

Towards Sustainable Cities: Prospects and Dangers of Cycling Bicycles in the City of Johannesburg

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Abstract— The city of Johannesburg has recently constructed and demarcated cycling lines along some of its major highways. Some of them connect the University of Johannesburg campuses which are across towns. None of the University staff and students seems to have any interest in cycling. The study is based on quantitative research. Questionnaires were given to students and 484 students responded. The study aimed to investigate if the student are aware of the cycling lanes. Through the response from first survey question, students seem to be concern about safety. Students were also asked if in their opinion cycling is safe. 50% of the response said no while the other half said yes. Out of the number that said yes there where asked how is cycling unsafe. Students also gave their opinions and also choose from theft (in their residence), Theft elsewhere (e.g., school, shopping Centre), reckless driving, cycling lane design and surface, lack of cycling skills and mugging and robbing. 484 students responded to this study. Reckless driving is ranking at 86% percent which shows that the respondents are more concerned of the motorist who ignores or do not respect the rules of the road.

Index Terms— cycling lanes, cycling safety, sustainability

I. INTRODUCTION

This study seeks to investigate the cycling safety, as it is currently promoted as one of the alternative mode of transport. Due to high reliant of on automobiles in the urban planning and development in South African cities [1], this has resulted in disconnected cities. The city planners, politicians and managers are currently working on ensuring that other mode of transport are included in with the plans and development of the cities. In this research the bicycle is viewed as one of the most sustainable way of traveling, this paper seeks to promote the usage of bicycles in the city whilst also highlighting the pros and cons of cycling. Whilst the bicycle is widely accepted as a crucial part of any urban transport strategy [2], it is with this fact that this research aims to weigh the pros and cons of successfully converting Johannesburg into a bicycle friendly city. Since at the core of transportation policy, practice and implementation lies

sustainability [3], the study identifies cycling in the broader literature of sustainability and sustainable development

Cycling is a world buzz, the researcher, politicians, business men, environmentalist, transport planners, government officials and the society at large are paying attention to cycling [4], [5] and [6]. This is due to the cities around the world considering cycling as a sustainable mode of transport, [4] and impacting positively towards public health, [7] saving the environment and urban development, [8]. Despite all this cycling is still very unpopular in the city of Johannesburg, [9]. The urgent need and promotion of cycling is influenced by several factors that are mostly discovered in this century starting from the negative impacts of motor transport to the unhealthy pattern of life up to the overpopulations that is experienced in the urban areas [10].

The past unlawful government through its segregation and discrimination transport system in South Africa is negatively affected, major infrastructure development caters mainly for private car users, resulting in poor access to mobility, [11]. However, CoJ is currently working on the process of coming with a sustainable transport system through changing the status quo of private car oriented landscape to more people centered.

While cycling should be made available for everyone, in a way that is feasible, affordable and safe [12]. Cycling is mainly discouraged by several factors such as safety and infrastructure, [6] the reckless driving of the motorized users, [13]. Safety becomes the main concern for several people when it comes to cycling, [14]

II. THE CITY OF JOHANNESBURG CYCLING LANES

It is realized by the Gauteng province [15] that transport in South Africa accounts for 31% in energy consumption while CO₂ emission accounts for 16%. [15] Further states that CoJ is an energy efficient city in the global and national term but inefficient in relation to cities in developing countries. The town of Johannesburg has a goal of turning into a smart city, with sustainable development and smart mobility. Encouraging the use of non-motorised transportation and public transport has the capacity of reducing the use of personal motorised transport and therefor its terrible outcomes in the metropolis of Johannesburg, [16]. Cycling is getting amplified attention worldwide as a means of solving problems encountered by the urban transport, [10] and [17] City of Johannesburg (CoJ) had developed the cycling lanes, its strategy of encouraging transport mobility through cycling [18] there

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have been less of the participation from the public side, while there is additionally a limited number of studies on biking and how cyclists have interaction with cycling infrastructure within the metropolis, [16]. Cycle lanes in UJ Kingsway Campus, UJ Doornfontein Campus and also cater for members of the public who are commuting to and from the CBD of Johannesburg [19]. The length of the route will be approximately 15 km. Generally most in SA towns depend on public transport or non-motorized alternatives. It is for that reason that cycling and walking are legitimate brief distance transport modes, however, they receive very scant attention and the daily problems faced by cyclists and pedestrians should be inclusive of road safety, which are currently not addressed [20].

This papers reviews literature and also results from a questionnaire survey. The papers discusses the impact of reckless driving, theft, mugging and robbing, infrastructure and cycling skills. It is clear in the results that students are worried by these *factors* which make them view cycling negatively. Cycling is perceived as the unsafe mode of transport, [4].

III. THE IMPACT OF RECKLESS DRIVING TOWARDS CYCLING

People driving cars do not cycle because they think cycling is not safe due to traffic [4]. On the roads, cyclist are more vulnerable and are thus more prone to injuries when they encounter collisions, [21]. They normally complain about safety and the motor vehicles together with bad weather sometimes. [14] So accidents are becoming the most deterrent for the cyclists, [7]

There are fewer fatalities when comparing to injuries caused by the motor accidents, [4] and [21] Even though the accidents caused by the motor are many but the cycling as a preference mode of transport is very low, Lawson et al (2013).

A. *Theft, robbing and mugging of cyclist*

Bike theft needs to be treated with urgent attention because is also one of the deterrent to cyclists, [22]. Police have recorded a lot of complains about bicycle theft. Some thieves even steel components of the bicycle especially when its chained, wheels and seats have been reported stolen in some incidents.

B. *Infrastructure lanes of cyclist*

Cyclists prefer road designs with a clear regulation of road user behavior, [23]. They also prefer clearly demarcated cycle lanes. The city of Johannesburg has gone out of its way in ensuring this. The road rules should be enforced by police officers and motorist should be punished if they do not obey the cycling lane rules.

C. *Impacts of cycling skills*

Education is one of the interventions that can be used to reduce the cycle related injuries. Training and learning the road rules also help keep cyclist safe. They are also

encouraged to also safely secure their bikes with chain and lock when not attended to Policy [12].

IV. SOCIETY

A study by [24] on bicycle ownership in 150 countries determined that the weighted mean percentage of ownership ranged from 20%-81%. They also found ownership to be highest in Northern Europe and lowest in West, Central and North Africa, and Central Asia. The study also established that 42% households own one bicycle and there were at least minimum of 550 million bicycles in each household globally and that the availability of bicycles remained unchanged since 1990. This finding still lacks additional research as the reasons for such ownership could be especially in the African region. Safety could be also be a factor that can be attributed to the mentioned low number. Other factors presented by [24] are the generally geography and the hospitability of some areas to bicycles as a result of deserts and mountains with particular reference to the Sahara in an African context. They suggest further collaboration between the public health and transportation fields as a way forward to advance the study.

[25] Argued for the importance of understanding the impacts of investing in new cycling infrastructure. This study examined the users of a newly built cycle path looking at cycling behavior in particular. They observed an increase in use of lanes based on bicycle count but attributed this to existing cyclists changing routes to use the new path, and more cyclists from outside the study area using the new path. This research, together with that of [26] seems to suggest that safety issues can be linked to the behavior of cyclists. They further note that there was a 75.5% increase injuries and hospital admissions that can be attributed to bicycle accidents. [26] Did however observe a difference in their observation of Boston cyclists. These include obeying traffic signs, giving pedestrians right of way and the wearing of helmets.

V. THE IMPORTANCE OF CYCLING LANES

[9] Explored the impact of cycling lanes relative to physical activity, air pollution as well as exposure to road safety. They contend that the design of cycling infrastructure tends to consider safety issues but not wider health issues. [30] Explored the effect of cycling lanes on safety and identified two categories namely actual as well as perceived safety. The perceived safety, they argue, is measured by characteristics such as separation between cyclists and cars and relative velocities. They further link actual safety to the frequency of crashes perceived.

VI. RESEARCH METHODOLOGY

The researchers used the online questionnaire. It was administered to more than 450 residents of the city, most of which were student. Gaps in the data were filled by secondary data and Observations that were made by the researcher. Almost all participants responded to the survey. The data was recorded on the Microsoft excel and some of the analysis were done there as well.

VII. RESULTS AND ANALYSIS

All participants responded to the survey questionnaire. They were asked their opinion in relation to safety and slightly more than half indicated that it's safe. But the number of people who indicated that it's not safe is also alarming and suggests that more still needs to be done in order to ensure safety on the cycling lane and also of the bicycles whilst parked. The figure 1 and 2 below shows the statistics.

Is cycling safe in your opinion

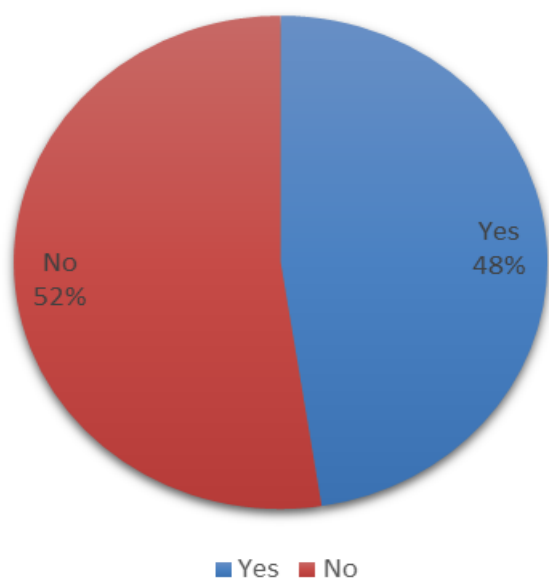


Fig 1, Safety opinion

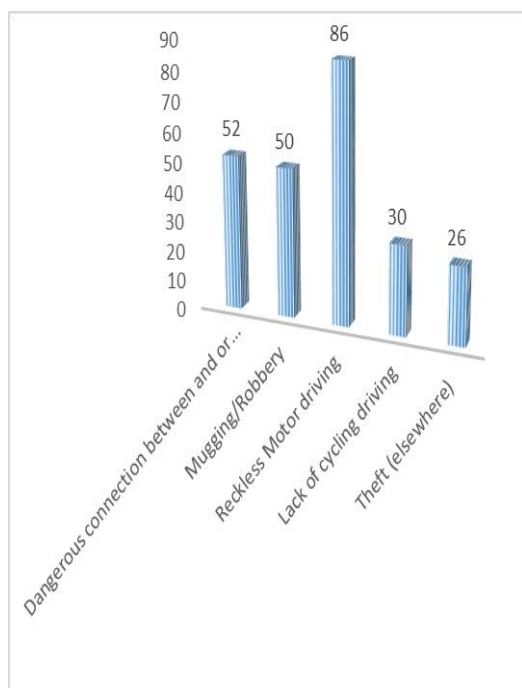


Fig 2, Cyclist's safety

A.Reasons that can affect cyclist safety

Respondents indicated that they were more afraid of reckless drivers. They felt that these make it impossible for them to cycle as they mostly target cyclist as soft targets. Dangerous connection of roads followed up, this makes it difficult for cyclists to cross roads safely. These rather prefer crossing at controlled intersections, mostly by the robot. Other notable influences included Mugging/theft/robbery, lack of cycling skills and knowledge of the road rules.

B.Factors affecting cycling

[18] Factors affecting cycling include:

- Distance travelled: the longer the distance the more likely the more dangerous it becomes to cycle
- Road safety: Normally this depends on the location, the more dangerous and the higher the crime rate in a community is, the more likely their roads will also be dangerous
- Security: more secure areas with security guards and visible policing are likely to have more cyclists.
- Competition for space: the more congested a place is the fewer cyclists its' prone to have.
- Climate: fairer climates promote cycling
- Status and convenience: In Africa cycling is often associated with low ranking people
- Topography: Flat area promote cycling, people want to avoid hills
- Supporting infrastructure: cycling lane demarcation usually supports and promotes cycling.

There are major factors affecting cycling prospects, such as support infrastructure, road safety and security can be manipulated and controlled to the benefit of the cyclers through various regulations or education. Other are natural elements of which very little can be done. These include climate and Topography. Mostly the climate is fair, thus not a huge factor.

C.Ideal Framework for the city of Johannesburg

The researchers agree with the adopted conceptual framework of which a working sustainable cycling framework implementation plan can achieve, shown in figure 3.

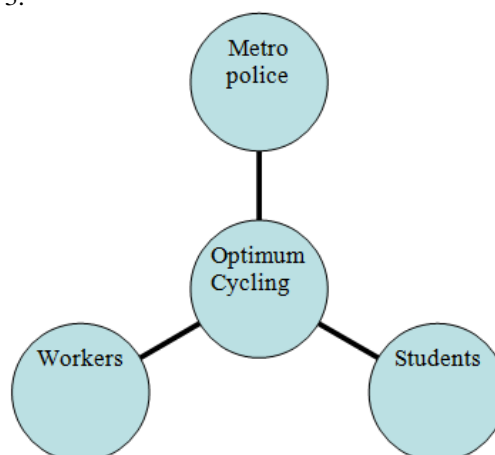


Fig 3, Working cycling framework

If everyone around universities and in towns where there are cycling lanes can start cycling it will be a way forward to involve more students. The South African Police officer and the Traffic officer cycling in the same lanes in a form of visible police, people can start feeling safe and be more willing to cycle.

VIII. RECOMMENDATIONS AND CONCLUSION

The roads are clearly not yet safe for cycling and a lot still needs to be done to ensure safety for cycling. Many studies have found bicycle-motor vehicle crashes to be more likely on bidirectional cycle paths than on unidirectional cycle paths because drivers do not expect cyclists riding at the right side of the road. In this paper we discuss the hypothesis that opening all unidirectional cycle paths for cycle traffic in both directions prevent this lack of expectancy and accordingly improves cycling safety.

It is also further recommended that police increase surveillance of the cycling lanes and that enforce the cycle lanes rules such that cyclist can avoid, death, injuries and theft. More education and training is also recommended to both cyclist and motorists.

It is recommended that in future plans cycling should be integrated in the public transport system such that commuters can rent and use bicycles for short distance travel at a cheaper rate.

It is also recommended that more campaigns and promotions of cycling should be advocated for. One can get the most influential people (such as government officials and celebrities) to cycle and or advocate for cycling competitions and celebration of achievements thereby reducing the fear and cycling anxiety

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