Car Free Zone as Planning Vision to Enhancements Transportation in City Centers (Holy Najaf City Center-Iraq)

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Abstract. The idea of a car-free city represents a solution to the problem of fuel consumption and air pollution caused by the use of cars and replaces the idea of owning and using private cars with an efficient transportation system, and it doesn't mean living without cars, because cars have become an integral part of a modern city. On the contrary, people can still drive in city but will not park their cars at home. Instead, they park elsewhere on their way home. Research problem: Weak regulation of the movement of vehicles in the center of the holy city of Najaf, which leads to the danger of pedestrian movement in the city center. The aim of the research: to provide a safe and effective movement for pedestrians in the center of the holy city of Najaf. Research hypothesis: The use of the car-free zone strategy in the city center transportation system achieves security for the population in the old city. The research examines reasons behind suggesting free-of-vehicle areas. It gives a number of policies to achieve the strategy in the center of the holy city of Najaf, including the provision of public transportation, furniture and comfort for pedestrians in the streets, as well as easy access for the residents of the area. Thus, it is possible to draw the conclusion that there is a possibility to achieve this strategy in religious centers according to a number of policies that suit the specificity of the area.

1. Introduction

Over the years, cities have been shaped by the way people arrive and move around. They jointly developed with changing transmission technologies. Different types of transportation - walking paths, roads, trams, railways and airports - have shaped our cities in distinct ways. There are many areas in the world where people always live without cars, because there is no access to the road or other reasons. Research problem is what are the necessary measures to develop a car-free environment in the holy Najaf city center in the context of sustainable urban development? So the aim of this research be to gain more knowledge about car-free projects and their basic strategies in order to understand the procedures regarding the future development of city centers and to collect and reflect what has been implemented in terms of measures and experiences for other cities and the possibility of their application in the city center of Najaf.
2. Car Free Zone

Please follow these instructions as carefully as possible so all articles within a conference have the same style to the title page. This paragraph follows a section title so it should not be indented.

2.1. Creation of car Free zone strategy

The early 1990s saw an increasing number of conferences about car-free cities and sustainable transportation, while a few cities in Europe have taken initiatives independently towards a car-free hub model. Although the city transportation policy is a matter of local decision, this strategy is taken at the country level, at 1992 Interest began in about 100 cities, these cities suffering are common problems that must be addressed at the regional and international level (EURET, 1993).

The statement "car free" is a catchy phrase that cannot be taken literally. Which means reducing the movement of cars to levels compatible with environmental quality and the possibility of providing services to residents, visitors and commercial places. (Hartmut et al., 1994, p4). This makes the car free zone concept a contested term where the details depend on the context. However, car free zone concept is something of a misnomer. In most cases the car free zone concept appears as restriction to the traffic, which makes terms such as car limitation or car reduced more appropriate. (Thomsen, 2016, p17).

Definition, (Car Free Zone) refers to an administrative and regulatory action that depends on specific traffic laws, limiting car traffic is by blocking the area, there is a need for political and administrative intervention to ensure the plan’s efficiency and applicability a matter that is subject to discussion, study, and experimentation (Hartmut, Pharoah, 1994, p4).

The definition of car-free cities are those cities where cars or the use of cars are put aside of usage on city roads, instead people usually use commuting on bicycles, walking and public transportation. Citizens avoid the use of motorbikes, scooters, vans, and large trucks as well, but use them to transport heavy goods. (Patel et al., 2016, p15).

2.2. Reasons and Benefits

Car-free cities offer citizens a much better quality of life, because vehicles cause danger, pollution and noise, car free cities residents depend mainly on public transportation facilities or walking or cycling to move within the urban area. Walking becomes more enjoyable to historical monuments, in a quieter climate, with less noise and better air quality. These benefits have become widespread support among the population, (Hartmut et al., 1994, p14).

Car-free cities greatly reduce dependence on petroleum, car accidents, noise pollution, air pollution, gas emissions and traffic congestion to a great extent, parts of the city continued to be denied access to cars - especially in areas where cars were often difficult to accommodate due to narrow alleys (Patel et al., 2016, p15). Wright (2005) discusses the social value of car-free zones as stimulating higher levels of social interaction, such as roadside sidewalks with limited pedestrian space. It is not the absence of cars alone that creates such a scenario, but other features such as art, talents and informal possibilities to sit, the option to participate in activities and things to look at play an important part in an attractive social space. Moreover, it is important for public spaces to develop their own identity in terms of design, rather than creating areas of public flair that does not depend on the culture of the city (England et al., 2020, p8).

2.3. Reasons behind suggesting free of vehicle areas

In some cases, proposals have been submitted by local authorities to redevelopment in areas with limited road capacity. Or because of the great momentum of the population. This helps to address some of the problems caused by dependence on the car, (Melia, 2009, p31). Residents of a car-free
zone have a lower carbon footprint. Reducing congestion is based on broader city and surrounding policy and practice when implementing the car-free strategy, (Melia, 2014, p229), the space normally occupied by cars and parking spaces can be redirected. (Kwik, 2014, p11). The car-free zone strategy is achieved through planning and major political interventions. If we want the future of cities to be car-free, strong hands and scalable projects are needed (Urry et al., 2017, p22).

2.4. Reviving the social functions of the streets
Many roads have been turned into parks. In Seoul (South Korea), an abandoned highway has been converted into a public park, and part of the Paris Expressway in France is being converted into a car-free zone (Urry et al., 2017, p21). Japan has many pedestrian-only shopping streets, or "pedestrian squares", a large proportion of these areas were in the center of the main city. The success of this strategy in Japan (pedestrian streets) by allowing trucks onto the streets late at night and early in the morning hours to goods deliver. In a number of cities, designated streets are reserved for pedestrians from early in the afternoon until late in the evening, and are open to all vehicles in the morning. This provides daily access to cargo delivery vehicles to supply shops and allows cars to reach shoppers, while maintaining a specified number of traffic at other hours, (Michael A. Replogle, 1992, p36).

2.5. Terms of the strategy of car free zone
The term “car-free” can encompass a set of different restrictions, depending on both spatial and temporal nature, and restrictions on the use of cars. The restrictions can be portrayed as a set of possibilities and limited perceptions of long-term, outright bans. On the other hand, there are areas that lead to restricting the use of the car without being completely prohibited. These areas are sometimes called "traffic calming" or even "light cars". In this situation in cities and communities it allows minimizing vehicle entry but not preventing complete use, (Wright, 2005, p28). Three basic conditions for achieving the strategy, (Minh, 2016, p286):
•Good and easy-to-reach public transportation systems.
•The optimum distance from home to the specified service (walking and cycling only).
•Proper parking spaces.
Morris and others suggest classifying the car-free zone into three categories, (Melia, 2009, p29):
•Visually car-free: Where the residential area does not include any entry to private cars, but in certain cases (residents' ownership) parking can be provided underground or on the outskirts of the site.
•Low-car: Developments that feature low-rate parking.
•Car-free: Little or no vehicle infrastructure is provided.
Types of car-free strategy (Wright, 2005, p27):
•Car Free City - Motorized vehicles are prohibited from all over the city, with a few exceptions such as emergency vehicles
•A car-free shopping street - a mall focused on commercial activity for pedestrians; the possibility of allowing the entry of motorized vehicles outside peak hours. A car-free shopping street that is accessible by public transport vehicles.
•Car Free Historic Center - Historic District with no motorized vehicles.
•Car Free Housing - residential area restricted to motor vehicles and, in some cases, restricted to motor vehicle ownership.
•Car Free Day - A special day that offers an experience with a car-free life; Vehicles may be banned from the whole city or only in select areas. Car-free lifestyle.

So, four of the needs to achieve a car-free city strategy:
•Providing a high quality of life.
•Sustainable use of resources.
•Providing faster transportation for people and goods.
•Design standards.
2.6 Conditions for moving towards car-free cities

Nine conditions, for moving towards car-free cities:

• The importance of addressing the vision. The planning process is emphasized through political bargaining, and thus it is shared by all stakeholders, as well as recognition of the main challenges represented by the continued dependence on and development of cars in urban areas.

• Accessibility using public transport. High-quality public transportation caters to all groups and needs of society. Public transportation requires integration of the four main elements in accessibility planning - land use, housing, services, and transportation.

• A wide range of data and analysis of land use and transportation patterns, demographics, environmental pollutants, traffic accidents, social interaction, health and economics in the area designated for implementing the Car Free Zone Strategy. Data is necessary to understand the current situation as well as predict specific impacts. Also, data can be useful in environmental impact assessments.

• Through the participation of the stakeholders namely companies and citizens (Nieuwenhuijsen et al., 2019). Residents need to realize the true benefits of car-free development and personal mobility must be replaced by public transportation.

• The presence of evidence and a set of data in some areas to clarify the health effects of car-free zones, which may limit policy-making. Therefore, the evaluation of the implemented projects is a key to the future towards a car-free development transition.

• Detailed plans for implementation should include measures of progress, in line with city strategies. In terms of climate, the co-benefits of car-free zones can be a useful resource in climate change strategies.

• Equal access to transportation to integrate the entire community in a transition towards car-free areas (Nieuwenhuijsen et al., 2019). Therefore, there is a need for a shift in transportation policies, to enable equal access for all to more easily access places. If the transportation system provides only access to cars, then it is insufficient for the full participation of the community and needs to be strengthened. (England et al., 2020, p20-21).

• Achieving a sustainable transportation approach and low levels of vehicle use by reallocating space to public transport, thus making use of the available capacity in an efficient manner. (England et al., 2020, p21).

• A paradigm shifts towards sustainability and mobility in terms of accessibility.

2.7 Ways to transform cities into a car-free model

• Progressive implementation: People need convenient, frequent and reliable service. Diversion in locations should be relatively well serviced by rail or bus services. The appropriate arrangements for the delivery of the goods must be in place. The important result is that the route of the transportation system should allow for fast, easy and fairly direct service to all major parts of the city.

• Incentives to reduce vehicle traffic: One of the measures that is widely used by the authorities is to reduce traffic for citizens, Private cars are not allowed to move directly from one area to another. Motorists must exit the city, via ring Road, and then return to the intended area. Buses and cyclists can move freely between areas. Due to this mechanism, downtown traffic is greatly reduced.

• Better public transportation: In most places today, public transportation is called a second-class service for citizens in general. It is a necessary condition that public transportation becomes a first-class service and serves citizens of all strata of society. It should be safe at night, professionally run, clean and reliable in time.

• Faster service: Public transport service should get faster than it is today in most places. Ideally, the speed should be (at least 30 km per hour) within core city areas so that citizens choose to use public transportation rather than private driving. It motivates citizens to use public transportation.

• Increase density and decrease street width: To encourage the high quality of public transportation, most cities will require increased population density near transportation. The streets should be
constructed more narrowly. These measures can increase sufficient intensity while also freeing up some lands for green spaces at the fringes. (Patel et al., 2016, p15).

- Best cycling: The cycling improvements are pretty straightforward for car-free model making. For example, Good streets are needed. In densely populated parts of the city, multi-story bicycle parking lots and use of garages may be necessary.

2.8 Summary
The car-free zone strategy is achieved through a set of policies, including the provision of safe and fast public transportation, as well as easily accessible car parks and pedestrian areas, whether streets or sidewalks. Also, car-free zone can help connect the areas, thus improving connectivity in the city center and bringing comfort and safety to the residents of the area.

3 Practical Side

3.1 Methodology
The study begins by defining a specific area in which the strategy can be achieved, which is the center of the city of Najaf Al-Ashraf, as this area is of historical, cultural, religious, as well as urban importance, and because of its multiple advantages, including its good location and its distinctive geographical location. This process requires several steps to prepare the data, first, making maps of the study area, the reality of the situation, showing the types of roads in the old city.

Second, developing data on traffic, congestion, and parking locations, and finally applying the car-free zone strategy in the study area by analyzing the reality of the situation.

3.2 Najaf City Center
The city of Najaf is located on the edge of the western plateau of the country, at a distance of 160 km southwest of the city of Baghdad. This city contains the shrine of Imam Ali (AS) in the center of city, which gave it importance and distinction from other cities.

3.3 City Center Road
There is a ring road that called Al-Soor Street. It is a double road and can accommodate two cars in each direction, and at the present time, exceptionally, traffic flows on Al-Soor Street in one direction only.

The four main roads provide access to the Old City from Al-Soor Street: -
- Al-Tousi Street from the north.
- B - Al-Rasoul Street from the south.
- Zain Al Abidin Street and Al Sadiq Street from the east.
- From the west, there are two streets on either side of the city of visitors.

There are exceptional restrictions on traffic at the present time due to the security situation in almost all roads and there are some narrow streets that can only accommodate vehicles for the delivery of goods and also narrow alleys that can accommodate only pedestrians, (al-Husseini, 2010, Pg.92).

The figure show (Figure1) the main types of streets in the old city of Najaf are red for cars, and purple for pedestrians. The figure show (Figure2) the main inspection places are in the old city and they are at crossroads places and it is around the upper holy shrine and it is on two levels, the first level at beginning of the main streets in old city. The second level is near the shrine at end of same streets. The figure show (Figure3) the inspection places for pedestrians and cars, where green points are designated for vehicles, while red points are for pedestrians, and all of them are inside the old city. The figure show (Figure4) the main places of congestion for vehicles, which are yellow points. The reason for this congestion is intersection of vehicle movement with pedestrian traffic, especially during visiting
times in Najaf. The figure show (Figure 5) the main direction of movement of cars inside the old city, and movement will be in one direction from the car checkpoints, around the city and ending with street next to checkpoints.

The figure show (Figure 6) the main Parking in old city, where purple colour appears on the northeaster side, is reserved for public transport for neighbourhoods parking, and the rest of parking spaces are for private cars and are spread around the road surrounding old city.
3.4 City center Population
The population of the city center reached (14,782) people, where the total population density of the old city was 433 (person/hac), and the number of housing units was (1861) housing units.

The furthest distance from the center was 430 m, and the nearest residential area from the center was 230 m. This shows the small area of the center and the possibility of implementing the strategy in it.

As for congestion, the vehicle's peak speed was 20 km/h, while at normal times it was 60 km/h.

Through the theoretical framework, a number of indicators and policies have been developed that can be adopted in the study area to achieve the car-free zone strategy, such as:

• Laying a line for public transport.
• Putting street furniture, especially pedestrian streets.
• Providing car parking in easily accessible places.

1. Public transportation

The fence road that surrounds the old city has been specified for public transport, i.e. one path is for public transport and contains a number of stations opposite each main street station such as Al-Rasoul Street, Zain Al-Abidin Street and others. The total of the stations is about four stations in addition to a main station located outside the old city. One station from the other is less than 400 m.

And within each main street, small buses transport the elderly and people with special needs, as shown in the figure:

![Figure 7. showing Al-Rasoul Street and buses for transporting residents](image)
2. Putting furniture on the main streets in the old city, such as Al-Rasoul Street, Zain Al-Abidin Street, Al-Tusi Street, and Al-Sadiq Street (AS) because these streets are designated for pedestrians, such as placing trees to reduce the shedding of sunlight and placing places to sit, and the picture shows pedestrians in the street.

![Figure 8. showing pedestrians on Al-Sadiq Street](image)

3. Providing car parking in easily accessible places.

As shown in Map No. 6, the parking sites are not organized and do not meet the service for the residents of the area and the visitors heading towards the upper shrine. Therefore, new car parks must be installed, especially in the western and southern sides, as they are the most areas that contain residential units.

3.5 Discussion of results

Maps were used showing the locations of car parks, pedestrian and car roads, and closed places in the city center. The area was already implementing the car-free zone strategy, but in an unorganized way. Therefore, car parks were placed in locations easily accessible to residents and a number of strategies such as placing street furniture and places shading, as well as providing public transportation that achieves comfort and safety for the residents, thus reducing the migration rate of the area’s residents to other parts of the city, as this area has all their needs. There are a large number of indicators, but the type of fabric in the city and the specificity of the city determine a set of verifiable indicators.

4 Conclusion

This study presents the implementation of the strategy of the car-free zone in the center of the city of Najaf, which is an area that suffers from the disorganization of the movement of vehicles and its isolation from pedestrians after the closure of the city center and the prevention of vehicles from entering it due to the security conditions, which led to the need for a number of policies to organize it, including the provision of public transportation and the organization of The movement of pedestrians, isolating them from vehicles, and providing parking sites for the residents of the area and visitors.

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