COMPLETE STREET AS A KEY FOR URBAN ENVIRONMENT DEVELOPMENT

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ABSTRACT

Purpose: The concept of complete street is one of the modern trends concerned with diversifying means of transportation and reducing the disadvantages of mechanical transportation modes. This paper discusses the role of complete streets can play in developing the urban environment in the Alyarmok District of Baghdad.

Method/design/approach: The linear regression method used to analyze the opinions of 100 respondents surveyed in the study area in order to find the relationship between the urban environment and the complete street elements.

Theoretical framework: The Modern trends in urban planning aim to find alternatives to the policies of traditional transportation planning that focus on vehicular mobility.

Results and conclusion: This paper concluded that the implementation of a complete street strategy in the study area will lead to the development of urban environments.

Research implications: Encouraging street users to switch to active and public transportation and reduce dependence on vehicles.

Originality/value: This paper can contribute to finding solutions to problems of urban environment degradation, which suffers from traffic congestion and its associated problems.

Keywords: Transportation, Active transport, Linear Regression, Mobility Planning, Baghdad.

VIA COMPLETA COMO CHAVE PARA O DESENVOLVIMENTO DO AMBIENTE URBANO

RESUMO

Objetivo: O conceito de rua completa é uma das tendências modernas preocupadas em diversificar os meios de transporte e reduzir as desvantagens dos modos mecânicos de transporte. Este artigo discute o papel que as ruas completas podem desempenhar no desenvolvimento do ambiente urbano no distrito de Alyarmok em Bagdá.

Método/desenho/abordagem: O método de regressão linear utilizado para analisar as opiniões de 100 entrevistados na área de estudo, a fim de encontrar a relação entre o ambiente urbano e os elementos completos da rua.

Referencial teórico: As tendências modernas do planejamento urbano visam encontrar alternativas às políticas de planejamento de transportes tradicionais que focam na mobilidade veicular.

Resultados e conclusão: Este trabalho concluiu que a implementação de uma estratégia viária completa na área de estudo levará ao desenvolvimento de ambientes urbanos.

Implicações da pesquisa: Incentivar os usuários de rua a mudar para o transporte ativo e público e reduzir a dependência de veículos.

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INTRODUCTION

In contemporary cities, the expansion of the use of vehicles has led to the deterioration of the urban environment (AbdelJawad, N., & Nagy, I. 2023). To counter this, many concepts and strategies emerged that attempted to regulate mobility in cities and limit its effects. One of these alternatives is the implementation of a complete street policy to create livable and walkable cities (Zavstoski & Agyman, 2015). This new transformation in urban transport planning has fundamentally changed the way urban environments are shaped (Karndacharuk et al., 2014). The streets are considered a scarce and valuable resource. And represent how to design and manage them by allocating public resources that must balance between different targets: cost-effective mobility, equity for non-drivers, user convenience, safety, and local economic development (Litman, 2015). The complete streets policy presents a vision of the possibility of converting streets from mere channels for vehicles to channels that provide a variety of transportation options. Where this system accommodates the daily movement of people and goods through different modes of transportation (Hickman et al., 2013). And that contributes to reducing the damages resulting from the use of private vehicles and their negative effects on the urban environment (LaPlante and McCann 2008). Such as improving air quality (Gutiérrez, et al., 2022). As it was found in 2012 that transportation causes one-third of carbon emissions in the U.S. and that switching to active modes of transportation (cycling and walking) instead of vehicles for trips of less than one mile can reduce CO2 emissions by 11–22 million tons per year (Kahn, R., 2016). The street trees and green infrastructure along the street are considered complete street elements that help reduce air and street surface temperatures and absorb pollutants before they are released into the atmosphere (Demuzere et al. 2014). Where a study in the city of Chicago proved that increasing the vegetation cover by 10% or planting 3 trees per piece of land can reduce energy expenditures for heating and cooling by about 50–90 dollars per housing unit annually (Kahn, R., 2016). It also enhanced safety and security conditions for pedestrians, cyclists and vehicle users. By the use of traffic calming techniques, such as reducing the spaces for vehicle movement, changing the geometry of the street and narrowing the crossing areas at intersections (B. Sarte, 2010). As indicated by a general American report (2015) that contains studies for 37 complete street projects that led to a reduction in the rates of collision accidents (70% of these projects) and also witnessed a decrease in the rate of injuries (56% of these projects) (National Complete Streets Coalition & Smart Growth America 2015). And it is possible that complete street projects are objects of economic development as far as they can be used to plan transportation, where they have a positive impact on increasing the activity of commercial traffic (National Complete Streets Coalition 2014). A complete street enhances community health by encouraging people to walk and dispense with vehicles on their trips. By providing complete street elements such as street furnishing, pedestrian walkways and services for the elderly and people with special needs. As a study conducted by the National Collation of Complete Streets in America found (2015), on 13 complete street projects, it was noted that 12 projects witnessed an increase in the activity of pedestrians. and in the same study on 23 projects, it was found that there was an increase in
bicycle users in 22 projects (Garrett-Peltier, 2011). So the future of sustainability in the transportation sector is strongly linked to the successful planning, design, and implementation of complete streets (Parsons Brinckerhoff, 2017). This paper aims to shed light on the contribution of the complete street strategy to improving the quality of life in the countries that have accredited it as a means of planning transport systems in terms of health, safety, security, justice, equality in the right to use the street for all categories and different physical abilities, economic growth and improving the environmental impact. By encouraging active and public transportation to reduce the dependence on private vehicles.

2 METHODOLOGY

2.1 Site Description

The study area is located in Baghdad (Al-Yarmouk Street), It is a residential street that turned into a commercial street in the previous period. The long of the street about 2km and width 60m. It represents a destination for many shopping and entertainment trips from the other areas in the city. It connected to two arterial streets on the eastern side and the western side at both ends. Figure 1 shows the location of the street. The street suffers from traffic congestion and a lack of safe movement due to poor planning, shortages in public and active transportation and reliance on private vehicles.

Figure 1: The study area location
Source: Prepared by the authors (2023).
2.2 Data Collection

The data collected in the study area by distributing 100 questionnaires using a random sampling method to street users. It included the questions to evaluate street elements (current data) shown in table 2. The questions in table 3 concern the influence of applying the complete street elements in the study area. To encourage street users to use active and public transportation.

3 RESULTS AND DISCUSSION

The Likert scale used in the statistical analysis of the responses of street users in tables 2 and 3. The five-point Likert scale shown as follows.

<table>
<thead>
<tr>
<th>No. categories</th>
<th>Weighted average categories</th>
<th>Period length</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.80</td>
<td>0.80</td>
<td>not available</td>
</tr>
<tr>
<td>2</td>
<td>1.81-2.6</td>
<td>0.79</td>
<td>not enough</td>
</tr>
<tr>
<td>3</td>
<td>2.61-3.4</td>
<td>0.79</td>
<td>somewhat</td>
</tr>
<tr>
<td>4</td>
<td>3.41-4.2</td>
<td>0.79</td>
<td>enough</td>
</tr>
<tr>
<td>5</td>
<td>4.21-5</td>
<td>0.79</td>
<td>very adequate</td>
</tr>
</tbody>
</table>

Source: likert (1932)

3.1 Current Situation

The descriptive analysis applied to the questions of the study questionnaire (table 2) to find the measuring average, standard deviation, relative significance and evaluation. These data indicated a weak infrastructure for pedestrians and cyclists, and were the relative importance this element 36%. This requires the re-planning of sidewalks in a way that takes into account the needs of users of active transport and gives more space to sidewalks and bicycle lanes. The sample showed the percentage of street trees was 47%. This rate was not enough, which requires planting shade trees along the street to reduce the intensity of sunlight soften the atmosphere for the road and isolate carbon emissions. It turned out that there is a weakness in the infrastructure of multiple means of transportation. It was percentage 46%. Where the street lacks public transportation facilities and buses or trams are allocated. The sample also showed that furnishing pedestrian walkways was 34%. It is almost non-existent in the street, which reduces the desire of street users to walk, especially those who want to walk long distances. It turns out that Corridors for the movement of the elderly and the disabled was its percentage 30%. Where it considered unavailable in the street, which hinders the movement of people with special needs and the elderly in safe movement in the street. It is clear from the foregoing that the street lacks the elements of completeness, which greatly reflected on the quality of the urban environment and the increase in pollution rates and traffic accidents in the study area.

<table>
<thead>
<tr>
<th>What is the percentage of availability of the following items in the streets of the case study area</th>
<th>Measuring average</th>
<th>standard deviation</th>
<th>Relative significance importance</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pedestrian and bicycle lanes are isolated from the street</td>
<td>1.79</td>
<td>0.977</td>
<td>36%</td>
<td>not available</td>
</tr>
<tr>
<td>2.35</td>
<td>1.132</td>
<td>47%</td>
<td>not enough</td>
<td></td>
</tr>
</tbody>
</table>
2. Afforestation on both sides of the street

3. Multiple transport lanes (public + active) transportation

4. Sidewalk furniture and resting places

5. Corridors suitable for the movement of the elderly and the disabled

<table>
<thead>
<tr>
<th>Element</th>
<th>Arithmetic Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian and bicycle isolated lanes</td>
<td>2.31</td>
<td>1.002</td>
</tr>
<tr>
<td>Street tree planting</td>
<td>1.68</td>
<td>0.827</td>
</tr>
<tr>
<td>Multiple transport lanes</td>
<td>1.50</td>
<td>0.847</td>
</tr>
<tr>
<td>Sidewalk furniture</td>
<td>1.50</td>
<td>0.847</td>
</tr>
<tr>
<td>Corridors of the elderly and the disabled</td>
<td>1.50</td>
<td>0.847</td>
</tr>
</tbody>
</table>

Source: Prepared by the authors (2023).

Figure 2: The arithmetic mean of the answers

Source: Prepared by the authors (2023).

3.2 The Element of Complete Street

The simple linear regression equations used to determine the relationship between the complete street elements (independent variable) in table 3 and the urban environment (dependent variable).

\[ (\text{urban environment}) \ y = 1.001 + 0.665X \] (assessment of street items)
The data of the linear regression equation given in Table 4 explain that applying the elements of complete streets leads to an increase in the improvement of the urban environment by 66.5%. It is a constant value (B). This effect confirmed by a test (T) whose value (11,079) is greater than its tabular value (1,984). As shown by the correlation coefficient (R = 0.75) in Table 4, there is a strong correlation between the complete street elements and the urban environment, which is considered a partial positive direct relationship statistically significant with a value of 0.000 and means that application of the complete street elements increases the development of the urban environment.

Where the descriptive statistics data for the questionnaire showed in case of applying the complete street elements in the study area. Which shown in table 3. The relative importance of planning and implementation pedestrians and bicycles region are isolated from the street was 70%. Which reflects the desire of street users for safe and comfortable areas to practice walking or cycling. Increasing the percentage of street tree and green infrastructure along the street considered one of the necessary elements for practicing active mobility at different times and seasons, and the percentage of this element was 69%. The results indicated that Provide an infrastructure for multimodal transportation in the study area contributes to the promotion of active transport and by 78%. Therefore, appropriate lanes should be allocated for various modes of public transport to increase transportation options for street users such as, active or public transportation. 62% of the answers indicated that furnishing streets, sidewalks, and resting places increases the desire of the community to walk. Also, 82 percent of the answers indicate that implementing corridors for the movement of the elderly and the disabled helps them a lot to use active transport. It is a very important option, as it serves the less physically able to benefit from the advantage of complete streets.

That means that when implementing the street elements mentioned in Table 3, it encourages street users to use public transportation or active transportation such as walking or riding bicycles and scooters, or to exercise. To reduce the negative effects resulting from the use of private vehicles and their repercussions on the urban environment.

### Table 3: The Influence of Complete Street Elements

<table>
<thead>
<tr>
<th>What is the influence of the following factors to encourage you to use Public or active transportation such as: walk or and riding a bicycle or scooter or Playing sports?</th>
<th>Measuring average</th>
<th>standard deviation</th>
<th>Relative significance importance</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pedestrian and bicycle lanes isolated from the street</td>
<td>3.04</td>
<td>1,442</td>
<td>61%</td>
<td>a lot</td>
</tr>
<tr>
<td>2. Afforestation on both sides of the street</td>
<td>3.47</td>
<td>1,344</td>
<td>69%</td>
<td>a lot</td>
</tr>
<tr>
<td>3. Availability of multiple means of transportation (public and Active)</td>
<td>3.28</td>
<td>1,326</td>
<td>66%</td>
<td>Very much</td>
</tr>
<tr>
<td>4. Sidewalk furniture and resting places</td>
<td>3.09</td>
<td>1,415</td>
<td>62%</td>
<td>a lot</td>
</tr>
</tbody>
</table>
4 CONCLUSION

Complete streets is one of the concepts that has increased interest in it recently for organizing the city's environment and its livability. This study showed that the implementation of complete street elements in the study area contributes to the development of the urban environment by up to 66.5%. By the reliance on active transportation and public transportation and the reduction of reliance on private cars. The results of this paper reached by applying the linear regression equation, to determine the relationship between the complete streets and the urban environment. The study concluded that 96% of the region's residents and the elderly do not prefer to take trips in the study area by walking or using bicycles. Due to the lack of suitable
lanes for the elderly and people with disabilities, 46% of the respondents prefer to apply it to encourage them to switch to active modes of transportation. Noting that the implementation of this element may lead to an increase in the percentage of those wishing to use active transportation and abandon their vehicles, Also, 32% of the sample size believes that the provision of multiple modes of transportation will encourage commuters in the study area to use public or active transportation.

On the other hand, there are several limitations facing the implementation of complete street policy, including how vehicle users accept the idea of reducing speeds on the streets, the costs of establishing complete street elements and the trade-offs between the complete street elements because of the limited street space.

This study recommends legal legislation to ensure the application of complete street policy in street planning and development projects and to give the necessary flexibility to the authorities responsible for choosing the elements of complete street that are appropriate to the urban context in the study area. Which helps in developing the urban environment.

REFERENCES


