paul. (2001, 2001//). *Time Delay Neural Networks Designed Using Genetic Algorithms for Short Term Inter-City Traffic Forecasting.* Paper presented at the Engineering of Intelligent Systems, Berlin, Heidelberg.

Waqas, Ahmed. (2012). *Rural Urban Transformation in Pakistan: A spatial analysis of urbanization and market access from 1965 - 2010*. Paper presented at the First Annual Conference - December 13, 14, 2012 - Planning Commission, Islamabad, Pakistan, Pakistan. https://www.slideshare.net/m-hameed/4-2-ahmad-waqas-urbanization-agglomerationpak12dec-copy?from_action=save

Wikipedia. April 2022). Abbottabad. Retrieved May, 2022, from https://en.wikipedia.org/wiki/Abbottabad

Yu, Zhaowu, Yao, Yawen, Yang, Gaoyuan, Wang, Xiangrong, & Vejre, Henrik. (2019). Strong contribution of rapid urbanization and urban agglomeration development to regional thermal environment dynamics and evolution. *Forest Ecology and Management, 446*, 214-225. doi: https://doi.org/10.1016/j.foreco.2019.05.046