SUTP. Sustainable Urban Transport Project

IMPLEMENTING THE NEW URBAN AGENDA

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

TUMI Transformative Urban Mobility Initiative

On behalf of Federal Ministry for Economic Cooperation and Development

Two-and-Three-Wheelers:

The Challenge with an Increasing Number of Vehicles

iNUA #11: Two-and-Three-Wheelers

We will promote access for all to safe, age- and gender-responsive, affordable, accessible and sustainable urban mobility and land and sea transport systems, enabling meaningful participation in social and economic activities in cities and human settlements, by integrating transport and mobility plans into overall urban and territorial plans and promoting a wide range of transport and mobility options, in particular by supporting: (a) A significant increase in accessible, safe, efficient, affordable and sustainable infrastructure for public transport, as well as non-motorized options such as walking and cycling, prioritizing them over private motorized transportation [...]

New Urban Agenda #114

Currently, two-and-three-wheelers constitute close to 30% of total motorised vehicles worldwide. In middle and low-income cities such as Ho Chi Minh City, Colombo, and Dar es Salaam the share is varying between 50% and 90%. Close to half of the global motorized two-and-three-wheeler fleet operates in urban areas.

Two-wheelers include mopeds and motorcycles. They are predominantly used for personal transportation and in paratransit modes. Two-wheelers also rapidly gained importance as urban freight delivery vehicles. Three-wheelers include small taxis usually carrying up to three passengers.

Over the past two decades, two-and-three-wheeler fleets have expanded at an annual average rate above 7%. It is expected that the current stock will double every five years.

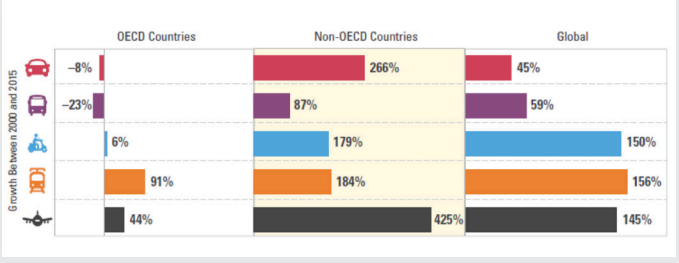


Figure 1 Growth of Passenger Activity for Motorized Transport Modes (Source: IEA and WBCSD, (2004); IEA, (2015))

The question, if two-and-three-wheelers are a blessing or curse to urban mobility is often debated by the policy makers in growing cities, but they have struggled to exactly understand the proper role of motorised two-and-three-wheelers in urban spaces. This has led to a crisis of policy, of regulation and of implementation.

What are the Characteristics of Two-and-Three-Wheelers?

Two-and-three-wheelers satisfy the mobility needs. Even in cities with a high density of public transport facilities, they still play a significant role as they cater to the first and last mile connectivity. In middle- and low-income cities, the two-and-three-wheelers offer a significantly:

- high route and schedule flexibility,
- ease of access (door to door) and
- manoeuvrability in congested traffic with
- low operating costs.

Besides the private use, two-and-three-wheelers are also gaining popularity in urban freight distribution for small and medium enterprises due to:

- growing e-commerce,
- traffic congestion,
- restrictions for urban freight distribution, and
- limited on street parking at destinations.

The two-and-three-wheelers play a key role here, as they replace trips otherwise carried out by lorries or vans.

Problems with the growing Number of Two-and-Three-Wheelers

In many cities, the movement of two-and-three-wheelers are becoming increasingly restricted due to high externalities. High densities of motorised two-and-three-wheelers in urban areas pose serious strains on:

- overall traffic congestion,
- energy consumption,
- carbon emissions,
- traffic accidents
- air and noise pollution, and
- road safety.

In the light of the expected growth rates in the two-and-three-wheeler population by 2050, a continuation of existing policies will likely result in a 1.6 to 5-fold increase in externalities compared to the 2015 level[1]. The substantial contribution of two-and-three-wheelers to transport externalities makes a compelling case for prioritizing policy action (Figure 2).

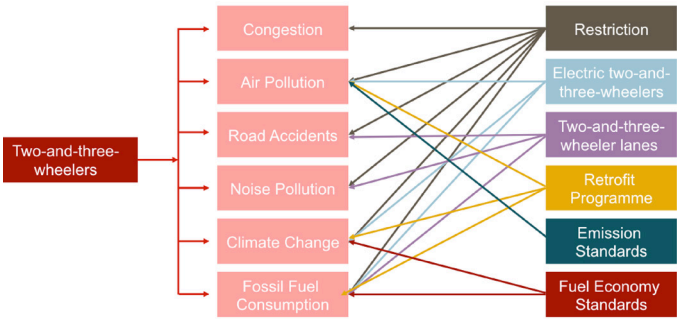


Figure 2: Two-and-Three-Wheelers Externalities and Solutions

Sustainable Policy Options

Among middle- and low-income cities, there is widespread acknowledgement of the need to improve the sustainability of two-and-three-wheeler traffic. Looking to the future, cities need good knowledge of policies and measures on how to proceed. There are various urban examples of reorganizing, regulating and integrating two-and-three-wheeler as a mode of transport within existing transport systems to achieve accessible, affordable, environmentally friendly, and efficient transits.

The following elements are highly relevant for transforming the use of two-and-three-wheelers into a valuable addition to urban sustainable mobility concepts, including:

- driving restrictions,
- regulations for air pollutants and CO_2 emissions,
- infrastructure solutions,
- technology-based retrofits
- improving sidewalks,
  - cycling facilities, as well as
  - public transit accessibility, and quality.

The two-and-three-wheelers could be the key facilitators of long-lasting structural and systematic changes occurring towards shared mobility services, electrification and autonomous vehicles. Already, we see some broad contours of such an innovation being shaped by companies such as Uber, SmartScooter, SafeBoda, Ola and Halan within the existing regulatory framework.

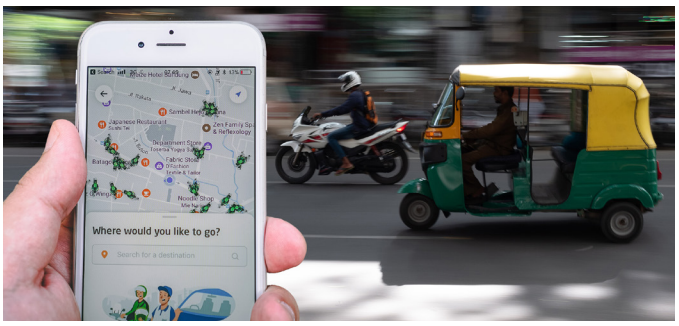


Figure 3: Egyptian Ride Hailing service Halan hits 3 million rides in one year

What can Mayors do to transform Two-and-Three-Wheelers into a sustainable Mode of Transport in Urban Spaces?

1. Restricting Two-and-Three-Wheelers

It is important to acknowledge that the specific externality of a transport mode on a specific road depends on several factors, such as traffic operating conditions, existing laws, maximum speed, passenger occupancy, vehicle characteristics, human behaviour and city typology.

It has been proven most effectively that banning specific types of vehicles should be justified only after carrying out a comprehensive

[1]Source: GIZ, SUTP, TUMI, TUEWAS (2018): Two-and-Three-Wheelers, https://www.sutp.org/files/contents/documents/resources/A_Sourcebook/SB4_Vehicles-and-Fuels/GIZ_SUTP_TUMI_SB4c_Two-%20and%20Three-Wheelers_EN.pdf

socioeconomic impact analysis. However, private cars carrying only one passenger cause the highest external costs within urban areas. Cars should thus be the starting point for restrictions as all alternative travel and transport modes available to former drivers would be more efficient.

2. Retrofit Programs

Generally, available technological solutions to reduce tailpipe emissions can be categorised into two broad categories:

- enforcing standards for new vehicles entering the fleet, and
- retrofitting/scrapping of existing vehicles.

In many countries, old two-and-three-wheelers emit a disproportionate share of transport emissions. Because of this problem, many countries have implemented age-based or emission-based regulations to keep old and pollution intensive vehicles off the road. However, countries find it difficult to impose such regulations due to stakeholder resistance, leading to limited success.

3. Supporting electric Two-and-Three-Wheelers

The International Energy Agency has estimated that two-and-three-wheeler fleets need to be completely electrified by 2040 to meet the Paris Agreement targets. The results of a cost-benefit analysis indicate that electric two-and-three-wheelers can provide a maximum in social benefits among all other available technologies.

It has been proven most effectively

- to set ambitious electric two-wheeler penetration targets and include a subsidy scheme for greater penetration of electric two-wheelers
- to internalize external costs ensuring pricewise competitiveness between electric and internal-combustion engine two-wheelers
- to regulate the conventional two-wheeler parking while granting free parking slots for electric ones

In addition – Components of a Parking Strategy for Two-and-Three-Wheelers:

- strategic planning of location and land use
- features of on-and-off street parking
- prioritizing on-street parking options
- considering private sector involvement
- developing pricing strategies

- to provide greater access/circulation of electric two-wheelers that use pedal assistance instead of throttle power
- to increase the share of renewables in the electricity mix and use lithium-ion batteries instead of lead-acid batteries
- to promote electric scooter sharing schemes and integrate them with existing public transport schemes.

4. Extending Safety Measures for Two-and-Three-Wheelers

Dedicated lanes are built with the aim of segregating two-and-three-wheelers from mixed traffic, thereby reducing the risk of accidents while improving the capacity and level of service. Two-wheeler lanes should ideally be located between mixed traffic curbs and car lanes to avoid right turn conflicts as well as clashes with stopped vehicles, pedestrians, and cyclists in the curb lane.

Key measures	Interventions	Safety Effectiveness	
		Proven	Promising
Safer roads and mobility	Exclusive motorcycle lanes	■	
	Protected turn lanes and widened shoulders/lanes		■
	Removal of roadside hazards		■
	Speed limiters and traffic calming		■
	Improving road surface conditions		■
Safer vehicles	Antilock brake systems (ABS)	■	
	Headlights at night		■
	Daytime running headlights		■
Safer road users	Setting and enforcing legislation - Mandatory helmets, helmet standards, strengthening penalties	■	
	Wearing reflective and protective clothing		■
	Mandatory registration of vehicles & licensing of two-and-three-wheeler operators	■	
	Training - Compulsory skill test for permit	■	
Minimizing exposure to high-risk scenarios	Expanding public transport	■	
	Improving walking and cycling facilities	■	
Modifying use behaviour	Setting and enforcing speed limits	■	
	Setting and enforcing alcohol impairment legislation	■	
	Social marketing	■	
Improving post-crash medical care and response times	Introduction of uniform treatment protocol	■	
	Quick response time	■	
	Offer early rehabilitation	■	

Box 1: Two-and-Three-Wheeler Accident Reduction Strategies (WHO)

It has been proven most effectively

- to establish an efficient lane width with a range between 1.7m and 3.8m
- to avoid separate lane demarcations for roads where motorcycles and three-wheelers constitute over 50% of the vehicle modal split
- to decrease the speed for safe integration of traffic
- to integrate helmet laws regulating the mandatory use of helmets for drivers and passengers

How Mayors can encourage Governments to reduce the Traffic caused by Two-and-Three-Wheelers

5. Vehicle Emission Standards

Two-and-three-wheeler emissions are now regulated in many countries, but there is a very high diversity in the stringency and typology among current regulations between countries. In general, smaller two-wheelers are subject to more stringent standards, while heavier ones, especially three-wheelers, enjoy more relaxed standards.
It has been proven most effectively that:

- countries can advance directly to more stringent standards, given that they adequately consider the social costs of air pollution and the speed of technology innovation over the past decade.
- countries with serious PM pollution should consider the development of a specific PM standard for two-and three-wheeled vehicles.
- countries should strengthen vehicle inspection and maintenance (I/M) programs.

6. Fuel Economy Standards

Due to their small engines and light-weight frames, two-wheelers have a higher fuel efficiency than passenger cars. This is part of the reason why two-wheelers have thus far been neglected in fuel efficiency improvement agendas in many countries. However, it is well established that the fuel efficiency of two-and-three-wheelers decreases as engine capacity and kerb weight grow. Further experience suggests that the design and technology of two-and-three-wheelers plays a significant role in improving fuel efficiency.

It has been proven most effectively that countries set progressive fuel efficiency standards for two-and-three-wheelers. These need to be established simultaneously with vehicle emission standards to ensure high benefits.

Where to learn from?

Singapore has implemented a zero-growth target. This policy is applicable to all private passenger transport modes including two-and-three-wheelers. As the quota system is also combined with several other regulations such as electronic road pricing, mass transit improvement, taxation, etc. this restriction is expected to result in a net-positive impact.

In Bangalore, exist about 120.000 three-wheelers and about 10% of them run on two-stroke engines. As part of the ban of two-stroke vehicles, a 500 USD subsidy was offered to drivers to purchase new, four-stroke, LPG-driven three-wheelers. The economic incentive provided was substantially higher than the resale value of 15 years old three-wheelers which explains the success of this policy.

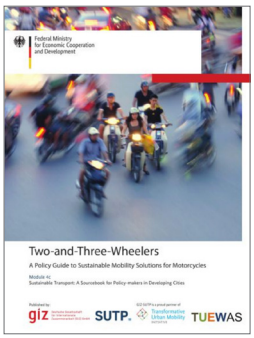
India recently revised its taxi regulations to accommodate motorcycle use as on-demand ride services. The motorcycle taxis are now acknowledged as a low-cost last mile connectivity solution for the passengers.

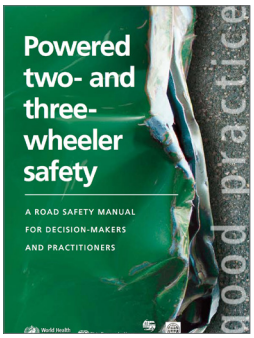
In several European cities (e.g. Antwerp, Rotterdam, London), Low Emission Zones have been introduced to fulfil the standards for air quality. Zones are monitored by cameras or via random checks.

Related Publications

GIZ, SUTP, TUMI, TUEWAS: Two-and-Three-Wheelers. A Policy Guide to Sustainable Mobility Solutions for Motorcycles.

› **English**





WHO:

Powered two- and three-wheeler safety. A Road Safety Manual for Decision Makers and Practitioners.

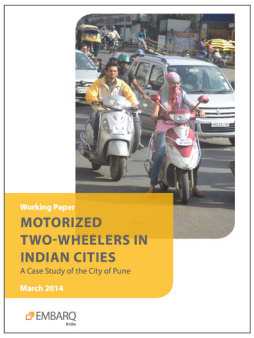
› **English**

EMBARQ India:

Motorized Two-Wheelers in Indian Cities.

A Case Study of the City of Pune

› **English**



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