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Urban Traffic Management: New Strategies to Improve the Quality of Life in Metropolitan Cities

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ABSTRACT

The quality of life in cities is strongly influenced by traffic management and related challenges. With the increase in population and urban development, problems such as congestion, air pollution, and accidents have become serious problems that not only threaten the comfort of citizens, but also negatively affect their physical and mental health. This paper examines the main challenges of traffic management in artificial environments and It provides effective solutions to improve the quality of life. To address these problems, proposals such as the development of sustainable public transportation, the use of smart technologies in traffic management, and the use of non-motorized vehicles are presented. Finally, this article emphasizes that a comprehensive and multidimensional approach to traffic management is necessary to move towards creating a more sustainable city with a higher quality of life.

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Introduction

The quality of life in cities, as one of the most important criteria for sustainable development, has always been considered by urban planners and managers. With the increasing expansion of urban population and the increase in cars, several challenges have arisen in the field of traffic and transportation that directly affect the quality of life of citizens[1]. Heavy traffic, air pollution, and long travel times are among the problems that are not only convenient and affect the comfort of citizens, but also harm their physical and mental health[2].

Proper assessment of the impact of urban development on the environment can prevent the negative effects of development on the environment. A systematic audit model minimizes the judgments of evaluators and makes them more realistic assessments, nowadays cities face challenges, including resource requirements, governance complexity, socio-economic inequality, and environmental threats, and innovation is an important solution to address these problems. [3-4]. Second, innovation is necessary to provide appropriate solutions to the problems of urbanization and to ensure smart, sustainable growth, and the concept of urban planning is already necessary with the pervasive, how houses,public buildings, and street structures are built, whereas today it deals with a broader set of issues such as transportation optimization, traffic systems management, water waste management, street safety,etc. In planning, like other business and government sectors, it became known in the late 1950s and was constrained in the early 1960s due to the lack of artificial intelligence at the time. Ultimately, traffic management is not only a technical issue, but it should also be considered as a social and cultural issue. By implementing comprehensive and coordinated solutions, it is possible to improve the quality of life in cities and create a healthier, safer, and more sustainable city.

In this paper, the challenges in traffic management in urban artificial environments will be examined. Also, effective solutions will be presented to improve the traffic situation and increase the quality of life in cities. These solutions include improving public transportation infrastructure, developing green spaces, and using new technologies in traffic management. The purpose of this study is to identify and analyze these challenges and The solutions are aimed at improving the quality of life in cities. Considering the importance of this issue, it is expected that the results of this research can help to make better decisions in the field of urban management.

2. Research Methodology

This study aims to investigate the challenges and strategies of traffic management in artificial environments and its impact on the quality of life in cities, the present study is descriptive-analytical and uses qualitative methods (using books and past studies) to collect data.

3- Traffic Management in Artificial Environments

Traffic management in urban man-made environments is one of the most important challenges in urban planning and design, which is carried out in order to optimize traffic flow, reduce traffic, increase safety, and improve the quality of life of citizens. This management involves several key aspects[7], traffic analysis and planning begins with the collection of traffic data from intelligent systems such as cameras and traffic sensors. Traffic modeling, predicted

traffic behavior, and critical points are identified. Infrastructure optimization is also of paramount importance; the design of roads, intersections, and sidewalks should be done in such a way that traffic flow is optimized, and public transportation systems such as buses and subways are improved to reduce the use of private cars. The use of new technologies also plays a significant role in traffic management. Intelligent traffic management systems based on artificial intelligence and the Internet of Things (IoT) can help improve traffic flow[8]. Also, the development of mobile applications that provide real-time information about traffic, routes, and travel times can help users make better decisions. Promoting sustainable transportation is another important aspect of traffic management. Creating special paths for cycling and suitable spaces for walking can help encourage citizens to use these methods. Also, encouraging the use of electric and hybrid vehicles can also reduce the negative effects of traffic. Traffic demand management can help improve the traffic situation by applying incentive and punitive policies such as taxes or tolls on the use of cars during peak traffic hours and creating work-from-home programs to reduce the number of trips. By implementing effective solutions and using new technologies, it is possible to Traffic management in urban man-made environments is one of the most important challenges in urban planning and design. This management is done in order to optimize traffic flow, reduce traffic, increase safety, and improve the quality of life of citizens. In Table 1, the aspects and strategies of traffic management in cities are discussed.

Figure 1: Traffic Management in Artificial Environments

Traffic Demand Management	**Promoting sustainable transportation**	**Use of new technologies**	**Infrastructure optimization**
• Incentive and punitive policies: imposing taxes or duties on the use of vehicles during peak traffic hours. • Create work-from-home plans: Encourage remote work to reduce the number of trips.	• Encouraging cycling and walking: Creating special bike paths and suitable spaces for walking. • Use of electric and hybrid vehicles: Encourage the use of fuel-efficient and environmentally friendly vehicles.	• Intelligent Traffic Management Systems: Using technologies such as AI-based traffic control and the Internet of Things (IoT) to better manage traffic flow. • Mobile Apps : Developing apps that provide users with real-time information about traffic, routes, and travel times.	• Designing passages: Designing streets, intersections, and sidewalks in a way that optimizes traffic flow. • Improving public transportation: Upgrading public transportation systems such as buses and subways to reduce the use of private cars.

Traffic management in man-made urban environments requires cooperation between government institutions, municipalities, the private sector, and citizens. By implementing effective solutions and using new technologies, it is possible to help improve the quality of life in cities and reduce traffic challenges.

1.3. Traffic Management to Improve Quality of Life

Traffic management is recognized as a key factor in improving the quality of life in cities. It not only focuses on reducing traffic and optimizing the flow of cars, but it also has deeper impacts on various aspects of urban life. One of the most important benefits of traffic management is the reduction of air pollution. By improving infrastructure, developing public transportation, and using smart technologies, we can help reduce traffic. Also, promoting the use of sustainable vehicles can be very effective in reducing traffic and improving the quality of life of citizens. By planning and implementing effective solutions, large cities can overcome traffic challenges.

Heavy traffic and its lack of proper management can lead to an increase in air pollution. By optimizing traffic flow and encouraging the use of public transport, bicycles, and walking, pollution levels can be reduced and cleaner air can be provided to citizens. In addition, traffic management can help reduce road accidents and accidents by designing safe passages and intersections, installing appropriate traffic signs and lights, and educating drivers and pedestrians. Greater safety on the streets will increase the sense of security in citizens[14]. Also, by using new technologies such as smart traffic management systems, travel time can be reduced. It saves citizens' time, but also reduces the stress caused by traffic. Effective traffic management can facilitate access to public services such as hospitals, schools, and shopping malls. By designing efficient and safe public transportation networks, citizens can easily access these services. Also, encouraging the use of bicycles, walkers, and public transportation not only helps reduce traffic but also has a positive impact on the physical and mental health of citizens[15]. Creating special paths for cycling and walking can provide more incentive to use these methods, in addition, traffic management can help design more attractive and efficient public spaces. Reducing traffic in urban areas can allow for the creation of green spaces, parks, and social spaces that enhance the quality of life[16]. Conducting educational campaigns about safe traffic behaviors and the positive impacts of sustainable transportation can also raise public awareness and change citizens' behavior.

3.2. Use of New Technologies

The use of new technologies in urban traffic is known as an effective strategy to optimize traffic flow, reduce pollution, and increase safety. Intelligent Traffic Management Systems (ITS) include a set of technologies that help collect, analyze, and manage traffic information They help. With the use of sensors and cameras, it is possible to monitor the traffic situation in real-time and make more optimal decisions based on it. These systems include smart traffic lights, traffic signs, and traffic forecasting software.

Mobile apps and navigation apps also provide users with detailed information about traffic status, travel times, and best routes. Using data collected from users, apps like Google Maps and Waze can help optimize routes and save users from heavy traffic or to inform events. Also, the development of autonomous vehicles can bring about a major transformation in urban traffic management. These devices are capable of detecting obstacles, obeying traffic rules, and interacting with other vehicles using AI sensors and algorithms, which can lead to reducing accidents and improving traffic flow, in the field of public transportation, the use of technology

can increase the efficiency of these systems[18]. Installing GPS in Public Vehicles, These technologies include informing passengers about arrival and departure times, and optimizing routes based on travelers' needs. Electronic payment systems such as smart cards also facilitate the payment process. Collecting and analyzing big data related to traffic, driver and pedestrian behavior can help identify existing patterns and problems. Using this data, it is possible to make better decisions about road design, creating new infrastructure, and improving public transportation services.

Image 1: Smart Traffic Management

Air pollution monitoring technologies also help identify polluted areas and take measures to reduce pollution by using environmental sensors to monitor air quality in different parts of the city. This information can be effective in designing sustainable transportation policies. Also, smart parking systems use sensors and apps to provide accurate information about empty parking spaces that can be used to track when to search for a parking lot and thus reduce traffic caused by parking searches[20], the use of new technologies in urban traffic management not only improves the efficiency of transportation systems, but also increases the quality of life of citizens. Due to the growing urban population and traffic-related challenges, it is necessary to invest in these technologies to create a more sustainable and livable city [21].

Table 2: Essential Technologies in Urban Traffic Management

Smart Parking Systems	**Air Pollution Monitoring Technologies**	**Intelligent Public Transportation Systems**	**Mobile Apps & Navigation Apps**	**Intelligent Traffic Management Systems (ITS)**
These systems use sensors and apps to provide accurate information about empty parking spaces. This can reduce the time it takes to search a parking lot, thereby reducing the traffic	The use of environmental sensors to monitor air quality in different parts of the city can help identify contaminated areas and take the necessary measures to reduce pollution. This information can be	The use of technology in public transportation can increase the efficiency of these systems. These technologies include installing GPS on public transportation,	These apps provide users with detailed information about traffic status, travel times, and best routes. Apps like Google Maps and Waze can help optimize routes and keep users informed of heavy traffic or	These systems include a set of technologies that help collect, analyze, and manage traffic information. Using sensors and cameras, it is possible to monitor the traffic situation in real-time

caused by a parking search.	instrumental in designing sustainable transportation policies.	informing passengers about arrival and departure times, and optimizing routes based on travelers' needs. Also, electronic payment systems such as smart cards facilitate the payment process.	accidents, using data collected from users.	and make more optimal decisions based on it. These systems can include smart traffic lights, traffic status display boards, and traffic forecasting software.

3.2.1 Artificial Intelligence in Cities

In cities, AI systems were first introduced as part of smart city initiatives, and AI is an integral part of the smart city architecture that provides the efficiency and capability needed in the area of local infrastructure, services, and facilities. It also drives local organizations to use AI in the normal, advanced, management of employees in that area in terms of responsible innovation . However , nowadays AI is no longer exclusively associated with smart city projects, for example, there are many local governments, without a smart city program, that use AI-based chatbots in their customer services. In addition to AI-based chatbots to interact with local communities, local governments are also using AI to interact with local communities. Automate routine tasks through self-service and augment public services with data and analytics. In addition, over-personal services, asset forecasting, workforce, planning and resource optimization, reducing carbon use, optimizing energy consumption, and combating child abuse are local governments. Financial fraud is one of the applications of artificial intelligence in local governments,[23] and various sectors such as land use, zoning, environmental planning, and transportation. In general, the areas that planners are interested in using this new approach are divided into three parts: 1. Using the current and future capabilitiesof AI to create significant impacts on social and built environments Of cities, 2) use the current and future capabilities of AI to address the adoption and use of technology. Needs of planners, 3- Building the willingness and capacity of AI planners in urban planning can play the role of a changemaker. The State Council of the Development Plan states that AI refers to the promotion of complete information in urban planning, construction, management, and operation. In Table 3, the applications of AI in various social, economic, governance, transportation, and environmental dimensions are examined.

Table 3: Areas of Application of Artificial Intelligence in Urban Management, [26].

Application Examples	**Domains**
Assessing needs, making decisions , articulating benefits, supervising and managing in the social sector Reduction in the number of employees in the social sector Health & Hygiene - Setting up chatbots for people's questions and answers	**Social**
- Saving money and energy economically - Increased productivity	**Economic**
Improving the transportation system by enabling smarter road navigation and traffic management , smart parking, traffic light control systems, etc. Improving the movement of the public transportation system (city bus)	**Transportation**

- Autonomous vehicle with the aim of reducing accidents and increasing the safety of users	
Political and administrative support to citizens and participatory governance work - Supporting urban planners in order to meet the needs of citizens	**Governance**
Waste Management andOptimal Collection of Wastein the City in order to Reduce the Production of Environmental Pollutants - Construction management through efficient construction techniques and sustainable building materials	**Environmental**
- Identification of crime-prone spots - Tracking criminals	**Security**

4 . Challenges of Traffic Management in Artificial Environments

Traffic management in contemporary cities faces several challenges that require attention and effective solutions. One of the most important challenges is the increase in population and the number of cars, which causes heavy traffic and congestion on the streets. This, along with inadequate and outdated infrastructure in many cities, creates more problems that cannot meet the increasing traffic needs. Lack of coordination between different transportation systems, such as subways, buses, taxis, and bicycles, also contributes to traffic problems. Additionally, traffic caused by construction projects can temporarily disrupt the flow of traffic. Traffic violations, such as unauthorized parking and speeding, are other factors that add to traffic intensity. Environmental impacts caused by traffic, including air and noise pollution, are another challenge to consider in traffic management. Also, the need for intelligent systems to manage traffic in real-time, especially in emergencies or accidents, is one of the main requirements. Improper design of cities and lack of attention to public transportation needs can also lead to increased traffic. To solve these challenges, there is a need for innovative solutions, new technologies, and collaboration between different institutions to achieve an efficient and sustainable traffic management. And in Table 4, the challenges and solutions for traffic management in the environment are presented:

Table 4: Challenges and Appropriate Strategies in Traffic Management

Playbook	Description	Challenges
Improving public transport and encouraging its use	The growth of the population and the increase in cars lead to heavy traffic.	Population Growth and Number of Cars
Investing in infrastructure improvements and transportation network development	Many cities have outdated infrastructure that cannot meet the needs.	Inadequate infrastructure
Creating integrated and coordinated systems for transportation	The lack of effective communication between the subway, buses, taxis, and bicycles causes disruption.	Lack of coordination between transportation systems
Proper planning for the timing of projects and informing the public	Construction projects can disrupt the flow of traffic.	Traffic caused by construction projects

Development of sustainable transportation and the use of electric vehicles	Air and noise pollution from traffic harms public health.	Environmental Impacts
Implementing smart technologies such as smart beacons	Real-time traffic management is essential to minimize problems.	The Need for Intelligent Systems
Planning for Climate Change and Infrastructure Development	Climate change can affect traffic flows.	Climate change

5- Conclusion

Improving the quality of life in cities, as one of the main goals of urban planning and traffic management, requires special attention to the challenges and opportunities in this field. Due to the rapid growth of the population and the increase in urban density, traffic problems have become one of the serious problems that not only affect the comfort and comfort of citizens, but also harm their physical and mental healthThere are several challenges in the field of traffic management, including congestion, air pollution, accidents, and lack of access to proper public transportation. These issues not only affect the quality of life of citizens, but also negatively affect the economic and social development of cities. Therefore, it is essential that urban managers and planners with a deep understanding of these challenges seek effective and sustainable solutions. There are various solutions to improve traffic management and increase the quality of life in cities. The development of public transportation infrastructure, encouraging the use of bicycles and walking, the use of new and smart technologies, as well as paying attention to environmental issues, are among the measures that can help reduce traffic problems and increase citizens' satisfaction. The quality of life in cities requires a comprehensive and multidimensional approach that takes into account all social, economic, and environmental aspects. By adopting appropriate measures and cooperation between different sectors of society, it is possible to move towards creating a more sustainable, healthier and higher quality of life. This path requires not only coordinated and continuous efforts, but also the commitment and cooperation of all stakeholders, including the government, the private sector, and citizens. Would be.

5.1. Future Proposals

1. Public transportation development: Investing in public transportation infrastructure such as buses, subways, and trams can help reduce traffic and air pollution. Creating special routes for public transportation and increasing access to public transportation stops are among the effective measures.

2. Use of new technologies: Leveraging smart technologies such as traffic management systems, routing apps, and real-time traffic information can help optimize traffic flow and reduce travel time.

3. Developing travel demand management plans: Designing programs to reduce non-essential travel, such as remote work and flexible working hours, can help reduce traffic load during peak hours.

4. Paying attention to environmental issues: Adopting green policies, such as planting more trees on the streets and creating green spaces, can increase the attractiveness of the urban environment in addition to improving air quality.

By implementing these proposals, it is possible to not only reduce the existing challenges but also move towards creating a more sustainable city with a higher quality of life.

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