

Impact of Land Use Change on Built Environment of Planned Neighborhoods of Lahore: A Case Study of Wapda Town

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Abstract

Lahore, the provincial capital of Punjab has gone through major spatial expansions as a result of unrestrained and continuous population increase. The expansion is mainly towards the south and south-east directions focusing on the planned settlements. Land being an essential resource is in continuous transformation of land use which accommodates expansion and other activities within the residential areas of the society. Transformation of land use change in residential areas resulting in the formation of main residential streets into commercial streets is one such issue that greatly affects the neighborhood-built environment thereby overloading the existing infrastructural facilities. WAPDA town housing society, one of the planned societies located in the southern part of Lahore is selected as a case study for the stated problem. The purpose of this research is the identification factors causing land use change and their impacts on the neighborhood-built environment. The data was collected through physical surveys that enabled us to explore the transformation of the designated land use pattern of the society. A comparative analysis of residential and commercial property users has been done to evaluate the overall satisfaction level through Yeh's index of satisfaction. The study revealed that commercialization is detrimental to the built environment and negatively affects the resident's satisfaction. The findings suggest that policymakers should enact such laws which can strengthen land use management and maintain the quality of life for the residents of planned neighborhoods.

Keywords: neighborhood, commercialization, land-use, change, satisfaction level, built environment

1. Introduction

The land holds a significant position in human existence and governs their development patterns. Humans have used land and its resources to meet social, cultural, and spiritual needs for the provision of food, clothing, and shelter. In this process of modification natural forests and grasslands are converted into residential, recreational, industrial, and commercial uses. This complex process of urbanization brought the complete transformation of human habitats and neighborhood development. Residential communities or areas are as old as human civilization as they existed in every civilization in form of organically developed neighborhoods without the control of planning authorities. A neighborhood is a significant urban unit and an appropriate scale for designing residential societies with the provision of basic public facilities within walking distance which have a direct impact on our daily lives. It fulfills the physical and social needs of the people that live in the same area [1].

WAPDA town cooperative housing society is a public planned gated society located in the southern part of Lahore. The situation of the

planned housing society was not the same as 15 years back as shown in Fig. 1. Currently, this society is facing multiple issues and problems which are complicated. The change of land from residential to commercial is one of the major problems which have been taking place and now in the case of gated societies like WAPDA town this phenomenon is increasing at an alarming rate.

From a survey, it is inferred that the highest usage of land goes mostly for residential use but in the case of this gated society commercial land use is growing and taking up the residential space.

As a result, many commercial properties are mushrooming along the major roads of WAPDA town like schools, clinics, banks, barber shops, real estate developers, and grocery stores which are increasing with each passing day. This change in land use and haphazard commercialization is leading to adverse impacts on the neighborhood's built environment, social, and economic factors. These impacts are usually felt by the people residing in the society because they are the continuous use of that area having a strong sense



of belongingness. Categorizing factors important to residents and recognizing how important each factor is for their satisfaction would allow urban design planners to present a superior built environment, which leads to a greater neighborhood with living satisfaction and improved quality of life.

2. Problem Statement

The change in land use is one such problem that warrants serious attention now and the issues relating to it are multi-dimensional creating serious implications regarding the environmental, socio-economic, and physical built environment of neighborhoods. The change in land use adversely affects the neighborhood's livability with increasing traffic congestion and overstressing of available facilities for the density of people for which it was originally designed. It has been noticed that due to this unplanned development and conversion of residential properties into commercial the number of residential houses has been reduced furthermore inadequate infrastructure and parking facilities, impact the traffic flow pattern. Therefore, it's the need of an hour that this issue must be addressed on a societal and authoritative level. This study attempts to discover the factors in the built environment that relate to land use conversion on a neighborhood level. This also intends to broaden the relationship between neighborhood physical and socio-economic environment and their impacts on land use patterns.

3. Literature Review

A focal point of the study for numerous architects, city planners, and urban designers is the idea of the neighborhood and the built environment which has become customary as a fundamental component of planning. The built environment comprises buildings, road networks, open spaces, and recreational facilities. It represents all the manmade, physical traits of the environment which include places of residence, work, and leisure including material structures such as parks, schools, transportation networks and other infrastructure [2]. It also considers the use of land, architecture, landscapes, transportation infrastructure, and other various amenities and commercial structures [3]. The built environment is crucial for neighborhood satisfaction in two ways; firstly, it has a direct impact on satisfaction and secondly, policymakers can manipulate it more than any other factor that may influence neighborhood satisfaction.

A strong correlation exists between the physical environment of the neighborhood and neighborhood satisfaction. Physical features are an important judge of neighborhood satisfaction [4]. Neighborhood satisfaction is strongly affected by factors like location and proximity. Increased neighborhood satisfaction in urban residents was studied as proximity to occupational services and shopping areas [5]. Conversely, negative relation exists with neighborhood satisfaction when commercial land use is within 1500ft distance from a residence which is the source of pollution, noise, odors, and traffic created by the retail land.

Urban land uses the main instrument for the master plan of communities. The distribution of the usage and land occupancy that has been developed in line with the prevailing rules of a local authority is land use. Residential land use is the largest consumer of urban space. It covers between 50-60% of areas in most cities. Land use can also impact the welfare of people's everyday life. In general, there is a strong association between noise, crowds of people, traffic, congestion, and air pollution with commercial land use. Negative relation exists between commercial development and levels of neighborhood satisfaction, as well as an adverse relation between increasing building density and reduced feelings of security in one's neighborhood [6].

3.1 Commercialization and its influence on neighborhood planning worldwide

Use change can be explained as the utilization of land or buildings for a purpose other than the original intended use of the land or building. Change in land use is the consequence of human efforts to utilize land to its highest potential [7].

Adaptation of land to commercial land use within the residentially zoned areas results in mixed land use, and impacts are usually felt by the people residing in such areas [8]. This also triggers a reduction in the number of formal houses within a city. Commercial land use has maximum traffic attraction and production perspective. These transformations create problems like lack of adequate parking space for the number of vehicular traffic on the road, causing traffic congestion to increase, without the appropriate facility of infrastructure and parking causes devastating impacts on traffic flow [9].

A study on the physical pattern of land use changes from residential to commercial in Indonesia's cities of Mampang, Prapatan, and

Jakarta was conducted. Conclusions drawn from the analysis reveal that land use changes in Mampang and Prapatan are not limited to building function changes, from the domestic function to retail land use, but also include intensity changes in the buildings. The advantages of the convenient road functions and high-profit returns were the forcible factors that influenced the land use transformation to happen. Particularly residential land use changes in Nigeria's Enugu urban area from 1997-2008 were also investigated and a sudden change in residential land use to commercial use in Enugu Urban was illustrated by the research [10]. Conclusions drawn from the findings showed that one of the major factors in this is a lack of a strong legal framework to verify the change in the current land use structure in the area of study. Constant pressure on commercial properties in the area has provided investors and developers with an indication of a boom in the commercial property market.

3.2 Commercialization trends in the neighborhoods of Lahore

The properties on Main Boulevard Gulberg were under severe land use conversion pressure and as of today, almost 80 percent have been commercialized. The remaining is destined to change as the situation prevails. After this land use conversion, there is an increased traffic volume and subsequent environmental degradation [11]. Samna bad, Lahore's another planned

neighborhood of Lahore. It was also under the massive pressure of land use conversion. The situation began to get worse when commercial uses seeped into the residential area which caused gigantic problems with traffic, parking, and environment-related issues [12]. Specialized markets like the car-sale market are developed on the main road which was initially planned as residential. This unplanned commercialization is one of the cardinal forces of degradation of the quality of life, especially in residential areas. Hence it is very important to identify the factors involved in transformation as they continuously influence everyday life [13].

4. Conceptual Framework

The concept of this study entirely depends on the factors that cause land use changes and the implications of the changes in land use, consequently affecting residents' perception and their satisfaction as shown in Fig. 2.

5. Methodology of the Study

The methodology implemented for this study possessed a series of tasks intended to bring detailed output. In this research process, a qualitative ethnographic study which is area based is adopted with an analysis of selected neighborhoods as a case study in which the primary focus was to examine the nature and extend of land use change and its impacts on the living environment of the neighborhood. The sampling technique used

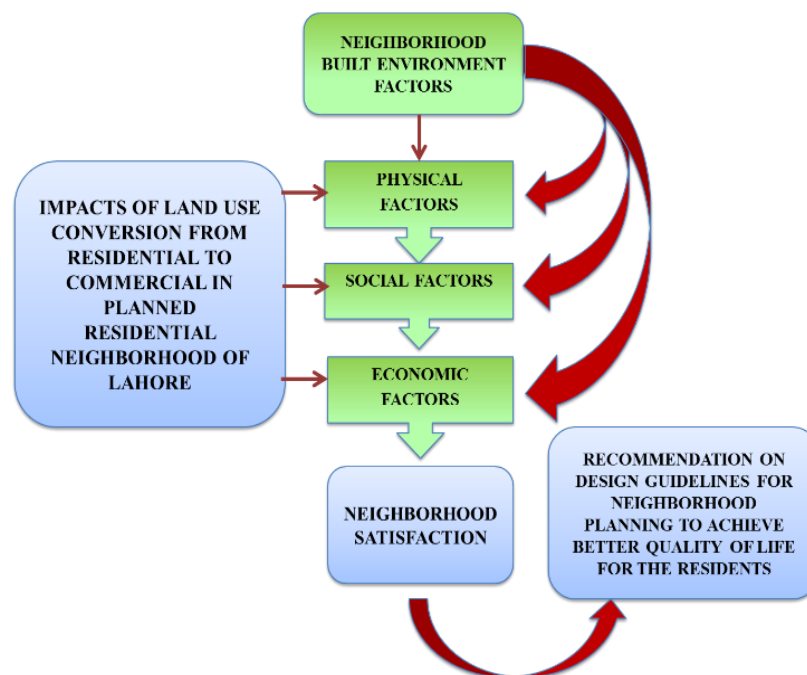


Fig. 2: Conceptual framework for the study

in this study is purposive criterion sampling for the selection of neighborhoods. WAPDA town cooperative housing society planned neighborhoods of Lahore were selected based on certain predetermined criteria of importance i.e., its location, representation, time, monitoring constraints, and trend of conversion of residential properties to commercial as shown in Fig. 3.

The first stage includes the development of major concepts and the identification of the objectives of the study. The second phase includes data collection, comparative analysis of satisfaction of both residential and commercial property users on the impacts of land use change from various field surveys, questionnaire surveys, and interviews with the public representatives of the housing societies to assess the number of cases of land use conversion in the selected neighborhoods. Through the land use survey, a detailed land use map of WAPDA town has been prepared. Finally, the third stage of the study includes a tabulation of collected information in the form of charts through both primary and secondary investigations, as well as suggesting some design guidelines to overcome or minimize the undesirable impact of land use change on the built environment.

A purposeful sample of houses (both residential and commercial) was selected that lived along the main roads as the majority of the conversion cases were seen along the main roads and are more likely to be affected by the land use transformation.

For the questionnaire survey stratified sampling was done in which the target population was those houses which were along the main roads and were divided into three strata considering road 1 182 ft. width, Road 2 of 100 ft. width, and road 3 of 80 ft. width as shown in Fig. 4

6. Findings

Data collected from the field shows that 170 houses out of 465 houses mainly along the major roads of the society of size 1 & 2 Kanal were converted from residential to commercial use AS shown in Table 1. The businesses include beauty parlors, cafes, grocery stores, real estate offices, schools, academies, banks, etc. The total area designated for commercial use was 153.65 canals and from a survey, it is deduced that the converted area has increased to 300.95 canals thereby reducing the area for residential use.



Fig 3: Location of Wapda town cooperative housing society with respect to Lahore

Table 1: Total No of Residential and commercial properties

No of Elements	Total Number of plots facing the Main Road	Residential	Commercial
Strata 1(Main road of 182 ft. wide)	94	40	15
Strata 2 (Main road of 100 ft. wide)	349	160	80
Strata 3 (Main road of 80 ft. wide)	226	120	50
Total number	669	320	145
Total number		465	

Table 2: Land use details of WAPDA town society

Legend	Description	Area in kanals	Area in percentage	Area in kanals	Area in percentage
	Area under residential use	5732	61.76%	5562	59.90%
	Area under roads	2590.65	27.91%	2590.65	27.91%
	Area under open space	375.63	4.05%	375.63	4.05%
	Area under public buildings	248.34	2.68%	248.34	2.68%
	Area under graveyard	179.36	1.93%	179.36	1.93%
	Area under Commercial use	153.65	1.66%	323.65	3.50%
	Total area	9280.53	100.00%	9280.53	100.00%

The percentage of transformation shows that the originally allocated land use has been doubled in the current scenario i.e. 3.5% as the society originally designed with 1.66% commercial use area as shown in Table 2. Society fails to meet the demand for commercial centers which is why these activities have started infilling the residentially zoned area. After the surveys, the following are the factors that are responsible for causing the change in land use pattern i.e., from residential to commercial.

6.1 Ineffectiveness of government authority policies

The lack of monitoring by the official authorities has stimulated the private developers to deviate from the initial layout plan of the

neighborhood. Local authorities normally find it difficult to control developments taking place due to financial constraints, lack of implementation of laws, and insufficient public education about the impacts of such activities.

6.2 Insufficient commercial area

From a survey, it is inferred that since the society was planned in the 1970's the land use percentage given to commercial areas i.e., 1.66% was not sufficient enough is the major reason behind the land use change from residential to commercial. This also gives a clear picture of the lack of conceptual planning on part of the planning authorities which didn't plan the society keeping prospects in mind.



Fig 4: Stratification of sampled population along WAPDA town Main roads

6.3 Major linkage to other societies

As the major roads of WAPDA town mainly 182', 100', and 80 ft. links to other societies, this also increased the commercial area along the major road which ultimately increased the economic value of the land. Economically it was a positive option to make them commercial.

6.4 Major area designated for commercial use not used for the same purpose

As observed the major area designated for the commercial area is not used for the commercial area. This is also one of the major causes of main land use change as the demand for commercial land use is not fulfilled and to do so they start infilling the residential properties to meet their demand for the commercial area. The current situation of the society shows that this commercial use in residential premises has increased up to 3.2% which makes 147 Kanals added to the previously allocated land use.

6.5 Iniquitous by the Government Officials

To an interview with the society secretary, the area designated for commercial purposes comes under the society's charge, but it is not yet developed due to the political dispute among the higher officials of the society. They want to develop it by making a commercial plaza and would then sell the property to earn profit from it which is a case of corruption among the officials.

6.6 Resident's opinion on a major cause of land use change

Both the residential and commercial property users were asked that in their opinion, what is the major factor in causing the residential to commercial land use changes in the neighborhood. The finding reveals that the factors that determine land use in the area include insufficiency of the existing commercial areas as well as to meet the increased demand. The study showed that demand and supply are the major factors of land use change. About 52 % of the target population confirmed to this that the existing commercial area is not sufficient and therefore increase in demand for the commercial area has led to the conversion of residential lands. As observed in the study area the majority of the land changes have occurred along the main roads in the period of the last 10 years, the economic activities have

also soared as a result of it as 12% of the target population verified it.

7. Impacts of Change of Land Use Pattern from Residential to Commercial

Conversion of the residential areas is poorly influencing the communal life of the residents. A change in land use encourages higher population density and unexpected and unbalanced division of residential blocks which consequently makes it difficult and costly to provide infrastructure, public services, and civic facilities to concerned authorities. The non-residential activity intensifies the negative effects within and outside society. It depreciates the environmental and physical, social, and economic factors of the neighborhood-built environment.

7.1 Impact on physical and environmental factors

Physical aspects of a neighborhood combine to shape the neighborhood's identity and character. Based on the sampling criteria questionnaires were distributed among 148 residential properties and 62 commercial properties to have comparative feedback on environmental and physical factors. Since the physical components of an environment have a substantial impact on consumers' perception and connection with space. Through in-depth interviews and questionnaire analysis, it is visible that substantial impacts have been laid on the environmental and physical factors.

7.2 Reduction in residential plots

Since changing land use from residential to commercial involves the transforming of a residential plot or existing structure into commercial use, the number of residential houses which have been taken up by the new commercial activities, are not equally made available or replaced within the same location, this causes a shortage in the overall residential units that a neighborhood has. Analysis of the survey data shows that a maximum no of residents agrees that a substantial amount of reduction of residential properties has been seen, whereas commercial property users also agreed on the fact that a reduction of residential plots is seen but despite it, some commercial users are neutral about this as they are not aware of what commercializing the residential properties is causing.

7.3 Quality of roads and pavements

The findings indicate that the maximum no of residential and commercial property users acknowledged that the land use change has affected the quality of roads. This is mainly because residents from other localities also approach WAPDA town for the commercial area developed along the main road and have increased the substantial amount of vehicular traffic on the main road. The quality of roads is affected due to these phenomena as for increased vehicular traffic sufficient parking facilities should also be provided but society fails to do so along the main road as it was not designed to be made commercial as shown in Fig. 5, 6 and 7. Usually, buyers park their cars on roads which damages the flow as well as the quality of the roads. Many different restaurants are opened along the main road because of the land use change which has severely affected the condition of the roads. The water (carrying different kind of oils and detergents in it) they use to wash their utensils is all thrown on the roads which seep into the road and harms the whole infrastructure provided and pavements as well.

7.4 Pedestrian Inconvenience

Pedestrian safety and convenience should be essential elements of the planning, design, construction, and maintenance. Planners should look at the land use, street connectivity, access management, and site proposal to provide for a walk able community. To achieve quality of residential streets and a pedestrian-friendly network, there are two foremost constituents in measuring the walking experience that is safety and security and attractiveness of streets. Findings indicate that the maximum no of residential and commercial property users agrees that pedestrian convenience and accessibility are disturbed due to parking on the road as they use the maximum area of the road for parking purposes which consequently obstructs walking. Moreover, no sidewalks have been provided to have a pedestrian-friendly network.

7.5 Vehicular convenience

Residents using their properties commercial as well as residential face utmost trouble while driving through areas of highly commercialized zones with bakeries and restaurants. One of the biggest reasons stated by them is the hindrance as they use half of the carriageway for parking their cars on roads and purchasing food from restaurants which causes traffic-clogged for hours and hours

creating inconvenience for the rest of the vehicles as shown in Fig. 8 and 9.



Fig 5: Effect on Roads and pavements,
Source: Field survey, Author



Fig. 6: Effect on Roads and pavements,
Source: Field survey, Author



Fig. 7: Effect on Roads and pavements,
Source: Field survey, Author



Fig. 8: Vehicular convenience, Source: Field survey, Author



Fig. 9: Vehicular convenience, Source: Field survey, Author

7.6 Increase in travel time

A maximum no of residents agrees that due to additional vehicular traffic on road, traffic congestion is generated owing to the travel time to be increased to get reached the main roundabout to internal access roads

7.7 Reduction in open spaces and parks for residents

The majority of the residents disagree on the component of the reduction of open spaces. Both the residents using their properties as residential and commercial are neutral and disagree with the phenomena of any reduction seen in the open spaces and parks rather, they explained while filling out the questionnaire that the open spaces provided in the society are not used for the said purpose for which they are intended for. They also mentioned that two of the commercial areas are provided but are kept open and not developed yet.

7.8 Impact on infrastructure

A major concern of the land use change converted from residential to commercial was the pressure it exerts on the available amenities. Residents were also given freedom about their opinion on the provision of facilities either created load on the infrastructure, amount of water, drainage, and water sewerage system. The Resident's perception reveals that the residential property users are not satisfied with the infrastructure, as commercial areas mainly restaurants consume more amount of water, and the quantity of water is reduced at some time of the day. Whereas commercial property users are satisfied with the delivery of infrastructure and are neutral about the load they are creating while converting their properties from residential to commercial.

7.9 Structural changes in the buildings and building aesthetics

The structure of the residential area has been immensely affected by the commercialization of residential properties on main roads. Some properties have changed their land use and proper commercial Byelaws are applied to them but some of them are still residential houses but using them for commercial purposes like some schools, beauty salons, and property dealers who have opened their offices in houses as shown in Fig. 10. The major target population identified the changes made to the building facade damaged the entire appearance of the society while entering it.

The commercialized shops along the main road had been divided into larger residential plots, single plots of 1 Kanal and 2 Kanal have been subdivided into smaller shops with reduced frontage of the building as shown in Fig. 11 and 12. Both storekeepers and residential property users responds that they witnessed a considerable change in building facades of residential areas.

7.10 Satisfied with the proximity of shops

Data findings show that in the case of residential property users along the main roads out of a total number of responses majority of the respondents are neutral about their satisfaction regarding the proximity of shops as they feel comfortable with shops being within walking distance but at the same time due to increased traffic volume, noise, and crowding other devastating effects, they are uncomfortable with

them being adjacent. Whereas commercial property users attest to a slight variation of satisfaction with the proximity of shops and are comfortable with it without knowing the impacts on the residential environment.



Fig.10: Impact on Structural changes in the buildings and Building Aesthetics,
Source: Field survey, Author



Fig.11: Impact on Structural changes in the buildings and Building Aesthetics,
Source: Field survey, Author



Fig. 12: Impact on building façade,
Source: Field survey, Author

7.11 Market placed within walking distance is a positive aspect

As more and more residential plots are converted into commercial plots, commercial activities would tend to increase in residential areas. Residential and commercial property users agree on the statement that the market placed within walking distance is a positive aspect. As comprehended in the urban planning of neighborhoods the markets or the commercial area is provided in every sector with a mosque which gives inhabitants easy access to the market to buy everyday goods which is a supplementary feature for them and they don't have to go outside the society to purchase anything.

7.12 Increased social gap and reduction in social interaction with neighbors

Shortage of recreational spaces and increase in commercial activities in the residential area are influencing the balance in the social character of the neighborhoods. Moreover, the multipurpose character of the area, non-residential activities, and heavy traffic flow on internal roads are reducing the scope of both direct and indirect social interaction and increase in public flow. This simultaneously increased the social gap among residents. The residents were also asked to give their opinions on the provision of social interaction spaces, within the respective society.

Most of them are dissatisfied with the provision of places for social interaction. Whereas commercial property users remained indifferent in their view regarding the reduced social interaction.

7.13 Increased sense of security

A recent study shows that crime rates affect residents' sense of security in their neighborhoods. Due to commercialization in the study area intruders from other societies also approach the society despite knowing whosoever enters the society for what purpose this somehow has increased the crime rate. As far as measures for security are concerned, the controlling committees have provided gates on the entrance of the internal roads which are closed after 11 pm every day keeping only one of the roads for each block opened the whole day and night and a security guard is appointed to guard that specific gate entrant. Even then only a few of the interrogated residents feel that security arrangements are satisfactory whereas the majority of the residents are not satisfied and find that the rate of crime has

increased due to the commercialization of residential areas

7.14 Impacts on health

Several health issues such as asthma, hypertension, faintness, and respiratory problems as well as Dengue fever have also been found due to the dilapidation of the Residential environment resulting from the excessive commercialization and increased traffic volume and air pollution in the study area. Residential property users don't feel the outdoor environment is safe for any kind of outdoor activity whereas commercial property users agree that it is safe enough.

7.15 Increase in air pollution

It is the ambient air quality of the environment that affects the life satisfaction of the inhabitants. Heavy traffic volume produced by cars, rickshaws, and buses and their emissions in the form of sulfur dioxide and carbon monoxide all contribute to increased levels of air pollution in neighborhoods. Though it can be easy to take the air we breathe for granted but air pollution carries serious health risks for dwellers, including heart disease, lung cancer, and asthma.

Residential property users agree that due to commercialization traffic has increased and caused the air to be contaminated. Whereas commercial property users are not aware of this and are disinterested in this.

7.16 Increase in noise pollution

Noise is a major environmental concern. Residents have been bothered by the increase in noise levels the most. Residential property owners acknowledged that commercializing residential plots has significantly increased the traffic volume which is the main source of noise pollution. It is not only the sputtering sound of automobiles, rickshaws, and bikes but also the uproarious sound of generators used by commercial property users in the absence of light that also adds to the noise pollution. Whereas commercial property users are neutral. So, we can conclude that an increase in air pollution negatively affects residents' satisfaction.

7.17 Increased traffic congestion

One of the systems affected most by commercialization on the main road is related to parking and traffic situations on roads causing congestion. Traffic congestion is when traffic slows to its normal speed. It is stressful, causes one

to get stuck in it, and makes it take longer to get to the destination.

The establishment of commercial centers and non-residential activities has increased traffic jams in residential areas and generates traffic congestion and unauthorized on-road parking which slows down the traffic causing blockages. Both the residential and commercial property users support the increase in traffic which have negatively affected residents' satisfaction.

7.18 Increased heat effect and thermal discomfort

Increased traffic congestion and vehicular traffic have caused the environmental air to mix with the smoke emitted from the vehicles forming the basis for the air to get heated. As the temperature of Pakistan is also fairly hot during summer and they have to wait in vehicular congestion for hours and hours, which resulted in thermal discomfort among dwellers and dependency on mechanical cooling systems for 90% of the dwellers. The increase of hard paved areas in front of the commercialized properties has accelerated the confined heat effect. Residential property users attested to this and commercial property users were disinterested in this.

7.19 Decreased privacy and comfort

The built environment can enhance privacy, comfort, and control. An increase in commercialization activities along the main road has hampered the privacy of the residents as well. Residential property users agree and do not feel safe as land use change affects their privacy and comfort level while commercial property users are neutral and do not feel any change regarding this.

7.20 Fear of accidents increased

More no. of intruders from adjacent localities use commercial areas and this traffic movement in the community is creating fear of accidents among parents and they don't feel safe permitting their kids to go outdoors. As a result, the physical and mental development of children is at great risk. as from the questionnaire survey maximum, no of residents using properties as residential attests that fear of accidents has increased and has negatively affected the residential psychological state of mind as they don't feel safe living along the main roads. Whereas commercial property users are unbiased about this fact as they don't feel any kind of change as shown in the bar chart.

7.21 Profit maximization

Residential and commercial property users admit that the commercialization of residential properties has maximized the rate of their earnings. Profit also increased.

7.22 Land values increased

The land use change and making the properties commercial have positive effects on the land values as the cost of their property is increased as being along the main road as well as being used as commercial. Both residential and commercial property users acknowledge this impact.

7.23 Overall Satisfaction Level

Overall satisfaction with the neighborhood is determined through the judgment of respondents based on the physical and socio-economic attributes of the neighborhood. Yeh's Index of satisfaction (YIS) was used to investigate people's satisfaction level with the impacts of land use conversion regarding the numerous factors of the built environment.

$$YIS = \frac{\text{Satisfied Cases}(X1) - \text{Dissatisfied Cases}(X2)}{\text{Total Cases}(X)}$$

Residents ranked their satisfaction on a four-graded scale from strongly disagree to strongly agree. The maximum levels of residents' satisfaction are signified in terms of neighborhood economic characteristics including profit maximization and increase in land values whereas the lowest level of satisfaction is indicated in terms of environmental and social factors due to commercialization. From Table 3 it is concluded that the difference in the level of satisfaction can be seen in terms of environmental, social, and economic factors. The findings suggest that the residential property respondents were dissatisfied with the overall quality of the neighborhood and in terms of environmental and social factors it comes out to be lower Yeh's index showing a lower satisfaction level among the respondents, and they don't feel it a good place to live anymore. Moreover, they are also dissatisfied with the trend of this land use conversion as in their point of view it does not give a pleasing visual appearance to society. Whereas in terms of the commercial property respondents a balanced sort of satisfaction level can be seen, and it falls to be on the higher side which shows a clear distinction of the satisfaction level as the commercial property users are satisfied enough with the trend of land use conversion from residential to commercial as in

their point of view it is a profitable act of doing so.

Table 3: Resident's Overall Satisfaction through Yeh's index

YIS (Level of Satisfaction)	Residential Property Users	Commercial Property Users
Environmental or Physical Factors	0.35	0.6
Social Factors	0.38	0.68
Economic Factors	0.875	0.62
Overall Satisfaction	-0.13	0.37

Based on the above discussions, the following recommendations are outlined to overcome this situation and create a healthy and vibrant living community environment.

8. Conclusions

The welfare and satisfaction of residents in any neighborhood is the major concern of authoritative bodies in designing and allocating appropriate land uses in society. From the results of Yeh's index to calculate the level of satisfaction of both residential and commercial property users it is evident that converting the land use of the residential property and using it for commercial purposes cause significant impacts on the physical built environment of the society.

The results of this study revealed that there were variations in the level of satisfaction between residential and commercial property users as commercial property users are satisfied with the trend of commercialization in a residential area in the prospect of economically benefitted whereas residential property users are disturbed and unsatisfied with the progressive degradation of the physical environment as well as social non-cohesiveness as a result of the commercialization.

Residential property users are not at all satisfied with this change having their overall satisfaction in the negative range i. e -0.13 on contrary to this commercial property user showed a positive inclination towards their level of satisfaction as they are satisfied with the economic benefits it provides to them and their overall satisfaction is in range of 0.37. This also provides

us the insight to identify the significant factors causing land use change. The study concludes that the demand for commercial areas is not fulfilled as designed according to the land use of society therefore with high pressure on demand of commercial areas it is the major contributing factor that gives rise to the change of use in WAPDA town cooperative housing society and investors propose a commercial market in residential premises. This sudden change of land use for five to six years has adverse effects on the residential property market as the trend is being increased with each passing day and every day a new shop has been opened thereby reducing the residential area. At various levels, the government should take charge and place more importance on the provision of those facilities that will improve the built environment of society and enhance better livability of the residents. Barring the temporary commercialization in its upcoming residential societies is a much-needed step the time as it will provide relief to the residents. Moreover, a ban on the commercialization of properties will let people refrain from involving in any such activity.

9. Recommendations

The transformation of land use was concluded as ribbon development and the cluster formations due to the influx of customers. For that purpose, the following recommendations were formulated:

1. The first step is to be taken at the government policy level where the investment framework should be introduced to the first buyers that locked the property with the vacant status. The facilitation of property owners will develop already blocked commercial areas and discourage the transformation as also observed the in case of Indonesia in Jakarta.
2. Adequate parking space in the basement of the multistoried buildings should be provided to reduce traffic congestion on roads. Commercialization of residential area should be limit areas long the periphery of neighborhood. The main road outside the society at the periphery should be designed as commercial when designing and allotting the land use of society. This will subsequently allow only those residents to enter the residential zone of the society who reside there. Limiting access along commercially established roads reduces traffic congestion and pedestrian-vehicle conflict. The provision of a traffic

plan in the commercial areas as found in the Malaysian context would further improve the built environment of the selected case study in specific and the whole city in general.

3. The infrastructure and other facilities should be designed and be anticipated in such a way that even in due course of time if a commercial strip develops along the periphery it doesn't put a load on the existing infrastructure and meet the densification of commercial area and population growth. For water drainage, drains must be provided along the roads to properly drain water into them so that water does not remain on roads and damage them. Mixed Use streets should be identified based on traffic/parking studies.
4. The plantations would reduce noise pollution in addition to air pollution as studied by [14] and suggest the interventions that can be used here. Urban green infrastructure is the need of the hour and for sustainable futures as well.
5. To promote economic and commercial activities without adversely affecting the housing conditions, the government and authorities should consider erecting multi-story buildings divided into single rooms for rent by the small-scale businessmen and women. These buildings could be located in the existing markets or designated commercial areas for profitable business and giving opportunities to the owners to increase their earnings. Commercialization in residential premises should be permitted taking into consideration community needs, and environmental impact, and provision for a safe and healthy environment should be maintained.

10. Acknowledgments

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