SUSTAINABILITY IN TRANSPORT ENVIRONMENT

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Abstract:

Designs for Sustainability and Eco-friendly are words that many of us get confused, mis-interpreted and misused. Being sustainable means construction of an asset using optimal amount or resourcing and whole of life cycle cost of creation and maintenance of that asset and the ability to sustain to serve for future generations without difficulties. Eco-friendly design means making a design to minimize impacts on the environment, bio diversity & eco-systems. There are new trends on investments in sustainable modes of transport to optimise sustainability with minimal impacts on the environment, and creating healthier and prosperous societies and economies. Hence, the today's challenge is to make a balance on both and between the sustainability and being eco-friendly.

For example, if we construct a new road pavement with new with kerb & channel, that solution should last for generations if used the right methodology, resources in a quality system. However residuals from wear & tear (of tyres and bituminous seal) release nasty chemical components to the environment through the provided drainage reticulation system. The resultant would be damaging the natural habitats of fish, flora & fauna, irreversible, natural environment and in today's built environment and urbanism.

In contrary if we construct the road without kerblines but surface drainage fall into a grassed swale would filter and absorb contaminants naturally before the disposal into the rest of the environment. This process would also delay the time of concentration and provide managing the disposal system efficiently. However, there are some issues & challenges that we need to manage in a **system approach** using **both eco-friendly** and **sustainability factors**. For instance, potential to drive over and mis-use defined extents would cause in maintaining the system without additional investments.

Hence, creating a more sustainable built-environment mitigating environmental impacts should provide maximum benefits to the society and the environment. To achieve this objective, there should be a better understanding among the parties who create facilities and societies that would enjoy the facilities in a win-win situation. Winning the sound support from the wider community and disciplined use of the asset are important in managing the life cycle of the assets.

Key words: *Sustainability, Eco-friendly design, road transport, pedestrian and cycle-friendly design, non-motorised transport*

The Full Paper:

There are four key sustainability factors[1], for consideration in planning and design in Transport Environment:

1. Managing changes in the environment

Maintain the integrity of environmental system considering both local and global approaches;
Projects or plans that will have a significant impact on the life support functions upon which human well-being depends, many of which are irreplaceable, must be considered thoroughly. Examples are rare, native plants, birds and fish that are irreplaceable, can be impacted by roads or rail construction projects through a forest reserve.

2. Optimise processes on a life cycle basis

Ensure the full cost of resource depletion is included in life cycle costing including all feasibility studies, estimates and generated options.

Equity and safety of engineering activities shall be maintained considering the improvement of the quality of life, long term resource use, prioritisation, consultation and precautionary principles.

3. Holistic problem solving

Take a "holistic approach" considering both basic human needs and efficiency. For example, freights operate both ways rather than in a single direction.

Importantly all historic problems must be identified and solved before proceeding with new developments; such as considering land degradation, soil erosion, ground contamination, vegetation removal, existing hazardous waste removal.
We have to consider reducing the use of non renewable resources, such as the combustion of petroleum and fossil fuels.

Consider a case of rehabilitating an existing road; a capacity check should not be misused on what we think is right but what the holistic end users would think to be right. For example jumping into a conclusion that, an existing "single lane capacity" would require a two-lane capacity served, without considering the other options such as facilitating non-motorised transport. This is because such road improvement would not consider the overall energy efficiency and opportunities to improve sustainability. There shall be considerations in the planning stage on current and future infrastructure demands & potential trends such as reservations for pedestrians, cyclists, stormwater, sewer, communication, recreational and any

other potential development activities. This is the moral obligation of facilitating one side without disadvantaging other parties.

The trend is setting towards a sustainable, low carbon future and other various sources of potential energy reductions with the potential to stimulate commercial development opportunities, business capabilities and green-growth with cleaner technologies.

Reduced greenhouse gas emissions and increased air quality due to an increased use of renewable energy sources and technologies. Green building technologies to preserve energy and resources are applicable on both mode of vehicles and facilities such as track & terminals.

Local government policy planning shall encourage active transport infrastructure and promote non-motorised transports such as pedestrian paths, cycle lanes and any other conventional and indigenous transport methods. When it comes to central planning consideration shall be given into energy efficient modes of transport such as electric rail, bus and ferry services.

Travel demand management on motorised transport such as control of vehicle imports, price management on petroleum based products to reduce consumption would be a part of the system approach of problem solving.

4. Connectivity and inter-modal transport.

Transport affects people's lives in significant and multiple ways. While transport is not an end in itself, it plays a critical role in economic activity and social connectivity. The availability and cost of transport determine access to employment, social, educational, cultural and recreational opportunities.

Transport plays a crucial role in regional and national prosperity. Transport costs affect what goods are available, where they are available and at what price. Further, negative side-effects of transport, such as air and noise pollution, greenhouse gas emissions and encroachment on natural land, affect human health as well as the living and natural environment.

Characteristics of excellent transport systems[4] in an economy and society shall consider cohesive, resilient communities, productive, high-value economy and quality, sustainable urban-rural environments.

For example, an excellent transport system should strengthen and link communities to develop, improve living standard of a society and synergy in economy, whilst maintaining the quality of sustainable urban-rural environments.

For an expanding urban development, modal choice options can be considered with options of:

- Proving sustainable linking of footpaths, tracks and Cycleways (basically it's non-motorised transport to be considered as a priority)

- Other non-motorised, sustainable transport modes combined with urban and rural planning and development (there may be indigenous and/or modern method that can be considered sustainably, for example a canal system, footbridges, shared paths)
- Bus Route development and linking
- Light rail transit & heavy rail
- Road corridor improvement options

The history of human civilisation building footpaths and tracks is tremendous and there are many stories of magnificent masterpieces such as the Great Wall in china, granite paved roads built by Incas and Romans, and a bridge built using monolithic granite columns and beams in Anuradhapura, Sri Lanka are some to mention.

Trends from the 19th century to the beginning of the 20th century are being changed from the "harbour surround city concept" of promoting petroleum based, motorised transport into complex, multi-modal integration connecting and integrating societies.

In case of saturating capacities of existing road networks, the authorities are looking into facilitate pedestrians and cyclists in various means and there are mechanisms developing on feasibility and economic evaluations and the prioritisation of such projects.

For example, if we need to prioritise a short-list a collection of transport projects, a simple spreadsheet based technique can be used **to score and evaluate based on various factors**, such as:

- Facilities (schools, hospitals, residential areas)
- Public transport (existing routes, link to existing, potentials; say within 500m to existing Bus Stop)
- classification of network (and supplementing existing network)
- Available facilities of sustainable transport such as footpaths, cycleways and opportunities to improve connectivity
- Opportunities to improve societies (harmony, recreational, tourism & aesthetics)

In addition to the above criteria, "bonus scores" can be provided for metro, urban, residential zones, etc. and other factors such as constructability and use of the "benefit over cost" ratio.

When the local authorities are receiving lesser and lesser funding from central governments and/or hard to increase sources of income, investing on sustainable transport development shall be more viable and encouraging with increased tangible and non-tangible benefits. It would also be more attractive when the minimal impact on natural and built environment is considered.

4.1 Improvement of modal choice in a Transport Oriented Development (TOD):

Transport oriented land and urban development is to optimise energy use in land-use transport modelling.

The old trend from the beginning of the 19th century to the oil-peak development was to plan considering homogeneous zones linked with a hub with a lesser priority in transport cost optimisation. This caused bringing all resources to a centre to build services and products in economy of scale and resulted congestion, wasting energy and time. For example when the residential area is far away from the school and work zone is in another distinguished zone.

In a transport-oriented development model, clusters are developed with basic needs so that the energy used in transport is optimised. There are new cities being built and existing congested cities are being mitigated considering these energy efficient Transport Oriented Development concepts.

The Conclusion

Summarising all the above, the **potential to invest in transport** using sustainable (plus Eco-friendly) is expanding. This is not limited to typical road transport, rail and urban development in network or regional level but also encouraging non-motorised transport in local level. Opportunities for facilitating using both sustainable and eco-friendly transport solutions such as facilitating pedestrians and cyclists is in practice and encouraging.

Hence, it can be concluded that, **global societies shall strive to facilitate sustainable transport modes in order to develop healthier societies, countries and economies**.

References

1: The IPENZ (May 2005), *Practice Notes 05 (ISSN 1176-0907), Sustainability and Engineers.*

2: The Auckland Transport, (June 2012), *Powering Auckland's low carbon transformation, discussion document.*

3: The IPENZ Presidential task Committee, 2003-2004, *The IPENZ discussion paper on Sustainability.*

4: The Auckland Transport, 2012-2022, *The Long Term Plan*

5: The NZTA, The Design of Pedestrian Network, available on-line http://www.nzta.govt.nz/resources/pedestrian-planning-guide/docs/chapter-14.pdf [accessed on 09/10/2012]

6: David Lindsay, ARC, Dec 2004, Transit Oriented Development, planning for choice, health, prosperity and democracy, available on-line www.qualityplanning.org.nz/pubs/Transit-Oriented-Development.pdf [accessed on 09/10/2012]