(RESEARCH ARTICLE)

Sustainable mobility and the smart city: A vision of the 4Dimensional (4D) design of city without personal automobiles of the future

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Abstract

The aim of this study is to develop a conceptual framework of sustainable future for cities and towns without personal automobiles and schematic traffic strategies in sustaining developing cities and towns. The discussions of this paper reveal that creative ways to sustain traffic and transportation within the metropolitan and towns in large scale can only be manifested if it fits within certain bounds of acceptability and therefore traffic sustainability can only move at a pace determined by the society. The paper concludes that cities and towns should aim to move towards environmentally sustainable transport and creative.

Keywords: Sustainable development; Sustainable transportation; Transportation and Energy; Urban/Rural design

1. Introduction

From Oluwoye, (2011) and Oluwoye and Ouf (2023) reported that the civic agreement of moment is an agglomeration of several factors similar as marketable, domestic, recreational, institutional land- use types (Oluwoye, 2011). These are united by the transportation system. Transportation creates what's known as place mileage. It does this by prostrating the manacle obstacles between the origin and destination (Oluwoye, 2011) likewise, in an attempt to make the conception of sustainable smart megacity development more specific, the author gives a narrow description concentrated on the habitable terrain of sustainable development of metropolises and municipalities.

The discussions on factors that contributing to creative potential below were extracted from Oluwoye, 2011 published paper entitled "Road safety through Planning for Roads and Road Environment: Pedestrian and Vehicular Interactions as a Ways Toward Sustainability of Urban Untarred Roads and Frontages in Developing Countries" p2.

"*Factors that contributing to creative potential: As a dynamic process, creativity appears to depend on the development of ideas, the willingness and resources to put those ideas into practice. The factors discussed herein could encourage a practical approach to change towards sustainable cities.*

The creativity initiative involves the establishment of a new set of forum that draws from both public, private, community and academic sectors to consider issues within the city, and also to suggest policy for sustainable development for cities transport.

However, with the emerging awareness that sustainable development is about economy, environment and society, as well as the ecology, the relevance of cities environmental creativity and sustainability appears growing rapidly.

Further, educational provision has always been innovative in most cities. Most cities have excellent networks of community educational institutions. Unfortunately, while educational provision has been seen as a potential of

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creativity and sustainable development for cities - it appears this has not been fully utilized. It should be noted that careful design and planning of roads can provide open space for pedestrians, or play areas for children, away from vehicular flow and for minimal through traffic on local streets in residential areas, where pedestrian accidents particularly those involving young children, are likely to occur (Appleyard, 1981, Buchana 1963, Oluwoye 1988, 1997) p2".

1.1. Issue arises from sustainable practices:

The question now is that what is "Smart City"? A 'smart city' is a City without personal automobile that has knowledge of dynamic process and creativity and apply technology to improve the environmental design and management. Figures 1-4 below are examples of smart city.

Figures 1-2 Connected Smart city Seoul New York Smart City

Figures 3-4 Tokyo Smart City Amsterdam Smart City

1.2. Purpose of the paper

The aim of this study is to design a conceptual framework for environmentally sustainable transport for futures of cities or towns without personal automobiles and also transform the concept into the schematic traffic strategies in sustaining developing cities and towns.

2. Analysis and results

2.1. Conceptual 4D design model of sustainable future

As soon as one gets involved in accessibility planning for pedestrians and bikes one has to decide whether walking are legitimate parts of the total traffic mix on the road network or more akin to wheeled pedestrians to be kept apart from motor traffic as much as possible. Over 50% percent of journeys are made on foot, and over 50% of the population relies on walking as the only means of travel during the working-day. At least 70% of journeys in residential areas are made on foot. The majority of walk families who have cars also have to make journeys on foot.

Walking as a means of transport differs in several respects from all the other transport modes. Walking has always been the main mode of travel. Considering the inner suburbs' the main difference to occur with the introduction of the car was the change of work trips from public transport to car. The effect is more noticeable in the outer areas where the housing spread out and it is further to walk to local facilities. Relatively little study has been made of walkers and the purposes of walk journeys.

As shown in figure 5 below, smart environmentaly sustainable transport means that a change's in sustaining our towns and cities have to occur in modes of transport towards modes that leads to walkable and bike environment.
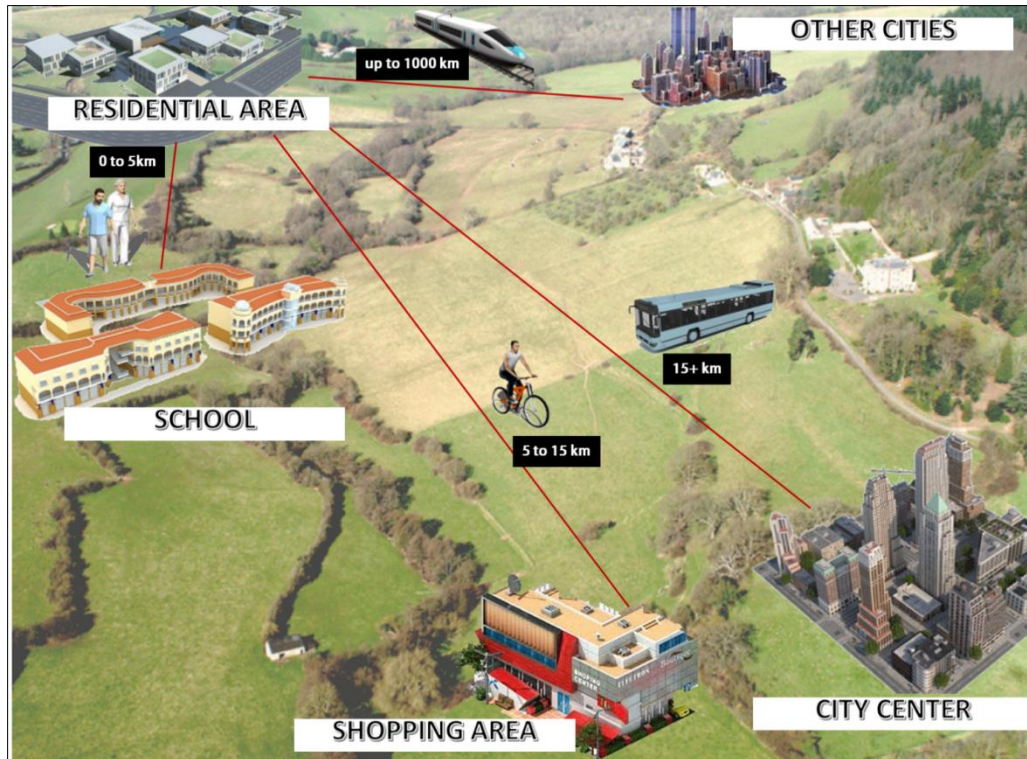

Figure 5 Sustainable future: 4D of cities or towns without personal automobiles

2.2. Schematic Traffic Strategies in Developing Sustainable Smart Cities/Towns

The following changes need to occur as regards choice of mode of passenger transport:

The design principles of residential area to school

for design distances walked to school of greater than 0 and less than 2.5 kilometers for 10years children and greater than 2.5 and less than 5 kilometers for 14years adolescent

The design principles of residential area to shopping area by bike

- Distance to be covered while travelling from home to shopping area or grocery store should be greater than 5 and less than 15 kilometers

The design principles of residential area to shopping area by public transport mode

- a change from using private auto to using public transport with as a result, twice as many passenger kilometers being covered by public transport;

The design principles of residential area to greater than 1000 kilometers area by air

- a change from travelling by air for distances up to 1000 kilometers to travelling by high speed train.

For that purpose:

- a great improvement will be made in facilities for public transport and for cyclists as an alternative to using the car, notably for commuter traffic.
- pricing and incentive instruments will be used to influence the choice of transport mode in passenger transport.
- information and stimuli will be provided to all those involved, stakeholders, local government and individual members in the community.
- encouraging people to the use of public transit to be coupled with discouraging the use of cars, otherwise no contribution will be made to sustainable development.

None of these options can be realized overnight; some of them require amendments to legislation, while the precise advantages and disadvantages of others still need to be studied carefully.

3. Discussion

Diversity, flexibility and self-reliance are significant for manifesting both creative and sustainable potential; these factors ensure that cities and towns possess the ability to respond to changing sustainable circumstances. Dynamic relationships between these factors are clearly important.

A synergy between hard and soft factors is essential. Also community self-reliance and local determination with outward vision is quite essential to stimulate creativity and support sustainability. It is clear that in the search for economically, socially and ecologically sustainable cities, demand management will be a central requirement for policy making.

For instance, the supply led approach to transport accepts the dominant role of vehicles and thus seeks to reduce the impact of these vehicles. A demand led approach will actively seek ways to reduce the demand to travel by improving local provision of goods and services will also seek ways to meet demand for mobility by providing a variety of quality choices that offer alternatives to vehicles (automobiles). Therefore, there is need for decision makers to search for new approaches and rethink issues involved as to what might work best for our cities and towns. Thus, demand management will be much likely to stimulate sustainability and creativity of transport development than a market-based approach which seems to supply existing demands. Often, we see the over-riding need for commercial viability especially the automobile industries clearly used as an excuse to deny the viability of creative and sustainable alternatives. Creating a wide-ranging new initiative that has at its core the need to change patterns of resource use creates a clear way of opportunity to bring in new and creative thinking.

4. Conclusions

In conclusion, the conceptual design of sustainable mobility and smart cities seeks to converge residential, commercial, and civic uses to create dynamic communities, placing housing, schools, recreational places, businesses, etc., in one area as opposed to separate, and makes walkable neighborhoods offer benefits to the environment, health, and efficiency. Furthermore, residential schools and workplaces in neighborhoods, making them close enough to be accessed by multimodal transportation (bicycles, pedestrians, walking space, mass public transit). However, creative ways to sustain traffic and transportation within the metropolitan areas and towns on a large scale can only be manifested if it fits within certain bounds of acceptability, and therefore traffic sustainability can only move at a pace determined by the society. Overall, the concept of creative sustainable cities potentially offers a new way to achieve meaningful sustainable transportation change.

Compliance with ethical standards

Disclosure of conflict of interest

There are No conflict of interest to be disclosed.

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