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[기본연구] 가나 주요 도시의 지속 가능한 교통을 위한 비동력 교통 시스템 활용 증진 방안

국제도시 및 인프라연구센터
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ENHANCING THE USE OF NON-MOTORIZED SYSTEMS FOR SUSTAINABLE TRANSPORTATION IN MAJOR CITIES IN GHANA

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ABSTRACT

This research investigates the importance of boosting non-motorized transportation infrastructures to improve sustainability in Ghana's main cities. With rising urbanization and population development, the strain on existing transportation infrastructure has risen, leading to increased traffic congestion, environmental degradation, and negative public health impacts. Recognizing the importance of sustainable transportation, this study looks into the ability of non-motorized modes, such as walking and cycling, to solve these issues. The report highlights important challenges and potential for improving non-motorized systems through a comprehensive evaluation of existing literature and an analysis of present urban transportation dynamics in Ghanaian cities.

The research adopts a mixed-methods approach that includes surveys and case studies to gain views from policymakers and the general public. The findings help to shape targeted interventions and policy suggestions for a more sustainable and inclusive transportation landscape. This study intends to give concrete solutions for policymakers, urban planners, and stakeholders to prioritize and invest in non-motorized transportation infrastructure by concentrating on Ghana, a nation at the crossroads of increasing urbanization and the need for sustainable development. Finally, the research hopes to add to the continuing debate on sustainable urban development in emerging nations.

본 연구는 가나 주요 도시의 지속 가능성을 높이기 위한 비동력 교통 인프라 활성화의 중요성을 탐구한다. 도시화 및 인구 증가가 가속화되면서 기존 교통 인프라에 대한 부담이 커졌으며, 이는 교통 체증 심화, 환경 악화, 그리고 공중 보건에 대한 부정적인 영향으로 이어지고 있다. 지속 가능한 교통의 중요성을 인식하며, 본 연구는 걷기 및 자전거 타기와 같은 비동력 교통수단이 이러한 문제들을 해결할 수 있는 역량을 탐구하고자 한다. 이 보고서는 기존 문헌에 대한 포괄적인 평가와 가나 도시들의 현재 도시 교통 역학에 대한 분석을 통해 비동력 시스템 개선을 위한 주요 도전 과제와 잠재력을 강조한다.

본 연구는 정책 입안자와 일반 대중의 견해를 얻기 위해 설문 조사와 사례 연구를 포함하는 혼합 방법론 접근 방식을 채택한다. 이를 통해 얻은 연구 결과는 보다 지속 가능하고 포괄적인 교통 환경을 위한 목표 지향적인 개입과 정책 제안을 형성하는 데 기여할 것이다. 이 연구는 증가하는 도시화와 지속 가능한 개발의 필요성이라는 갈림길에 서 있는 국가인 가나에 초점을 맞춰, 정책 입안자, 도시 계획가 및 이해관계자들이 비동력 교통 인프라에 우선순위를 두고 투자할 수 있도록 구체적인 해결책을 제시하고자 한다. 궁극적으로 본 연구는 신흥 국가들의 지속 가능한 도시 개발에 대한 지속적인 논의에 이바지하기를 기대한다.

I INTRODUCTION

Non-motorized transport includes walking, cycling, and variations of small-wheeled, human-powered transportation modes. Except for walking, these modes utilize non-motorized vehicles such as bicycles, skateboards, push scooters, wheelchairs, and rickshaws. This entry focuses on the two primary non-motorized, or active, modes – walking and cycling for transport. Biking and other non-motorized transportation are the most equitable and efficient means of achieving sustainable mobility goals. Many cities worldwide support non-motorized transportation, such as walking or biking, to foster sustainable, low-carbon commutes while improving public health and environmental quality ((Banister, 2008). Cities worldwide have succeeded in increasing the share of cyclist commuters by implementing comprehensive policies supporting bike infrastructure ((PUCHER, 2010, pp. 391-414)).

The Centre for Cycling Expertise (CCE) in Accra is promoting sustainable transport, focusing on walking and cycling. The initiative aims to improve conditions for pedestrians and cyclists, reduce emissions, and contribute to a more sustainable city. Government attention to cycling and non-motorized transport is crucial for Accra's growth, promoting economic mobility, environmental awareness, and improved quality of life. (World Road Association (PIARC), 2011)

Sustainable transport strategies for cities, focusing on non-motorized vehicles, can help decongest cities. Improving pedestrian paths and cycling zones can increase non-motorized travel and reduce carbon emissions, which contribute to 13% of global greenhouse gas emissions, cited by (Cervero, 2013). This approach not only reduces carbon emissions but also promotes a healthy lifestyle and physical activity.

In this paper, I will be discussing how the use of a non-motorized transport system will lead to sustainable transportation in Ghana as well as help reduce vehicular congestion in the major cities in Accra.

1.1. BACKGROUND

Ghana is home to approximately 34 million people. The two largest cities are Accra, with about 3 million residents, and Kumasi about 2.4 million. Almost 56% of the population lives in the urban areas making these two cities major regional economic, industrial, and cultural centers. The urban transportation system in Ghana is experiencing challenges in accommodating the growing population and economic activities, walking is a very important and widespread transportation mode in Ghana but there is a tendency to take pedestrians and walking for granted and not prioritize them since sidewalks are not properly designed, and inadequate universal access elements makes it challenging for people with disabilities and pedestrians.

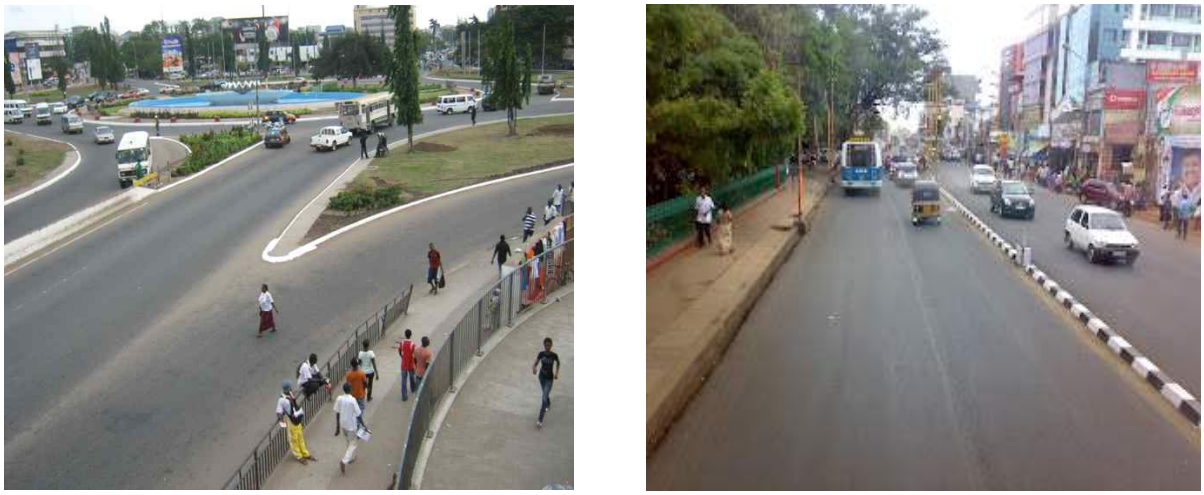


Figure 1. Ghana's road design

1.1.1. GHANA'S POPULATION DATA

As of 2021, the most populous regions in Ghana are Ashanti and Greater Accra, each accounting for around six million inhabitants. The capital and largest city of Ghana is Accra, which has an urban population of 2.27 million. Following these were the Central and Eastern regions, each registering 2.9 million The Greater Accra Metropolitan Area (GAMA) has about 4 million inhabitants, which makes it the 11th largest metro area in Africa. The second largest city is Kumasi in the Ashanti region with 1,468,609 total inhabitants. The figure below shows Ghana's population in all sixteen regions.

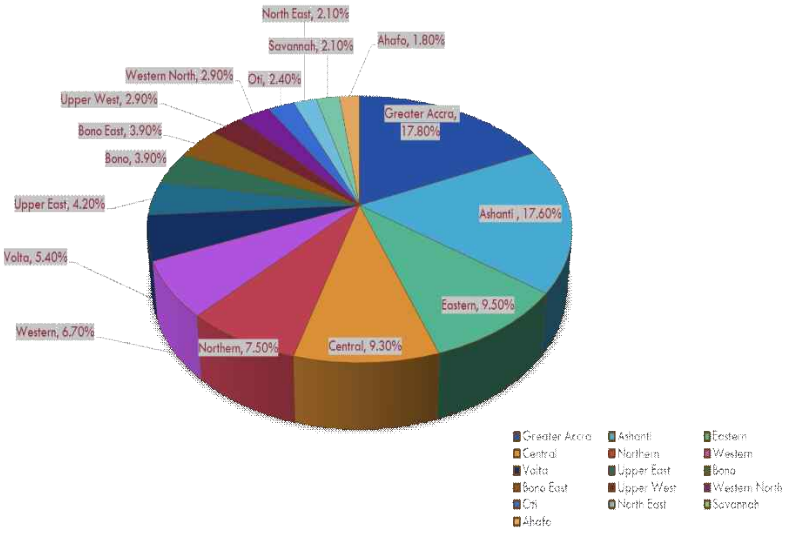


Figure 2. Ghana's population distribution

1.1.2. PUBLIC PERCEPTION OF CYCLING

The chart shows that almost half of the population walk to most of their destination daily, and only a few people enjoy cycling due to adequate infrastructure but even with that threat and limitation 55% of the population still uses the non-motorized form of transport as compared to the other motorized

system.

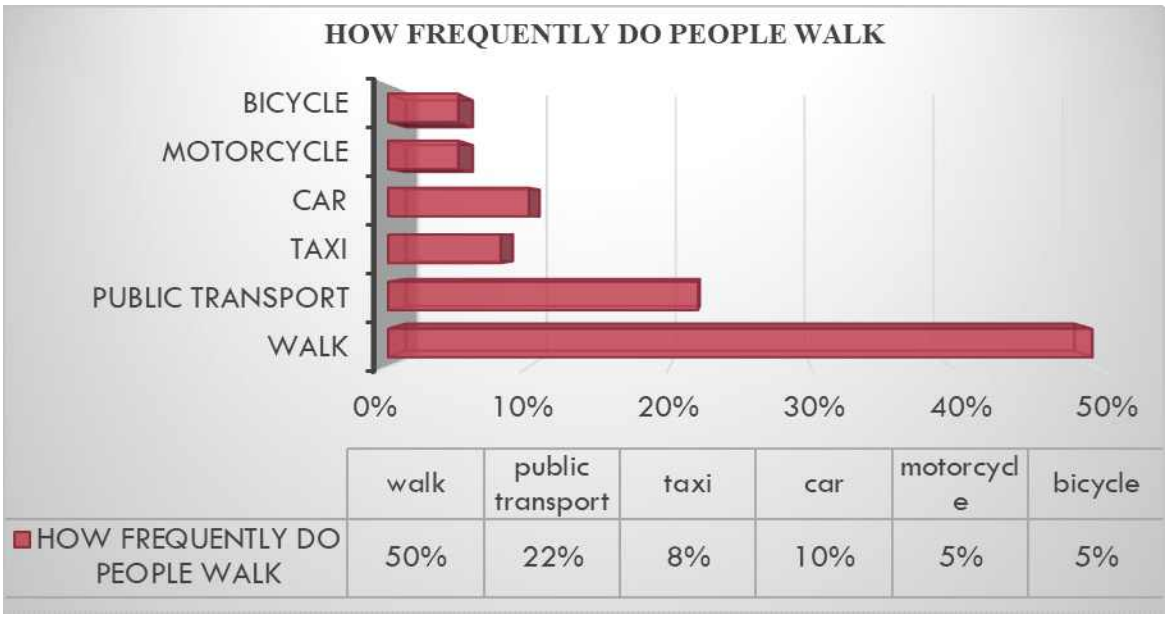


Figure 3. public perception of cycling

1.2. NON-MOTORIZED TRANSPORT MODES

Non-motorized transportation modes, powered by human or animal effort, are environmentally friendly and energy-efficient, reducing emissions and fuel consumption. They are often more affordable and suitable for short trips, helping to reduce traffic congestion and greenhouse gas emissions. They are particularly useful for short trips and can be particularly beneficial for short trips. Examples are Walking, Bicycling, skates, skateboards, push scooters, hand carts, and Wheelchair travel.

II OBJECTIVES OF STUDY

The purpose of this study is to

- Learn about the history of cycling in Europe, especially in Denmark
- Delve into understanding how Denmark successfully initiated the non-motorized system
- Find out the measures Ghana can adopt from Denmark to develop and implement the non-motorized transportation system to ensure sustainable transportation

III CASE STUDY FROM DENMARK–COPENHAGEN

Historically, Copenhagen's commuters have preferred biking as their primary mode of transportation, even during the 1960s and 1970s when the car boom was sweeping cities worldwide. This historical and cultural preference remained significant through the 1980s and 1990s when the city implemented the first free bike–sharing program (Jacobsen, Tourism and Transport , 2015)Jeppesen 2011. This rich history of biking in Copenhagen enabled a consolidated infrastructure for biking that allows 84% of all Copenhageners access to a bike. As a result, 68% of the commuters biked at least once a week, accounting for 1.2 million kilometers (about 745645.43 miles) traveled by bike in a working day (Gossling, 2013). Figure 4 shows the share of all intracity trips by different modes in Copenhagen, where biking has the second highest share.

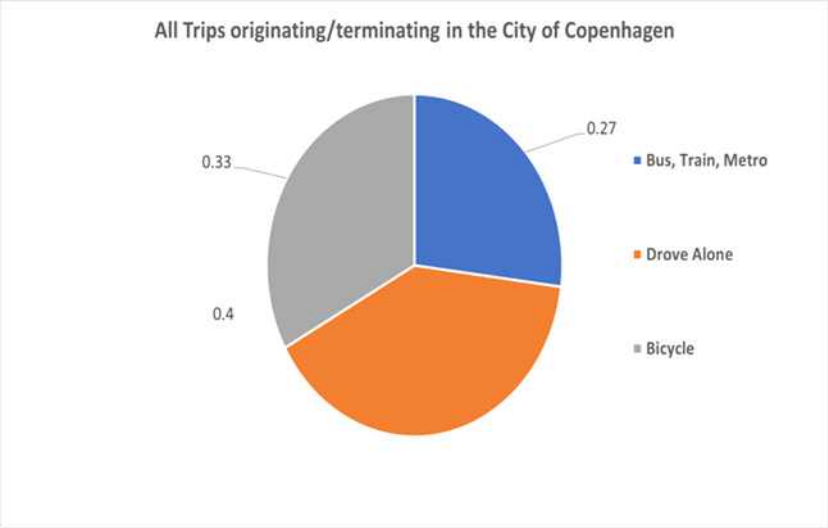


Figure 4. All Trips originating/terminating in the City of Copenhagen

Currently, Copenhagen is one of the cities in the world known for the use of the bicycle as the main means of transport for its inhabitants as well as tourists. According to a report from 2017 about nine out of 10 Danes have a bicycle for their mobility needs, and only four out of 10 have a car. Annually, in Copenhagen, inhabitants travel by bicycle about 1.2 million km, which is equivalent to two round trips to the moon, while only covering 660,000 km by metro.

In 2009, the Danish Cycling Embassy was founded to facilitate access to technical knowledge, helping to promote a cycling culture in cities around the world as the main means of transport for inhabitants. Members of the Danish Cycling Embassy are a network of representatives from the private, public, and civil society sectors representing the cutting edge in all areas related to cycling, from urban planning for bicycles and friendly cities to the creation of synergies between cycling and public transport, the construction of safe infrastructure, and the development of successful campaigns and municipal policies that motivate people of all ages to use the bicycle in the city. Examples of soft policies include campaigns to promote biking as a healthy and environmentally friendly transportation

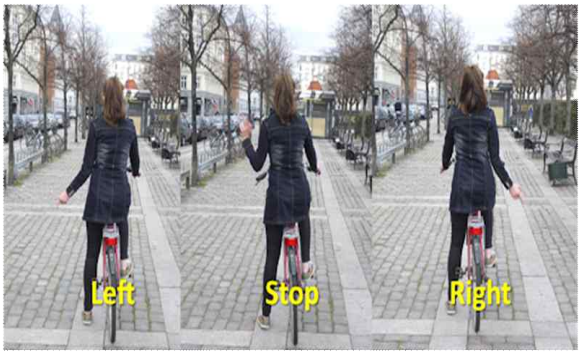
choice. Although studies concur that biking share has dropped globally while car use is still increasing, in some European cities, the trend is the opposite, and a renaissance has taken place in the last two decades (Gilbert R, 2010).

Copenhagen uses key performance indicators (KPIs) to monitor biking. These indicators include the share of commuting cyclists, the percentage of cyclists that feel safe, total cycled kilometers, average cycling speed, the number of cycling tracks, green routes, and bike parking spaces on roads and pavements. The adoption of these performance indicators and the historical willingness of citizens to bike have led to the development of several command–and–control measures categorized as ''physical infrastructure,'' ''comfort and service,'' ''technology development,'' and ''regulation'' (Gossling, 2013). We learn from Copenhagen that a suitable combination of measures, policies, and programs enhances sustainable and equitable commutes. Also, the success of biking is explained by the historical roots of environmental movements that called for biking and pedestrian infrastructure rather than roads and highways. It is, therefore, uncertain that the renaissance of biking will overcome the growth of driving in other cities. However, momentum for biking trips can occur despite the rising number of cars when residents and governments collectively support biking infrastructure. As exemplified by Copenhagen and other European cities, as the number of cyclists increases to reach a critical mass, cyclists become visible, thus improving perceptions of safety and, consequently, the number of cyclists (Jacobsen, Tourism and transport: Future prospects, 2015).

3.1. KEY POLICY HIGHLIGHTS OF DENMARK–COPENHAGEN

For Copenhagen to successfully implement the non–motorized system of transportation some major policies were introduced to guide non–motorists (cyclists and pedestrians) and other road users to ensure harmony and safety on the road. Some of the key policies have been highlighted below:

- Provision of fully separate bike paths and cycle tracks protected by curbs from motor vehicle traffic
- Modifications are done in intersection design with features like bright blue marking of bike lane crossing intersections, bicycle access lanes for cyclists, etc.
- Traffic signal timed to cyclist speeds
- Bi–directional travel permitted for cyclists on a one–way street
- Mandatory bicycling education for all schoolchildren
- Bicycle sharing program introduced providing city–wide connectivity at minimal costs.



3.2. CYCLING RULES IN DENMARK

For every policy to roll out successfully there is a need for rules and guidelines. Some of the measures that have been put in place in Denmark to ensure the safety of cyclists are: Non-motorized transport users (bicycle, scooter, pedestrians, and skateboarding) are always expected to ride on the right side. Hand gestures are very crucial while cycling in Copenhagen to signal other road users of your intention while using the road. When going right you point with the hand towards the right and when going left you do likewise. In the case of stopping between, you raise your hands to the sky. Cyclists are not allowed to ride in the pedestrian area. If there is no cycling path, just keep on riding on the right side. Follow the traffic rules. If they have cycling traffic lights, great, follow them! Otherwise, follow the normal traffic light signals and compulsory wearing of helmets for cyclist.

3.3. SOME IMPACT OF NMT IN COPENHAGEN

- About 150,000 people cycle to work or educational institutions every day (45% of the inhabitants)
- An increase in bicycle modal shares from 25% of trips in 1998 to 38%
- The bicycle is now the most popular transport form for commuting in Copenhagen.
- 60% decline in serious injuries from 1995-2006
- The bicycle's modal share for trips to work or educational institutions has risen to over a third since 1998.
- 70% increase in total bicycle trips.

Ⅳ GHANA NMT STRATEGY

Learning from Denmark– Copenhagen, Ghana can start by improving its sidewalks, crosswalks, paths, bicycle lanes, and networks. There should be Public bicycle systems (automated bicycle rental systems designed to provide efficient mobility for short, utilitarian urban trips), expanding its road and path connectivity with special non–motorized shortcuts will make way for cyclists and pedestrians, traffic calming, streetscape improvements, traffic speed reductions, vehicle restrictions, and road space reallocation, education on safety, law enforcement, and encouragement programs are all means Ghana can incorporate in its existing road policy to make way for cyclist and other users.

Furthermore, these additional measures will ensure the sustainability of the NMT; Integration of NMT into the transport system, infrastructure development, and land use planning, endorsing and facilitating the use of the various modes, stand–alone or combined with others, facilitation of research and new initiatives to improve non–motorized transport performance, Development of road design and maintenance standards that recognize non–motorized transport as traffic and lastly, Development of traffic regulations that take into account the non–motorized transport as a fully–fledged transport mode to help reduce the number of traffic fatalities/injuries of vulnerable non–motorized roads users.

4.1. SOME BENEFITS GHANA CAN DERIVE FROM THE IMPLEMENTATION OF NMT

Successful implementation of the non–motorized transport system will contribute to climate change through improved air quality since this system has zero carbon emission which is one of the sustainable development goals of the World Health Organization (WHO). It will also improve the physical health of the people of Ghana because cycling and walking are major exercise that ensures

the overall health of an individual. This transport system will empower the vulnerable because it is easy, flexible, cheap, and fast, by this transport system we will equally help reduce vehicular congestion and travel time.

4.2. CHALLENGES

Every project in the world encounters some challenges and this project in the case of my country cannot be an exception, some of the obstacles that will come in the way of the NMT implementation are;

- Inadequate funds to expand the road network.
- Individuals might not accept this system in the first roll-out, due to safety concerns.
- Bicycles will have to be subsidized and this cost will be directed to the government to attract people. to switch to this mode of transportation,
- Last but not least, different kinds of road users will encounter conflict.

V CONCLUSION

In the case of Ghana, the road infrastructure in the cities is conducive to the NMT system, therefore, we need to ensure that a well-coordinated set of measures, policies, and initiatives are enforced to improve sustainable and equitable commuting. Furthermore, we should advocate for bicycle and pedestrian infrastructure rather than roads and highways since it is the start of the success of riding. If the citizens and government work together to encourage riding infrastructure there will be a significant increase in the number of cyclists and this will lead to an eco-friendly environment free from excessive carbon emissions.

VI RECOMMENDATION

- The government should ensure that the non-motorized transportation system will not be gender biased but rather ensure social inclusion through collaboration with various stakeholders in the transport sector to guarantee a sustainable NMT framework.

- Again, there should be intensive education in the communities and schools to enlighten people about the importance of this mode of transportation to the environment and health.

- Lastly, ensure adequate infrastructure is built to facilitate the safety of cyclists and pedestrians.

References:

1. Banister. (2008). the sustainable mobility paradigm. transport policy, 15(2), 73–80.
2. Cervero, R. (2013). Transport infrastructure and the environment: Sustainable mobility and urbanism.
3. Gilbert R, a. P. (2010). Transport Revolutions: Moving People and Freight without oil (2nd ed.). . Routledge.
4. Gossling. (2013). journal of Urban mobility.
5. Jacobsen. (2015). Tourism and Transport . ResearchGate.
6. Jacobsen. (2015). Tourism and transport: Future prospects. ResearchGate.
7. PUCHER, J. &. (2010). Built Environment(1978). walking and cycling for healthy cities, 36, No. 4, 36(4), 391–414.
8. World Road Association (PIARC). (2011). Roads for a Better Life: Mobility, Sustainability and Development. 24th World Road Congress Proceedings, (p. 16). Mexico.