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Effects of Urbanization on Future Mobility

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Abstract

As global urbanization accelerates, technological advancements are poised to transform cities into smart hubs by 2050. With 70% of the world's population projected to live in urban areas (United Nations, 2018), cities face unprecedented challenges, including climate change, infrastructure demands, and mobility needs. This paper explores the evolution of smart cities, focusing on sustainable solutions and advancements in transportation technologies. The urban population is expected to grow by 25% by 2050, necessitating sustainable urban planning to mitigate the effects of climate change. Technologies such as artificial intelligence (AI), the Internet of Things (IoT), and quantum computing are anticipated to play pivotal roles in enhancing city operations, energy management, and waste reduction. By integrating these technologies, cities can improve quality of life while reducing their environmental footprint. A significant aspect of this evolution is the transition to zero-emission solutions. Policies like the European Union's 2035 ban on new petrol and diesel vehicles and the United Kingdom's directive mandating 80% of new vehicles be zero-emission by 2030 underscore the shift toward sustainability. These efforts align with the global emphasis on reducing carbon footprints and combating climate change. By 2050, urban travel demand is predicted to double (OECD, 2020). Current models of private car ownership, where vehicles are parked 95% of the time, are inefficient and unsustainable. A paradigm shift toward shared and autonomous vehicles is anticipated, with the World Economic Forum targeting a 75% reduction in car ownership. Autonomous vehicles (AVs), expected to dominate roads by 2050, promise significant benefits such as enhanced mobility and safety. Studies suggest that AVs could reduce traffic fatalities by up to 90% (World Health Organization, 2021), addressing the fact that human error accounts for 94% of traffic-related deaths. Despite these advancements, challenges remain. Cybersecurity threats, data privacy issues, and societal



acceptance of autonomous technologies pose significant hurdles. Additionally, high investment costs and infrastructural requirements demand robust policy frameworks and public-private collaboration. The transition to smart cities presents both challenges and opportunities. Issues such as legal compliance, public trust, and the societal adoption of new technologies must be addressed. Policymakers must also consider high infrastructure costs and ensure equitable access to smart solutions. However, the potential benefits—including reduced traffic congestion, improved public transportation, and enhanced environmental sustainability—outweigh these challenges. Cities in Türkiye mirror global trends, with urbanization increasing steadily. The country's adoption of electric and autonomous vehicles reflects its commitment to sustainable development, aligning with international standards and ambitions for zero-emission transportation. By 2050, smart cities and advanced transportation systems will redefine urban living. The integration of AI, IoT, and autonomous technologies will foster more efficient, sustainable, and livable cities. While challenges persist, collaborative efforts among governments, private sectors, and communities will ensure a transformative urban future. The journey to 2050 promises a smarter, greener, and more connected world.

Keywords:

AV, Urbanization, IoT

