

Decentralization in Central Business District of City by Land Use Pattern Alteration to Promote Pedestrian Movement through Urban Design Strategies Case Study: Sabzevar City, Iran

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Abstract: *Cities are perhaps one of humanity's most complex creations, never finished, never definitive. They are like a journey that never ends. Their evolution is determined by their ascent into greatness or their descent into decline. They are the past, the present and the future. Cities in developing countries like Iran are facing some of the concern are: motor vehicle congestion and urban growth. However, the concern in cities like Sabzevar is that this growth is far more rapid (especially increasing day by day motor vehicle). Like many urban processes the spatial nature of these problems is self-evident. In order to solve urban mobility problems, this work aims to clarify urban land use changes of the CBD in a city. Sabzevar city is selected as the study area, because due to excessive focus of attractive land use, functional differentiation is developed as a result of rapid urban growth. In this paper, the authors analyse patterns of land use in CBD and examines the relation between these patterns and the movement of population.*

Index Terms: *Decentralization, traffic congestion, changing land use pattern, Sabzevar city, pedestrian movement, vehicle movement.*

I. INTRODUCTION

This paper explores the complex process of mobility and land-use integration in rapidly growing cities in developing countries. It first identifies barriers to and opportunities for effective coordination of transit infrastructure and urban development. It then recommends a set of policies and implementation measures for overcoming these barriers and exploiting these opportunities. Well-integrated transit and land development create urban forms and spaces that reduce the need for travel by private motorized vehicles especially in central business district area. Areas with good access to public transit and well-designed urban spaces that are walkable and bike able become highly attractive places for people to live, work, learn, play, and interact. Such environments enhance a city's economic competitiveness, reduce local pollution and global greenhouse gas emissions, and promote inclusive

development. These goals are at the heart of transit-oriented development (TOD), an urban form that is increasingly important to sustainable urban futures. Central business district (CBD). An area where cities' major businesses (financial institutions, stores, major convention and sport facilities, and hotels) are concentrated. CBDs produce agglomeration economies. In Central Business District Major Characteristics is:

High accessibility • High land cost • High development density • High living cost • Presence of tall buildings • Major commercial activity - Bank headquarters - Financial firms - Professional services in general.

In Central Business District Secondary Characteristics is:

• Large public buildings • Town hall and government buildings • Specialist shops and high end shops • Small resident population • Office buildings • High pedestrian movement • Maximum parking restrictions in general.

The urban structure in Sabzevar city is changing very rapidly. This condition happens because of the land use changing from open space to settlements or economic activities. The changing of land use can be forced by the scarcity on the land for human activity and the high land value in the city especially in CBD.

The city boundary has been developed six times from 1921 up to 2001. The Central Business District in the heart of the city is the oldest part of it and actually is the place where the city originated. The most important developments have taken place from 1975 onwards where the city almost became double in size and extended its boundaries to the surrounding villages.

Land use quality is affected by the various strata in the population differently depending on where they live and people live in different parts of the city depending on their socio-economic status. Due to high land value in the central area, the space allocation for earn money with any use is high priority resulting in non-coherence amongst different land uses of urban spaces.

Central Business District is focal point of a city. It is the commercial, office, retail, and cultural centre of the city and usually is the centre point for transportation networks. Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing.

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Mixed use. A pattern of development characterized by a mixture of diversified land uses, typically including housing, retail activities, and private businesses, either within the same building space (for example, vertical mixing) or in close proximity (for example, horizontal mixing) means mixed use which is necessary in sustainable decentralization. Non-motorized transport is any type of transport mode that is not motorized, such as walking and bicycling.

Non-motorized transport, or NMT, has gained popularity as not only a clean, carbon-free form of mobility with a very small footprint but also as a means to improve public health through increased physical activity.

Pedestrian-friendly design intended to enhance the pedestrian experience, typically through improved amenities (for example, attractive landscaping, lighting, and seating areas) and by improving the efficiency of walking (for example, small city blocks, grid street patterns).

Transit-oriented development (TOD). Compact, mixed-use, pedestrian friendly development organized around a transit station. TOD embraces the idea that locating amenities, employment, retail shops, and housing around transit hubs promotes transit usage and non-motorized travel.

Highlight a section that you want to designate with a certain style, and then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages.** Use italics for emphasis; do not underline.

II. BACKGROUND OF STUDY AREA

Sabzevar is a city in Northeast Iran, situated in Razavi Khorasan province with geographical coordinates of 36° 12' 52" North and 57° 40' 47" East. The City of Sabzevar had a population 232000 in 2011 which rose from 30545 in 1956. The city is a capital of Sabzevar County, in Razavi Khorasan Province of north-eastern part of Iran. It is approximately 220 kilometres west of Mashhad, the provincial capital and approximately 651 kilometers east of Tehran, the capital of Iran. By considering to Antiquity and historical background of Sabzevar city, this city, particularly in central parts of city is having Traditional tissue. Due to central business district located at the oldest part of city, there are a lot of attractive places in this part of city. It is cause to many visitors come to CBD from other part of city and the surrounding areas.

III. CITY WARDS

The entire city of Sabzevar has been divided into twelve sectors by City Corporation and each sector has its own sub-sectors called quarters as presented in the Figure. The Sector three in the middle is the oldest sector amongst all sectors of the city and also if the focal development node. There are numbers of monumental buildings and heritage structures registered under protection of the cultural heritage organization in this sector addressing the age and history of this area. The distinct section of this sector is in the quarters of two and three which are identified to be the centre of marketing, business and financial activities as well as dense built-up sector where lines of transportation converge from various parts and nearly from all directions. Therefore, it is known as the commercial hub of a city which is also called

heart of the city as the city life highly depends upon this region. In other words, heart of Sabzevar is a specialized area and a “distinctive region with a complex web of associated and interwoven land uses”.



Figure1: Sectorial Division of the City (CBD- Cyan Coloured- Sector no 3)

Ward number 3 includes 5 neighbourhoods which are located in the central part of city. This area is around 1822025 sq.m which is 182.2 hectares accompanying a variety land uses in this part of the city. Existence of shops along with presence of the old market, Jame Mosque, Imam Zadeh Yahya and offices in the CBD (neighbourhoods 2 & 3), gathers a tremendous amount of daily visitors to the heart of the city for shopping, gathering, visiting, recreation, religious practices and administrative purposes. Residential land use is the maximum with 50.22 %, after that networks take about 24.63% and the lowest one is of green spaces with only 1.9 percent and minimal industrial use of 1.1 percent.

Table 1: Land Use in All Neighbourhoods of Ward 3

Land use		Area (Sq.m)		Percentage	
Residential		915016		53.46	
Com merci al	Active	133780	171800	7.34	9.42
	Inactive	38020		2.08	
Publi c	health centers	18285	101933	1	8.85
	Educational	57996		3.18	
	Sport	690		0.03	
	Administrativ e	23980		1.31	
	Catering	4590		0.25	
	Cultural	2255		0.12	
	cultural-histor ical	310		0.01	
	cultural-religi ous	17960		0.98	
	Transportatio n	22025		1.21	
	Urban Facilities	8105		0.44	
Military	5028	0.27			
Industrial		34425		1.89	
Park & open space		31875		1.74	
Roads		448750		24.64	

Source: Sabzevar Municipality Archive

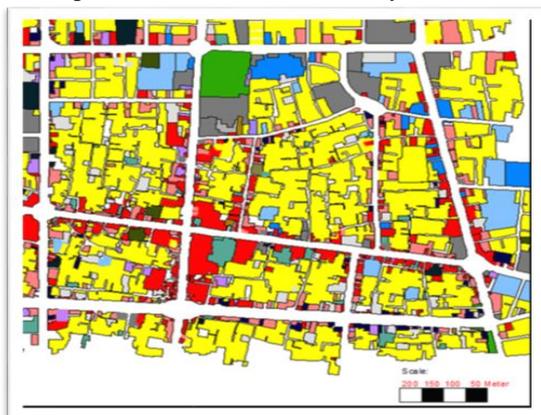
IV. CBD STRUCTURE

The oldest part of the city is concentrated on the CBD where most of the buildings look mundane and chaotic within a context of city market and some historical precincts where the streets connecting each other are as wide as 3-4 mts includes Beyhagh, Asrar Street and an indoor market along with commercial, businesses and administrative centers. Concentration and growth of commercial units in this part has led to change in Land use from residential to commercial, this part it still carries its old and exhausted fabric with building which has maximum two floors.

Some of the slums of the CBD (located at the southwest of CBD) have the ethnic minority (Ghorbatha) groups which are generally Itinerant migrants. Their ethnic, cultural characteristics and particular dialect from one side, and people’s negative and discriminatory attitudes toward them from the other side, despite their hard work and creativity in the manufacturing of tools and crafts, the city has entirely separated this community from rest of the society. These people live with the minimum facilities and lowest level of life standard in a very old and rusty area. Number of households living is 120 to 150 and off late few groups have been scattered to other parts of the city.

Land Use at Central Business District:

The Central Business District (CBD) has an extent of 781,000 sqmts. The residential land use accounts for 46.69% followed by 23% for traffic network and 15.21% for commercial purpose. The rest of the area is accounted for green spaces and open spaces for sports, cultural and recreational areas. Around 6 % of city’s traffic is located at the heart of the southern part of CBD. The CBD has chaotic structure, narrow alleys and plenty of deadlocks with high density of residential land use portion. Main streets which have been constructed around 1921 have no sufficient infrastructure. Data on accidents were collected from department of road and accident to link the rapid growth in population, economics of development, industrialization and motorization encountered by the country in 2011, which were 4372 accidents. Most of the available land use in this region has insufficient parking spaces, for which on street parking plays an important role to reduce roadway width.



- Hospital and clinic
- Residential
- Mix of residential, commercial
- Cultural, historical, educational
- Governmental office
- Industrial and manufacturing
- commercial
- Sports and recreation
- Urban installations

Figure 2: Land Use of Central Business District

Table 2: CBD Land Use-2011

Land Use	Area Sqm	Percentage
Residential	364649	46.69
Commercial, service, private office	118790	15.21
Public	94501	12.1
Educational		
Healthcare		
Military		
Sports		
Administrative		
Hospitality and Tourism		
Cultural		
Historical cultural		
Religious cultural		
Warehousing and transportation	14839	1.9
Urban equipment and facilities		
Bare land	8591	1.1
Green space	179630	23
Industry	781000	100
Road and networks		
Total		

Source: Sabzevar Municipality Report, 2011

The CBD area of Sabzevar city is a complex and diverse zone and is bounded by commercial activities at the type 2 arterial roads. Inner core of the CBD is a network of narrow and discontinuous internal roads. Its main roads are intersected by a number of internal streets and alleys of widths varying in unorganized fashion. Much of the future urban development is expected to take place much in the north and eastern parts of the city with lower levels of development in the southern part of the city.



- Arterial roads Type 2
- Sub arterial roads
- Collector, Local roads

Figure 3: Road Classification in CBD

V. TRAFFIC DIMENSIONS OF CBD

As majority part of historical landmark, cultural and religious places, many banks, institutions, schools and government departments, old market and main commercial units have situated in CBD, so traffic volume would be so heavy, that's why it needs to decrease traffic. Most of the travels occurs in the morning to reach to schools, administrative affairs and also for those people who immigrate from other nodes or rural area to achieve their requirements. Traffic volume also would be heavy in the evening and peak hours which are related to shopping and religious affairs.

Unfortunately, people tend to use their private vehicles for short distances instead of walking. According to report of traffic police department, Sabzevar city is fifth largest city in Iran with about 110,000 two wheelers and also there are around 70,000 private vehicles in the city.

Table 3: Vehicles Statistics in Sabzevar City 2011-2013

	Four wheeler	Heavy vehicle	motorcycle	Total
2011	30,000	6000	75,000	111,000
2012	40,000	7000	80,000	127,000
2013	52,000	10,000	92,000	154,000

Source: Traffic Police Department

A. Current Traffic Volume Condition in CBD

Except HMV like buses, trucks and trailers all kinds of vehicles are permitted in CBD. There are more number of vehicles and pedestrian traffic accumulating due to prominent tourist spots like presence of heritage and religious structures. As CBD has old texture residents don't prefer to exist in this area.

At Sabzevar city, most of banks and financial branches are located at Beyhagh Street and Asrar Street. Most important religious places (Great Mosque, Pantheon) heritage zones and oldest markets are located in Beyhagh Street. Municipality, education department and main city police station are located in Asrar Street. Hospitals, most of Clinics, Training and Treatment centres are located in Kashefi and Asadaabadi Street.

B. Vehicles Movement Pattern in CBD

Due to the narrow street widths and existing traffic congestion in major roads of CBD, the movement of vehicles faces many issues.

Beyhagh Street No.1 has been survived for 16604 Passenger Car Units (PCU) in 2005 and 12269 (PCU) in 2014, followed by Asadaabadi Street-5 with 13129 PCU in 2005 and 10191 (PCU) in 2014, Kashefi Street-2 for around 13581 PCU in 2005 and 9351 (PCU) in 2014 and Asrar Street-4 for 10837 PCU in 2005 and 6674 (PCU) in 2014. These roads were catering for two-way traffics when the survey was made.

While most of the government innovations introduced in urban transport have come from local and regional actors, the city municipality decided to adapt all busy roads to one-way since 2009 to reduce vehicular traffic congestions in CBD.

The one-way cycle lane includes the Beyhagh Street (St.No.1), the Kashefi Street (St.No.2), Asadaabadi Street (St.No.5) and Asrar Street (St.No.4) as seen in Figure 5.4.

Ambulance lanes have been taken care for emergency as special one lane.

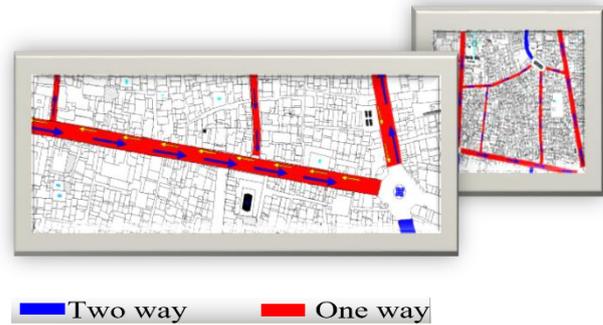


Figure 4: Vehicle Movement Pattern in CBD Since 2009

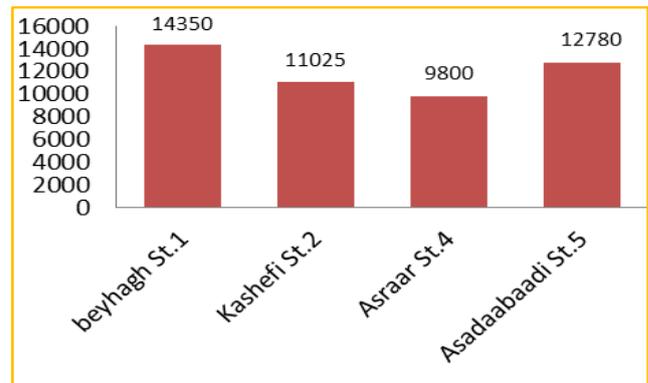


Figure 5: No. of Vehicles in the Major Roads of CBD, 2014

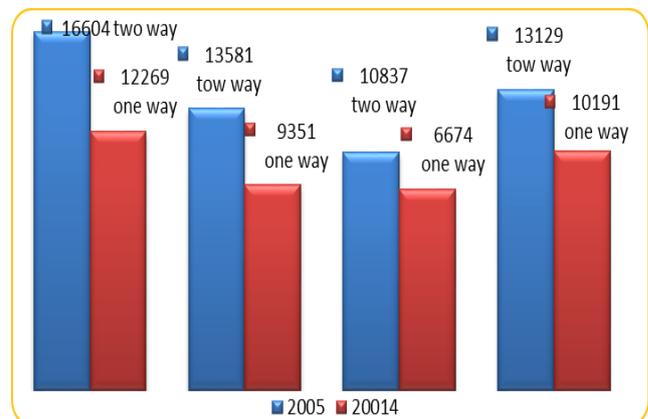


Figure 6: Table Showing the Relation between Two-way One-way Traffic Growths in the Streets of CBD

C. Level of Service in CBD

Level of service is a qualitative assessment which tries to answer how good is the present traffic on a given facility assigning quality levels of traffic based on performance measure like speed, travel time, freedom of mobility and road safety analyzed by the user virtually unaffected by the presence of others in the traffic stream. The levels of service can be classified into six categories from A to F where level A represents the best conditions and level of service F represents worst traffic conditions.





Figure 7: Classified level of Service (LOS) in CBD, 2005

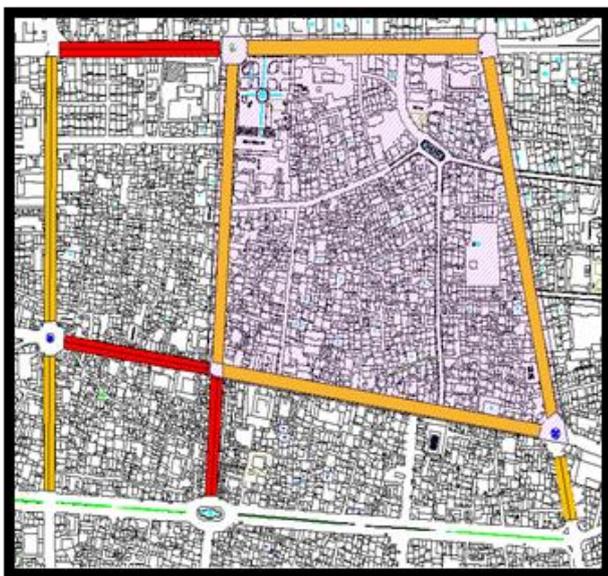


Figure 8: Classified level of Service (LOS) in CBD, 2010

D. Pedestrian Movement Pattern in CBD

Walking as a part of popular form of physical activity has lost its original position in Sabzevar due to existence of sidewalks in all roads with low standard width for pedestrian volume on sidewalks and high vehicle volume in major roads of CBD, give proof of this claim. The CBD is enticed with grand and elegant shopping precincts owing to which there is more pedestrian volume when compared to the rest of the city. The framework proposed will bring strategies in encouraging people to walk and increase pedestrian volume in CBD. Sabzevar as a developing city continuously faces increasing vehicle movement that is increasing in city more and more and in result, the attendance of pedestrian in urban spaces will become less and less.

In the following, all statistical information about pedestrian traffic volume in sidewalks of major roads and major intersections in CBD are for 2005 and 2014.

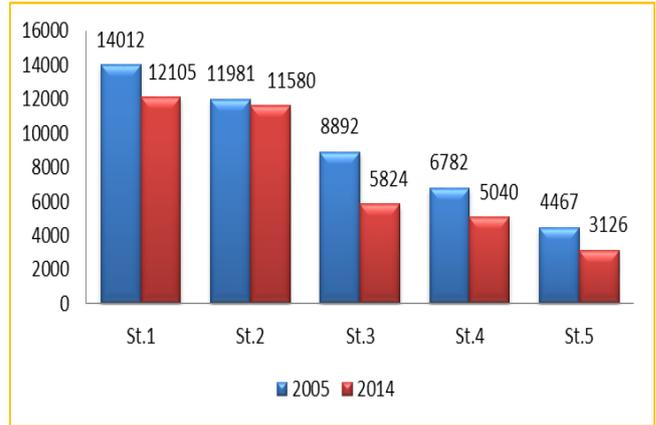


Figure 9: Pedestrian Volume in Busiest Streets in CBD of Sabzevar

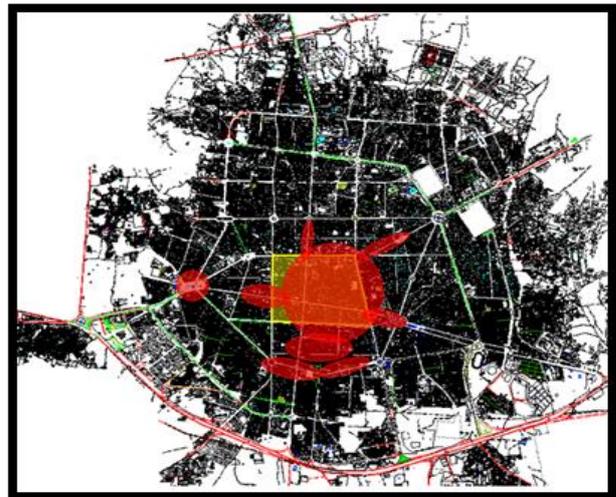


Figure 10: Pedestrian-Vehicle Conflict Zone Street No 1 [Beyhagh Street]

Beyhagh Street (Street No.1& No.3) is one of the main and oldest east-west axis in the urban network. According to the land use analysis, most important commercial units, educational and cultural places and other service centers are located in these streets due to which most of the travel originates here, since most of the trips begin from here due to the existence of attractive places of trip yet the width of the passages remain minimal.

Street No 2 [Kashefi Street]

Kashefi is a one-way street carrying the traffic load entering from Beyhagh and south. It is a south-north axis with majority land use of commercial, public and semi-public and multi fictional mixed land uses. Unlike Beyhagh, Kashefi land use and functionality is not limited to only commercial use, but also it has many numbers of health centers, clinics, banks, schools and offices.

Street No 4 [Asrar Street]

Asrar Street is a north-south route that connects the north traffic to Beyhagh junction. Unlike other streets of CBD, this street does not have a commercial role and in fact its main function is to carry the north-south traffic as being the oldest north-south line and being home to many Banks, Offices,



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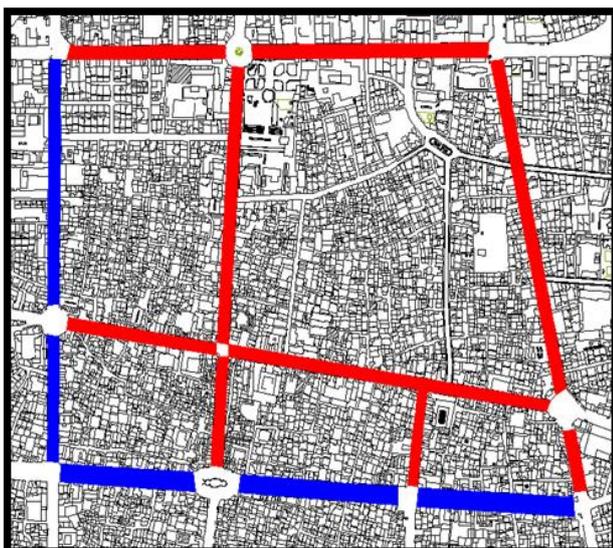
Amphitheaters, and so on. On the north, it is attached to Hakim sq. and from south reaches to Beyhagh junction. It is a one way street and since has many offices in it; therefore it is mostly crowded during the daily working hours. Since commercial activities are not strong here, it does not have heavy pedestrian traffic after working hours but vehicular traffic remains the same throughout the day since it is an important connecting bridge to the central part and south of city. Commercial units such as printing offices, currency exchange office, service offices in Asrar street (St.4) are not that much attractive to encourage people to walk. Several governmental offices, main branches of banks, institutions are located in this street.

Street No 5[Asad Abadi Street]

This street is a one-way axis from east to west carrying the traffic load to the main cycle and feeds the CBD network. Despite of being in CBD, this street does not play a commercial role in heart of city, instead it has accommodated many offices such as: Main Judiciary, Municipality, Hospital, Schools, Pharmacies, Medical Sciences department, Civil Registration and City Council offices. For the above uses, daily visits and pedestrian traffic is limited to working hours and during evening it acts more as carriage than a place to walk or to shop. Main land uses in Asadabadi Street (St.5) is government offices, medical affairs and education places.

E. Vehicle Parking Condition in CBD

In the Central area of the Sabzevar city, the on-street parking is very predominant. Vehicles are parked in state of perpendicular or parallel relating to a low width of carriage way and limited space especially in central business district of Sabzevar city. Existing on-street parking has occupied significant part of roads which results in effective width of carriageway has reduced. The volume has increased in the major roads and this conventional on-street parking system which is typically unsafe, unattractive and is inefficient.



Occupancy > 1 (critical)

0.8 < Occupancy < 1 (Very unstable)

Occupancy < 0.8 (unstable)



Figure 11: Busiest On-street parking in CBD 2014

VI. MAJOR PROBLEMS

- Due to current land use pattern, there are several reasons that rise traffic congestion levels. Congestion occurs in most of the day so more roads have been affected compare to before and congestion levels have risen in Sabzevar, while capacity of CBD have remained as before so it wouldn't be able to meet the demand of users. The present study aims to examine the magnitude of this multifaceted problem in a rapidly developing of Sabzevar and analyze the existing urban issues.
- Improper planning reforms of land use and non-coherence amongst different land uses of urban spaces maximize the number of trips and travel time according to people's demand causing inconvenience by increasing the number of trips to CBD from commercial, service, office places and hospitals from other land uses like residential.
- Actually at present there is significant number of governmental offices, including the mayor, governor, law, Charity Committee and etc. have offices in the CBD wherein most of the offices do not have basic parking spaces for their own staff and people concerned to their workforce. Most of these offices have a major direct impact on the traffic volume. Establishment of Mobini hospital at Kashefi street (No,2) which is working currently and Social Security Hospital in Kashefi street exactly opposite to the Mobini and construction of Heshmatieh in Asadabadi street (No,5) without consideration of necessary neighbourhood requirements, one of which is parking has burdened the traffic management of CBD at street no 2, 4 and 5. Existence of many governmental and nongovernmental departments, banks, financial institutions occupy on major streets of CBD, which attracting people from different parts of the city for public works and these areas have not been made pedestrian friendly by necessary infrastructure including visuals and aesthetics. Many a times the entry to these public is restricted after the office hours. One of a reason that is effective to non-enjoyable and lack of beauty visual of streets. Especially after working hours that the public places remain closed.
- Vehicle conflict with pedestrians is one major setback to the uncontrolled and insufficient parking slots which are increasing on a day to day basis highlighting parking issues and inconvenient on street demand capacity. Road safety is generally seen as an absence of accidents involving pedestrians, motorists and their passengers, vehicles and properly but the examination of interaction of land use and transport, road space and frontage responsibility and resources.
- Increasing number of vehicles at the CBD is leading to insufficient parking spaces which spillover to various other land-uses implicitly based on the current demand of parking areas usually taking place beyond the scheduled areas which are marked for parking causing inconvenience to the neighborhood usually blocking sidewalks and alleys. apart from two official off-street parking,

there are 6 institutions that have parking facilities in their premises though there are about 90 governmental departments, banks, institutions which are located in the central area of the city and only four of them have parking facilities for their employees.

VII. STRATEGIES

According to the trip attraction of the CBD, most of the important trips are made in streets which are around 7-8 meters or even lesser, that is due to the unorganized parking lots as mentioned in the identified problems that Sabzevar has not considered critical traffic situation of the 50.13 percentage of residential traffic that happens to lie within the CBD, in other words, about 28.62 percent of residential area of city has been located in CBD area. The average number of existing structures like the major commercial units with respect to the existence fall around 2600 spaces related to trade and commerce, either in retail, or wholesale and also around 50 bank branches and more than 20 different financial and credit institutions adds up to the increase in traffic at this particular region of the city.

Revitalizing the city core by transforming into commercial-cum-recreational areas by shifting government and non-government offices that are located on Beyhagh, Kashefi, Asadaabadi and Asraar Streets which are working during working hours away from CBD as a transfer and change of land use.

Existence of main historical places and a lot of commercial units is great potential to change performance of CBD to commercial-recreation. This makes:

- ✓ Development of pedestrian strategies by making all public places and spaces as barrier-free; high priority for safety of pedestrians and high quality design that creates a positive experience for everyone who walk in the CBD,
- ✓ Pedestrian Zones to be identified in the Master Plan for enhancing the public spaces and encouraging priority for pedestrian movement in the CBD,
- ✓ Promote walking as active and environment friendly mode of transport amongst citizens,
- ✓ Pedestrianization of Identified Streets: Promoting full-time pedestrian friendly that can bring about the most significant improvement in terms of pedestrian safety and mobility as well as streetscape enhancement to encourage people to walking in CBD of Sabzevar city,

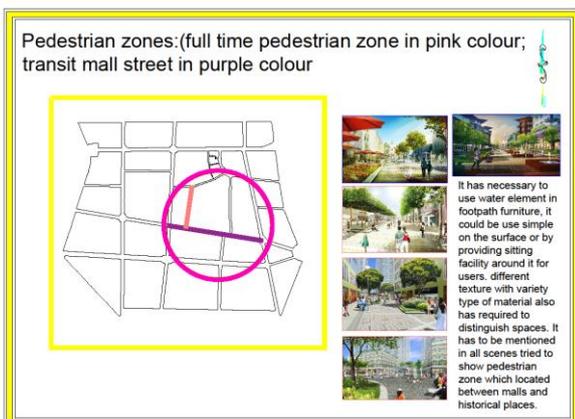


Figure 12: Full Time and Transit Mall Pedestrian Zones

- ✓ Increase number of pedestrian causes to business boom,
- ✓ Changing land use in worn out texture which located in CBD area and create commercial-recreation zone based on pedestrian priority, like Golestan neighbourhood which by 83082.83 sqm area is 4% of Sabzevar's worn texture.

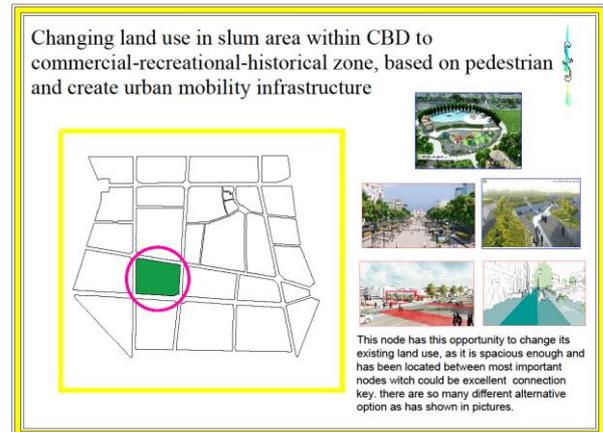


Figure 12: Example of Changing Land Use in CBD (Golestan Area)

VIII. CONCLUSION

Due to Existence of many governmental and nongovernmental departments, banks, financial institutions occupy on major streets of CBD, current land use condition in CBD of Sabzevar city is unattractive to walking, especially in peak hours that the public places would be closed.

This paper highlights the land use condition in central business district of Sabzevar city, current traffic volume condition CBD, pedestrian and vehicle movement pattern, level of service and parking condition in CBD were reviewed.

Integrated modes of mobility to promote changing land use in CBD of Sabzevar city were suggested. The most efficient mode would be providing friendly pedestrian street and create recreational-commercial area based on pedestrian facilities within CBD.

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