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Eco-Mobility in the Context of Rural-Urban Connectivity

(Background Paper for EST Plenary Session-3)

Final Draft

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ECOMOBILITY IN THE CONTEXT OF RURAL-URBAN CONNECTIVITY

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1. INTRODUCTION

Although more than half of the population worldwide now lives in cities, there is still the remaining half living in rural areas especially in developing regions. Based on the report by OECD (2013), 80 per cent (%) of these rural populations still live close to an urban area for socio-economic reasons. This underlines the significance of rural-urban links for the mobility of people, goods, services, knowledge, but also externalities such as waste and pollution. The linkage becomes a critical continuum for dealing with sustainability issues (PLUREL, 2007). Future of sustainability in developing countries hinges upon whether pathways to sustainability can be created within these rural-urban regions, as they are pertinent in terms of human welfare, socio-economic activities, and have an enormous influence on the environment.

The changing land use structure due to rapid urbanization leads to urban sprawl which creates long-lasting impacts on the social, economic and environmental performance of the region. One of the main drivers for urban sprawl is the absence of urban-rural linkages increasing competition between cities and surrounding local governments. Neighboring authorities may compete for higher tax revenues, leading to high levels of greenfield development and loss of green space (European Union, 2014). The need to travel greater distances for access induces more unnecessary trips and carbon emissions.

On the other hand, most transport development that is planned to improve rural and urban connectivity is automobile-centric especially in developing nations. Even with more road construction, mobility has not improved but instead traffic gridlock is a perpetual phenomenon in many developing cities, especially at entry points into the city. This familiar scene reflects the traffic influence of a rural area to an urban area. The situation is exacerbated as rural areas are more automobile-dependent. Despite this, policies and strategies for sustainable mobility are often carried out in silos i.e. viewing both rural and urban areas as entirely separate entities and overlooking the links and change processes.

Planning for sustainable mobility is thus vital to ensure access while maintaining the environment and economic well-being of both rural and urban areas. This paper argues that ecomobility can support connectivity between rural and urban areas in two folds. Firstly, the essence of ecomobility is integration: in policy and planning efforts; through intermodality and enabling transport infrastructure and services; and with a people-oriented approach. Secondly, it realizes equitable access to places, goods, services, and activities as an end goal with reduced private motorized vehicles.

2. SIGNIFICANCE OF MOBILITY IN RURAL-URBAN CONNECTIVITY

The concept of rural-urban connectivity reiterates the idea of complementary functions of both rural and urban areas and flows between rural and urban areas of various sizes such as metropolitan areas, small- and medium-sized cities, or sparsely populated areas with local market towns. Essentially, this complementary function is based on the market-driven service provided by the urban areas and productive- or resource-based industries in the rural areas (OECD, 2013).

Figure 1 illustrates the complexity and interaction between urban and rural areas, which are respectively defined by the size and performance of each entity and separated by physical distance (adapted from OECD, 2013). There are five main linkages including people movements; financial capital; goods and services; information and technology; governance interactions and partnerships, which are influenced by the prevailing economic structure, spatial structure and governance structure that are established between these territories. The significance of transport services is substantial to facilitate mobility of people, goods and services. Without transport services, such interconnectivity would be impossible or limited especially in developing countries with limited technology or digital connection.

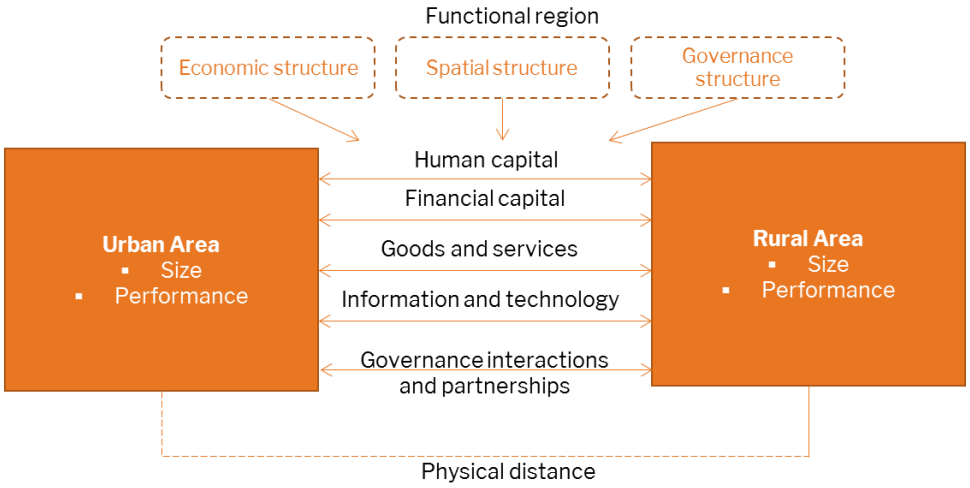

Figure 1: Linkages between urban and rural areas (adapted from OECD, 2013)

Often time, focus on (sustainable) development efforts tends to favour cities causing impartial and lopsided development in the rural area. Globally, 78% of the poor reside in rural areas, while the rural population represents 58 % of the developing world as illustrated in Figure 2 (World Bank, 2013). Lack of accessibility has been highlighted as one of the biggest challenges for rural areas. In sub-Saharan Africa, inadequate transport impedes agricultural growth and poverty reduction (World Bank, 2013). Improving road networks and access to public transport services play a key role in stimulating the economy and reducing poverty (Starkey, 2007) for equitable growth. Both urban and rural areas deserve clean, affordable, efficient, accessible and safe mobility.

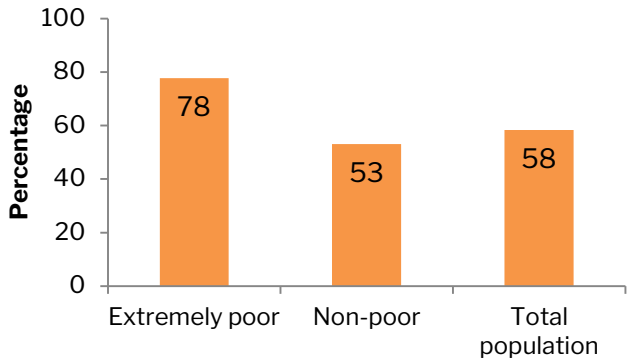

Figure 2: Percentage of people who live in rural area (Source: World Bank, 2013)

In addition, these flows illustrate that the nexus between rural and urban areas cuts across the sustainability pillars: people, profit and planet. By recognising the importance of rural-urban linkages within the connectivity context have implications on other sustainability agendas such as sustainable agriculture, education, poverty, food and security, disaster management and others. This again highlights the potential for synergies amongst the two territories. Recognition of the intimate relationship provides a basis for stronger partnerships between various actors to foster better spatial and transport planning for improved transport systems and development. Neglecting these links may create policy and institutional barriers to provide improved transportation services, which would induce stronger impacts on the poor and vulnerable in the rural areas.

Finally, urbanisation will continue to be a phenomenon globally. By 2050, it is projected that 70% of the population will be living in the urban areas (UN-HABITAT, 2015), which may induce stress on suburban or rural areas with the environmental externalities. Instead of perceiving urbanisation as a burden, sustainable mobility can be leveraged to capture the value of change. Most human settlements today tend to live at areas with good public transport lines and services, planning for ecomobility can steer the sustainable urban growth for more balanced territorial development to avoid implications resulting from urban sprawl and uncoordinated urban planning.

3. ECOMOBILITY - AN INTEGRATED APPROACH TO RURAL-URBAN CONNECTIVITY

Ecomobility offers possibilities for rural-urban connectivity through integrated, socially inclusive, and environmentally friendly transport options. This includes walking, cycling, and use of public transport and/or other climate- and people-friendly innovative transport modes. The core of ecomobility is *integration* in transport system planning and service delivery. It is a people-oriented approach to offer better services based on the various access needs and use patterns of the end users themselves, while communicating the services and mobility options. In order for commute between rural and urban areas to be less car-centric and encourage ecomobile modes of transport, planning approach should be based on these principles:

- **Integrated** – Integration of transport planning efforts with balanced transport modes. This means integration among government levels (municipal, city, and region); transport modes and services, sectors and territories (United Nations, 2016).
- **Flexible** – Improvement of flexibility to make an economic case since there is less demand in rural areas in comparison to high density urban areas for public transport. This could be through demand-responsive system that can be tailored.
- **People-centric** – Having the end-users in mind when planning to improve safety, affordability, efficiency, quality and accessibility of transport service. This enables planning to take upon a creative perspective in viewing roads, transit stations and public space.
- **Low carbon emissions** – Reduction of carbon emissions and improvement of environmental quality.

Figure 3 illustrates different pillars essential for planning for an ecomobile transport system in the rural-urban connectivity context would require attention and development at: (1) integrating transport planning and policy frameworks; (2) through intermodality and associated enabling transport infrastructure and service; and (3) a people-oriented transit.

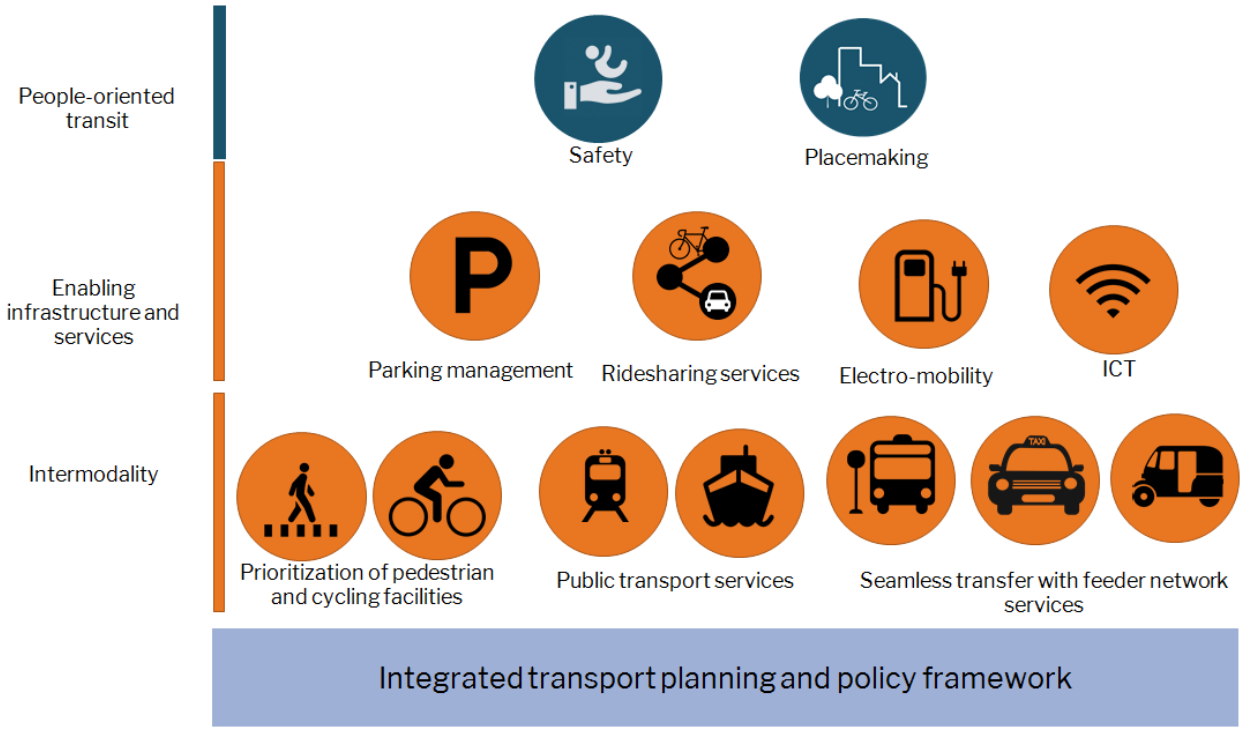

Figure 3: Ecomobility as an integrated approach to improve rural-urban connectivity

3.1 Integrated transport planning and policy frameworks

Transport planning is complex and has implications on wide-ranging sectors such as in healthcare, education, employment, energy, housing and others, especially in the context of rural-urban linkages because it involves different actors, institutions, policies and even environmental landscape. For this reason, a paradigm shift to an integrated approach in planning and policy development is even more crucial as considering rural and urban areas

in isolation would potentially create more bureaucracy, financial burden, thus leading to inefficiency of transport service delivery. This means rural and urban transport strategies and policy frameworks need to be aligned to improve rural transport connectivity to wider local, national and regional networks.

Although it is known that transport and land use planning should not be separated to function effectively, but in reality planning is often carried out in isolation. A big move forward towards integration of land use planning and transport planning is by recognizing that the process of any development should be centered on public transport (Transport for Quality of Life, 2011). Recognizing the importance of land use planning is even more crucial for urban-rural linkages as it can not only avoid unnecessary trips and carbon emissions and leverage on use of low-carbon ecomobile transport modes, but also to tackle urban sprawl. Leipzig in Germany reflects one of the perfect cases. Strategic land use planning between municipalities in Leipzig attracted people back to the existing city rather than building new places.

Planning of public transport services should be central in all development planning to link residential areas with areas of employment and services. Good transport links between rural and urban areas help reduce rural dwellers' reliance on private cars for travel needs. Street layout and design, walking and cycling paths, density of development, and location of development can be decided from the onset rather than making hefty adjustments later. For example, the development of Vauban, a suburb of Freiburg, has been centered on public transport from the onset to ensure excellent access to the central hub in Freiburg. Because of its intentional planning, it is now considered a car-reduced environment. The car mode share is only 16% of all trips, significantly below the average of Freiburg. Public transport accounts for 19%, while walking and cycling represent 64% of all trips (TQL, 2011).

In addition, one of the main reasons to justify for integration in planning policies is the unprofitability of public transport in rural areas. By bringing different actors and funds together through collaboration among the service provider, there could be establishment of a framework to equally share costs and revenues.

3.2 Intermodality

A demand responsive system that is customizable can be considered especially at rural areas instead of planning for mass transit that would require higher investment and passenger volume. One of the ways is through intermodality, which is a form of integrated system that offers rural-urban mobility through combination of road, rail, waterborne or cycling mobility options to transport passengers or goods. By definition, intermodality does not include walking but walking can be seen as a complementary mode. Walking is possible at built-up urban or peri-urban areas but walking at an interurban environment may be challenging, thus different complimentary modes of transport are required to facilitate mobility (International Transport Forum, 2015).

In establishing an effective intermodal system, several criteria are pertinent to enhance connectivity and efficiency. Firstly, cooperation amongst different transport operators mediated by a central institution, such as the regional transport authority. This could translate to synchronization in administrative procedures, standards, ticketing and fare system, timetable planning, and central interchanges to improve seamless travel.

Communication of such information to users in a single platform, preferably online, is also important for users to plan their journey ahead and make decisions accordingly. If the journey requires too frequent interchange, and high accumulative travel fare, users would naturally opt for car-centric travel; or for those who cannot afford one, mobility choices and coverage would be limited.

Intermodality in developing countries can take on a different form especially in countries where informal transport systems is predominant in serving the mobility needs of locals (UN-Habitat, 2015). Such systems can be complemented with the formal transport system, especially in terms of last mile connectivity.

Efficiency of intermodal modes is pertinent in shaping customer's choice and satisfaction. After all, a commuter will choose a mobility mode that can commute the fastest in the most cost-effective manner. In most cases, single-mode travel with cars is the natural choice, thus reiterating the need for a well-planned intermodal system.

3.3 Enabling transport infrastructure and services

Infrastructure for car-centric transport system differs from an ecomobile-friendly system. In planning for such infrastructure, pedestrian and cycling facilities should be prioritized based on the travel distance and landuse zones. The aim to provide enabling transport infrastructure and services is to enhance the users' experience in order to attract more users to opt for an ecomobile commute mode. Improvements could involve diversifying transport modes and services provided; reducing travel time; increasing sense of security and comfort. In addition, enabling infrastructure provides a basis for various modes of transport to operate complementarily. Different types of infrastructure to facilitate intermodality can be considered as follows:

- **Prioritization for pedestrian and cycling facilities** – Establish pedestrian and cycling pathways that joins to the next urban or rural communities and important service points such as schools; bicycle sharing stations; greening walkways or waiting areas.
- **Provision of public transport** – Bus services with dedicated bus lanes; rail network; or waterborne transport.
- **Seamless transfer with feeder network services** – Establish transfer squares for passengers to transit with feeder bases, taxis, or other informal transport modes. For larger transfer squares, focus local shops and establishments at these transfer squares. For example in Kitakyusu, Japan, pedestrian routes and deck that connect the transfer square to the major rail station were constructed for faster transfer (Yamamoto, 2011)
- **Parking management** – Park-and-ride system for cars and high-volume bicycle parking stations hold a great potential to reduce cars from entering cities and the need to increase road capacity. Parking spaces for bicycles have to be sufficient, secure and strategic in location for it to function effectively.
- **Electromobility** – Provision of battery charging station for small electric vehicles at strategic areas.
- **Ridesharing services** – Ridesharing services can be in the form of community buses, cars or services provided by specific organization, institutions or individuals. Information on ridesharing services can be provided on an information

communication technology (ICT) platform to match the needs between driver and user especially at sparsely populated areas.

- **Information communication technology (ICT)** – A real-time information system on one platform for all transport modes including ticket price, travel time, and distance that can be updated in real time.

Different modes of travel can be customized based on the local characteristics such as distance between rural and rural areas; population density; land use; topography and others.

Defining Zones or Areas

In general, an area or zone needs to be defined for key access locations, specific zone, neighborhood, or even region in order to understand the requirements of transport infrastructure, potential ridership, and transport modes (Shah et al. 2014). This is mainly defined by the distance between points of origins and destinations, which can mean: (1) distance between rural and urban area; or (2) distance within rural/urban area. The different types of transport modes can then be customized based on the distance or an area as depicted in Table 1 (adapted from Shah et al. 2014):

Table 1: Types of transport mode for different zones

	Zones			
	Primary	**Secondary**	**Tertiary**	**Catchment Area**
Distance between points of origin and destination	150 – 250 m or (5 to 15 minute walk) from points of origin or destination to a station	500 – 750 m is generally adopted internationally. However, populations in the developing countries may be more accustomed to walking longer distance.	5 km – 30 km (country/ region-specific)	Consider the target area of influence from the station.
Mode of transport based on priority	Pedestrian Cycling	Pedestrian Cycling	Cycling Electric bicycle Feeder buses, taxis or informal transport Ride sharing services Park and ride system	Public transport (rail, waterborne) Feeder buses, taxis or informal transport Ride sharing services Park and ride system

Rural-urban connectivity can be improved by taking into consideration different types of travel: long distance travel as well as 'first-mile' or 'last-mile' travel. For long distance intercity travel, efforts can focus on selecting existing or new rural routes and eventually connecting them to larger mass transit areas in the city. It would make sense to use public transport (rail or waterborne mode) services for such purposes. In addition to the *physical*

connection between rural and urban areas, an *integrated system* translates to a synchronized ticketing system and standards for seamless transit.

In connecting first- or last-mile travel that is usually within a rural or an urban area, priorities should be on pedestrian and cycling. Other feeder system such as feeder buses, taxis or smaller transport vehicles can be adopted. There have been ongoing initiatives to integrate information from informal transport modes into the formal system and make this information public such as in Minibus Taxi project in Cape Town, South Africa; and the Digital Matatus project in Nairoibi, Kenya. However, these initiatives are generally targeted within cities but such efforts should also be extended to rural or peri-urban areas.

Ridesharing services are pertinent to complement the public transport system. It is hard to completely do away with cars, thus car sharing system could assist in specific travel needs. Integration of different strategies would gradually build and expand a transport network to improve convenience, connectivity, and cost-effectiveness of travel.

Figure 4: Rural-urban cycling path in Leipzig, Germany (Source: ICLEI)

3.4 A People-oriented transit

A transportation system is not merely a physical infrastructure per se but a complex socio-technical system with no specific distinction between the physical and social elements to provide a function (Geels, 2005). A people-oriented transit holds two dimensions: (1) affordable, accessible, and safe transport infrastructure and services for everyone including children, elderly, women and disabled people; and (2) an improved public space or 'placemaking' to improve community cohesion.

Increasing traffic safety is important in developing countries as majority of fatalities occur in low- and middle- income countries (Shah et al. 2014). Increasing road safety is always important especially in the night or at quieter areas. This can be done through stringent safety policies, as well as related infrastructure and enforcement. Informal transport modes are frequently associated with safety issues. By recognizing the complementary role of the

informal transport system can be an opportunity to improve or regulate the system in one way or another. For example, the use of an ICT platform in Kampala, Uganda enabled the *boda* motorcycle taxi drivers to be monitored and trained to provide better services to their customers (Ch'ng, 2016).

Stations or transfer stations can be targeted for public space improvement. Basic amenities should also be provided at these areas such as street lighting, public toilets, seating or resting areas, bins. Furthermore, create community areas and green spaces; and concentrate local businesses, service centers or other activities around these areas. This improves convenience of locals to run errands during transit and focuses development around the public transport network.

It is also an increasingly popular notion to consider roads as public spaces especially roads dedicated for non-motorised transport. When designing the cycling or pedestrian paths, more scenic routes that is far away from main roads or highways can be selected. Otherwise, street lighting, smooth paths, tree canopies or even demarcation of low-speed zones can improve comfort and safety. In general, improvement of geometric street designs or transit facilities platform through urban planning can not only improve the area aesthetically but also traffic flow and safety of users.

4. CONCLUSION: OPPORTUNITIES AND WAY FORWARD

Rural and urban areas enjoy diverse yet complementary assets which creates a continuum of human settlements that connects people and resources with one another with strong economic, social and environmental exchange. Unfortunately due to existing institutional and political structures, these territories are frequently viewed in silos in urban and transport planning and development. Failure to recognize this continuum may result in lack of provision of ecomobile transport infrastructure and services and uncoordinated land use, triggering car dependent tendency in rural areas.

Having said that, developing countries still offer vast opportunities for improvement and sustainable development as the infrastructure and environmental landscape may not be as fixated as developed countries. The population is also more accustomed to non-motorised transport modes of movement such as walking and cycling. Such pre-conditions should be leveraged and emphasized in future urban planning for ecomobility. Not only will ecomobility maintain the distinctive rural and urban landscapes and functions, it also emphasizes on the quality of life for all especially rural dwellers by increasing access to opportunities and services. In conclusion, ecomobility supports connectivity between rural and urban areas. In achieving this, the key is integration – in policy and planning; transport infrastructure and services with a people-oriented approach – to diminish the need for use of personal motorized vehicles while improving connectivity.

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