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Sustainable impact assessment of non-motorized transport In Chandigarh

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ABSTRACT

Air Pollution is one of the main problem facing by the world. Motorized transport is one of the main cause of air pollution, to reduce pollution we should consider some alternate way of transportation like non-motorized transport in urban area. The non-motorized transport minimize the air pollution and it is safe and comfortable for the road user and it is sustainable way of transport and it decrease the injuries and death causes by motor vehicles and it decrease the traffic congestion. The non-motorizedtransport reduces the carbon emission, which helps to reduce the air pollution, walking and cycling not only reduce the carbon emission in air but also it keeps user physically active and healthy lifestyle. This study mainly focuses on sustainable transportation which is beneficial for road user. This study conducted in India at Chandigarh which is called as well planned city in India.

Keyword: Non-motorized transport, motorized transport, sustainable, health, air pollution

INTRODUCTION

1.1 Overview

The environmental condition is most important thing in the world, to decrease the harmful effects of environment certain steps should take in every sector, so we consider it in transportation to minimize the effect of harmful gases in air, and we should minimize the air pollution for this we should use clean energy and the transportation is the one of the main contribution of pollution in air, the huge use of motorized vehicles and the annual growth of energy consumption in transportation is increasing 5% and so pollution is increasing by maximum growth of road user in transportation (International Energy Agency, 2014).after developed countries like, European union and china ,India is the world's fourth biggest buyer of oil and the third place in emission of Co_2in 2012,transportation division India accounted 36% of utilization of energy in the worlds (International Energy Agency, 2014) to decrease the Co_2 emission in transportation India is related with the high use of low carbon methods of transport like bicycle rickshaw (Wilbur Smith Associates, 2008).it is clear that road users in urban India will be

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progressively use non-motorized transport(NMT).[1]

The government has to improve basic infrastructure of non-motorized transport pedestrian and bicyclists[3]. If we improve this infrastructure for non-motorized transport than it is more safety for road user.in this research we estimate relative impact on air pollution by using NMTS.

This study shows that if we implement the non-motorized in transport that is beneficial to this three things they are social, environmental, and economical. The social benefits are health benefits of people in different ways and the environmental benefits are decreasing the air pollution and noise pollution and so on and the economic benefits are traffic jam, mobility, damages of people life, infrastructure costs and depletion of non-renewable resources and so on to decrease this all damage we should control the air pollution by implementing NMTS in transportation.

The limits of non-motorized transport are we can only travel short distance by using cycle and walking according to the nineteen's records. We can travel by foot 2.5km and by cycling 5km[4]. The non-motorized transport activate the human life when we doing walking and cycling it also provide the health benefits, in Nairobi walking 45% of all trips making cycling safe and attractive[2]not only Nairobi.Developed countries and developing countries are trying to implement non-motorized transport in urban area so that they can reduce the air pollution and some other impact on nature and people health so that we are making research on Chandigarh in India which is second populated country after china and Chandigarh is called as well planned city in India.

1.2 Background

India is a fastest developing country in the world and India is also most populated countries list in the world [2], we know that population increasing day by day by and the usage of vehicles also increases traffic problem like pollution which is not good for people health. And accidents occur due to traffic congestion and fatigue mainly this occurs in urban area not only this problems there are also economical disadvantages like increasing cost of maintains due to accidents and huge life threats and injuries cost for the road user and parking cost is more, for government as well as road user or vehicle user and India[3]. There are age restriction for the usage of motorized vehicle usage like under 18 they strictly not to drive motorized vehicle in India.

In this the main problem is pollution and congestion and health problem and non-renewable sources depletion because of this most of developed countries bring change in there transportation system like implementation of non-motorized transport in their countries[2], as we know that it is impossible to change completely motorized to non-motorized ,so that countries take a step and they bring a change of certain percentage and they decreased the certain percentage emission of CO andCo_2 and many dangerous gases to improve the public health

The non-motorized transport is neglected in the present the generation though it has huge advantages because wrong thinking of people or lack knowledge about the advantages of non-motorized , so that we

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should analysis the benefits of non-motorized by choosing one of city in India.So that we can find what is preventing the people to use non-motorize transport

This study is about to gather data of transportation and to analysis the benefits of non-motorized transport

1.5Objective of the STUDY

- ✓ To determine the pollution occurred by motorized transport by analysis this by previous data of motorized transport and vehicles data in Chandigarh
- ✓ To estimate the pollution effect decreasing by using certain percentage of motorized by replacing the non-motorized transport
- ✓ To estimate the social benefits by using non-motorized transport (benefits like Health benefits accidents cost decreases etc)

1.6 STUDY AREA

The Chandigarh is well planned city in India and it is union territory and it is neighboring states of Punjab and Haryana. The total population of Chandigarh city is 1,055,450(as per censes of 2011) the male population is 55% and female population 45%,in Chandigarh the literacy 90.81% the population under 6 is 10.8% .the Chandigarh climate

Climate data for Chandigarh [hide]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	27.7 (81.9)	32.8 (91.0)	37.8 (100.0)	42.7 (108.9)	44.6 (112.3)	45.3 (113.5)	42.0 (107.6)	38.0 (102.2)	37.5 (99.5)	37.0 (98.6)	34.0 (93.2)	28.5 (83.3)	45.6 (114.1)
Average high °C (°F)	20.4 (68.7)	23.1 (73.6)	28.4 (83.1)	34.6 (94.1)	38.3 (100.9)	38.6 (101.5)	34.0 (93.2)	32.7 (90.9)	33.1 (91.6)	31.8 (89.2)	27.3 (81.1)	22.1 (71.8)	30.4 (86.7)
Average low °C (°F)	6.1 (43.0)	8.3 (46.9)	13.4 (56.1)	18.9 (66.0)	23.1 (73.6)	25.4 (77.7)	23.9 (75.0)	23.3 (73.9)	21.8 (71.2)	17.0 (62.6)	10.5 (50.9)	6.7 (44.1)	16.5 (61.7)
Record low °C (°F)	0.0 (32.0)	0.0 (32.0)	4.2 (39.6)	7.8 (46.0)	13.4 (56.1)	14.8 (58.6)	14.2 (57.6)	17.2 (63.0)	14.3 (57.7)	9.4 (48.9)	3.7 (38.7)	0.0 (32.0)	0.0 (32.0)
Average rainfall mm (inches)	33.1 (1.30)	38.9 (1.53)	30.4 (1.20)	8.5 (0.33)	28.4 (1.12)	145.2 (5.72)	280.4 (11.04)	307.5 (12.11)	130.0 (5.24)	21.9 (0.86)	9.4 (0.37)	21.9 (0.86)	1,059.0 (41.70)
Average rainy days	2.6	2.8	2.6	1.1	2.1	6.3	12.3	11.4	5.0	1.4	0.8	1.4	49.8

Source: India Meteorological Department (record high and low up to 2010)[3][4]

Fig.no 3: climate data for Chandigarh

•The Chandigarh highest temperature is in June 45.3and average temperature is 38.6

•The Chandigarh lowest temperature is in Jan and Feb zero degree

By this data we came know that Chandigarh has moderate temperature and non-motorized transport is suitable for Chandigarh climate

In Chandigarh the government has already constructed 110km cycle track for cycle user and the aim of the Chandigarh administration is to construct 180km bicycle track for the safety of cycle users .so the Chandigarh as divided into two phases, first phase they spend 12croces for cycle track construction and in second phase they will spend 12 cores and total 24 crocs project[5] this is why Chandigarh is best suitable place for using safe non-motorized transport.in Chandigarh there is well road marking and well planned city and its moderate climate make the non-motorized transport is perfect implementation.

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Fig.no 4: Map of Chandigarh city

2.1 Literature Review:

Michelle R. Oswald Beiler: The field of transportation designing has gotten progressively practical as difficulties of the twenty-first century proceed. Feasible portability subjects, for example, pedestrian and cycling travel, savvy development improvement, and travel arranged plan are being embraced and actualized.

Yubing Zheng; Hui Wang; Qidong Liu; and Jianchuan Cheng: The goal of this examination was to explore street crossing practices of people on foot and non-motorized vehicles at signalized pedestrianintersections. Videoaccountsatthree person on pedestrian Intersections empowered the collestions of required information, which included various variables (sexual orientation, age, instructive level, number group), gathered in various conditions. The resulted effects of three case thinks about indicated that wrong street crossing practices were visit during red light interims and last commencements of the green light, and the consistence pace of understudies was most certainly not fulfilling true to form. The outcomes likewise demonstrated that accident mind and group attitude was normal in both person on pedestrian and non-motorised vehicle guilty parties. The results propose that attributes of signalized crossing clients is a basic factor influencing traffic offense conduct also, adds to make a more secure intersection condition for people on foot and non-engine vehicles.

T.M. Rahul, Ashish Verma: In his paper proposes an operational framework combining a Composites Sustainable Indexes (CSI) to choose the help capacity sway on giving separated foot-way and cycle way. It develops an association between the future (NMT) system and CSI using the useful markers amount of mechanized vehicle and vehicle-kilometer went by the motor modes. The essential fragments of the structure fuse a valuation of the mode decision models, computation of the useful pointers for the circumstances when giving NMT foundation, and affirmation of the help capacity sway. The proposed system is use to choose reasonability away on giving NMT substance inside the main business districtsin Bangalore and round the transport stations passing on tours to main business centers. three relevant investigations were endeavored with the first one is the internal city trips and second one is zonal trips of the people and third one using both motorized and non-motorized transport trip journeys.

A development of capacity on giving different trails and cycle-ways. In futures from a social esteem perspective, giving NMT foundation offered another measured decision for the low-pay assembling and diminished their reliance on open transport. Outline of determine in this region and improvement of different way of decision model, Study region territory and gauge a mode decision modular

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utilizing utility based decision hypothesis. Estimation of modular move: Determine the mode decision when usage of proposed NMT framework mode decision model.The data required for his study was house-hold tourism survey data, modes choice modal, origin and end trip matrix network data, release factor.

Deborah Salon, Andrew Mcintyre: Pedestrian and bicyclist security is of developing concern, particularly given the expanding quantities of urban inhabitants deciding to walk and bicycle. Offering the streets to cars, these street clients are especially helpless. An instinctive applied model is proposed of the determinants of damage seriousness in crashes among vehicles and non-motorized street clients. The investigations are isolated by party to blame to test the novel theory that ecological factors influencing driver speed and reaction time might be particularly significant when the driver isn't to blame. Pedestrian results are extensively predictable with earlier research, and offer impressive help for this speculation. The most grounded indicators of damage seriousness incorporate person on foot propelled age, driverbalance, vehicle type, and a lot of factors that help decide driver speed and response time. Bicyclist results were more fragile by and large, and the qualification by party to blame was less significant. Novel Hypothesis test is done.

Catherine Morency, Hubert Verreault& Alexis Frappier: Various urban territories get procedures to grow the particular bit of outdoor and cycling,which means to decrease the harmful impacts of vehicle trips. Notwithstanding such activities, methods and structure propelling unique modes, modes portions of strolling (10.1%) and cycling (1.6%) remain tolerably little appeared differently in relation to the vehicle (54.2%) in the Larger Montreal Area. In extraordinary situation, it has all the earmarks of being critical to get to the upper bound of the capacity of biking and strolling. In his way of thinking to assess the lethargic strolling and biking trips in a urban region using gigantic scale Origin-Destination (OD) data. Results show that 5.2% of step by step mechanized excursion (427,812 trips) could be made by strolling and 19.5% (1,605,245 trips) by cycling. From these, 57.2% were made as vehicle drivers. 2.8% of automated excursions could be moved to both strolling and cycling. These excursions were allotted to either strolling or cycling using a covering method subject to trip partition: 45.8% of them (1.35% of total excursions) are moved to torpid strolling trips and 54.2% (1.5% of hard and fast trips) to inactive biking trips.

Shaleen Miller, Christopher Coutts: Regardless of acknowledgment that improving bike and person on foot framework is complimentary to the objectives of well-being what's more, manageability, it is normal that lessening government support for this framework will cause most proposed bike and passed by undertakings to go unfunded, and in this way hidden, in the US. This examination looks at a number of neighbourhood components that urban communities have used to back bicycle/ped foundation and a portion of the suggestions in doing as such. Contextual investigations of crowd funding, Tax Increment Financing, securities, gifts, and deals charge are talked about in four U.S. urban areas.[6]

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M. Amiri, and F. Sadeghpour: Sustainable methods of transportation, especially cycling, address environmental change brought about by Green-House Gas (GHG) outflows. Most of concentrates that have been done on cycling designs analyzed statistic factors, for example, age and sexual orientation. In spite of the fact that the inspiration to cycle is influenced by socio economics, climate conditions can likewise majorly affect cycling designs. In this examination, information identified with the trip examples and worries of cyclists was gathered through a block study, led under frosty temperature conditions. By understanding the components that effect cycling designs in chilly climate, urban communities in cool districts, can improve their cycling foundations and advance this economical method of transportation.

Abhijit Datey, Vishal Darji, Tejas Patel : Town streets Infrastructure in India's is on one-sides for motor vehicle. This is because of lack of a reaction to very extraordinary growth in mechanical vehicle in town India over the best recent two decade. Whiles the numbers of people in India six important cities expanded by about 1.89 occasions during 1981- 2001, the quantity of engine buses went active by over 7.76 occasions during a similar period. From the public enumeration of 2009, at any rate 37 percent (27.78 million) urban family units had a mechanized bike and 9.7% (7.67 million) urban familie had a mechanical four-wheelers. It has made obstruction on the streets, conveying about street prolonging activities and development of flyover.

Marisamynathan and Vedagiri Perumal: An unmistakable comprehension of the individual on person on foot crossing conduct under mixed traffic conditions is of necessity for giving basic framework and besides to overhauling walker security at signalized convergences. This paper endeavors to explore the crossing point lead of individuals by walking like convergence speed, consistence with sign, and individual on person on foot vehicular participation under mixed traffic conditions and to recognize the affecting elements reliant on measurable tests. 775 person on foot tests were seen from three signalized unions in Mumbai. Segments influencing person on foot crossing speed have been analyzed and an arrangement crossing speed has been settled for old and adult individuals by walking as 0.95 m/s and 1.12 m/s separately. Strategic relapse models have been made in which the odds of individual by walking encroachment and participation are exhibited and checked. This assessment can bolster investigators and pros to fathom individual by walking crossing conduct at signalized convergence and create passerby postpone models under blended traffic conditions.For this Video grapy is done at the signalized intersection, and Pearson's correlation coefficient test, ANOVA test, and Student t test are done.[7]

James Laird, Matthew Page, Shujie Shen: There is minimal confirmation on the enthusiasm for or advantage of strolling foundation in either urban or commonplace zones. The estimation of and the affinity to walk or cycle in rustic zone is most likely going to be not exactly equivalent to that in urban zones, deficiently in light of the partitions being referred to, yet what's more the different level so traffic. The model offer

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tricky to the family unit's territory similarly as other statistic factors. Typical status to pay measures for customers of the workplaces are 41%/trip for strolling and 19.3 % trip for cycling. These results when applied exantetoa number of proposed country roads updates shows that such

system offers a motivation for money. There remain basic limits to extended interest in strolling and cycling, which makes it difficult to evaluate solicitation and status stop a models reliant on data, which don't reveal society's frames of mind to strolling and cycling. Normal least squares (OLS) relapse, Poisson relapse, negative binomial (NB) relapse, zero-expanded Poisson (ZIP) relapse are finished.

Shin HuoyTerh, Kai Cao: Cycling has been perceived as one of the answers for urban transportation challenges. In 2013, Singapore has declared the National Cycling Plan to fundamentally build the cycling framework and advance cycling over the whole nation by 2030. Given Singapore's property imperatives, arranging the best cycling system is basic. Also, there has been developing strain to consolidate open support in arranging choices. So as to accomplish perfect arranging results and more noteworthy straight forwardness in arranging, numerous criteria and the points of view of various partners should be considered. The proposed cycling ways arranging bolster system will be implemented in Woodlands Planning Area (WPA). The cycling ways arranging bolster structure can consolidate various partners'inclinations into different situations, hence forth can improve the commitment among partners and add to more great transparency in Singapore's cycling ways arranging.[8]

3.1Methodology

This study is about non-motorized transport which is usable for sustainable transport, this study mainly focusing on air pollution and health benefits of people in a particular city in Chandigarh in India. We should prove the benefits of non-motorized transport by using this four types of approach.

Collection of data

•Collection of transportation data: the collection of vehicle data like two vehicle, four vehicle, cycle data, public transport data

•Collection of pollution data: Especially we should collect data that is produced by vehicles

•Collection of population data: we should gather the population data according to ages

•Collection of accident data: we should gather the accident data

Analyzing the data

•Comparing the transportation data with the pollution to know the how much percentage of pollution increasing by increasing in motorized vehicle

•Comparing the transportation data with the population to know the increasing usage of non-motorized transport and to find the disadvantages of over usage of motorized transport

•Comparing accident data with transportation data and population to find the disadvantages of motorized transport

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Estimating the benefits

•By taking previous data of non-motorized transport and live data of transportation and replacing live motorized transport with previous non-motor vehicle transport and determine the benefits of non-motor vehicle transport

Calculation the sustainable of non-motorized transport

•We have already compare the motorized transport with and non-motorized transport and we calculate the pollution (if replace certain percentage motorized with non-motorized)

•We have to calculate the health benefits of the people by comparing with the pollution data, vehicle data, population data and people who are affected by air pollution (asthma etc)

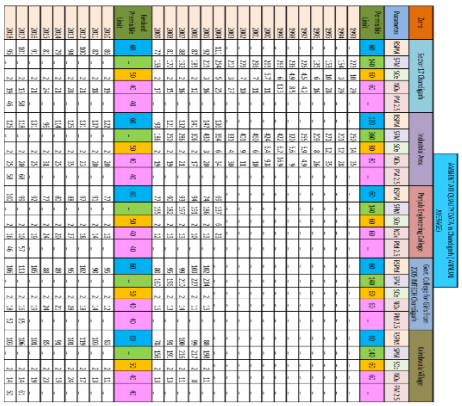
•By showing this calculation we can prove the benefits of non-motorized transport by taking the transportation data and accident data we should prove that increasing in motorized vehicle, increasing in accidents

3.2 Expected Outcomes

As we know day by day the usage of non-motorized is decreasing in India and we are taking one city as a case study and determining the benefits of non-motorized transport and in urban areas the non-motorized transport plays a very important in transport and in multimode of transport. We determine important of sustainable transport in urban areas of the city. we determine the decreasing of air pollution by comparing of previous data of motor vehicles and non-motor vehicles and decreasing of accidents by using non-motorized transport in proper way of divided lanes and we can show the health benefits and then we can prove that the non-motorized transport is a sustainable sources of transport and it is good for socialbenefits

3.3Draft data collection form

- **Pollution Data**



From this annual data we came to know that the pollution increasing from the 20th century by the usage of motorized transport the usage of motorized transport rapidly increased from 20th century.

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