

# SUSTAINABLE PLANNING APPROACHES TO DEALING WITH NEGATIVE EXTERNALITIES OF TRANSPORT CORRIDOR DEVELOPMENTS

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## ABSTRACT

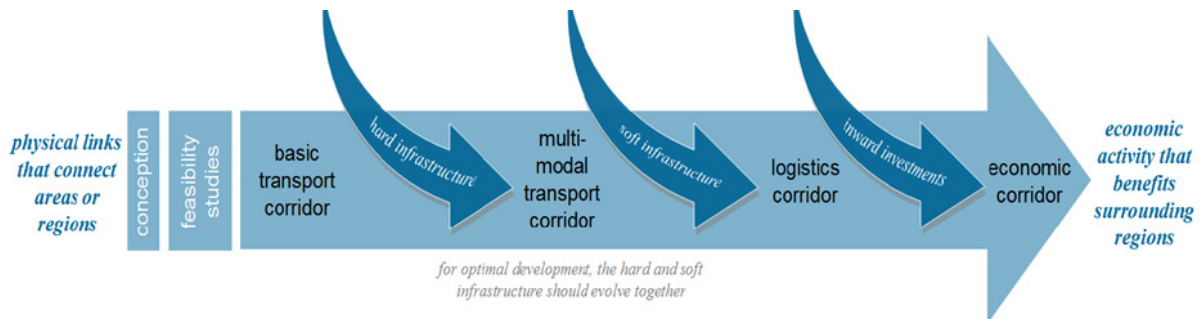
Transport corridor developments have emerged in recent years as one of the magic bullets that can improve efficiency in the transport and logistics processes along majors and that can foster sustainable economic developments in the corridor regions of many developing countries. Despite the obvious gains in the logistic processes and on the economic development front, such a best practice corridor development scenario has also come with negative externalities that equally threaten the sustainability of positive impacts it has brought. Poorly planned corridor developments are a characteristic of most developing countries that has been associated with what this essay calls negative externalities. This essay analyses a host of negative externalities common to most transportation corridor development initiatives in developing countries that require urgent attention through sustainable planning interventions. It further outlines the nature of sustainable planning approaches that are required to ensure sustained positive development outcomes along transport corridors. Empirical evidence to support the discussion points shared in this essay have been solicited from critical review of literature on transport corridor development planning, sustainable transportation, responsive urban development and planning, environmental planning, and sustainable urban planning.

**Keywords:** Transport planning, Corridor development, Negative externalities, Sustainable planning.

## 1. INTRODUCTION

Promotion of corridor developments along major transportation routes has become a common development practice that has attracted attention of both policy makers and development practitioners in developing countries such as South Africa (Marshall, 2022). This is because such developments bring many and varied economic opportunities that are likely to steer growth and development of host countries in the right direction. Transport corridor developments are also seen in other literatures as a way of improving efficiency in the transport and logistics processes along corridors, and as a way of generating economic development in the corridor region (Quium, 2019). By capitalizing on improved connectivity and transport networks positive economic development impacts are realized along the corridors (Quium, 2019). This essay defines a development corridor as a region designated as a high-priority area for investment aimed at promoting economic expansion and advancement. Usually, this is accomplished by building infrastructure like pipelines and railroads. They can be made to entice fresh capital, increase agricultural output, provide access to natural resources, and make it easier for them to be exported to international markets (Djais, 2014).

The last ten years have seen a rise in interest in development corridors, despite the fact that they are nothing new. They are expanding over hundreds of kilometres and into increasingly remote places on almost every continent, crossing international borders. According to Djais (2024), the development corridor's possible evolution can be depicted in the diagram in Figure 1. Transportation corridors connect gateways (such as ports and airports) with economic "nodes" like cities. By putting in place technology and legal requirements like trade customs or international laws, a corridor becomes a "logistics corridor." "Economic corridors" draw investment and stimulate economic growth, but they are only possible when logistics and transportation are established.



**Figure 1: The evolution of a development corridor. Source: Hope & Cox, 2024**

Most developments along transportation corridors however go ahead of planning and have a tendency of spiralling out of control in the absence of any meaningful mitigatory measures. This has not only compromised the integrity of developments in corridors but has severely dented any meaningful efforts towards achieving several Sustainable Development goals – including SDG 7 (affordable and clean energy); SDG 11 (sustainable cities and communities); SDG 12 (Responsible consumption and production) and SDG 13 (Climate action) among others. This essay is divided into 3 sections. Section 1 presents the introduction and the objectives of the essay. Section 2 discusses common negative externalities associated with transport corridor developments in developing countries. The 3<sup>rd</sup> and final section, proposes sustainable planning interventions that can solve the identified challenges.

## 1.2 Objectives of the Essay

The sole objective of this essay is to identify and discuss sustainable planning approaches to dealing with negative externalities of transport corridor developments.

## **2. NEGATIVE EXTERNALITIES TO TRANSPORT CORRIDOR DEVELOPMENT**

### 2.1 The Problem of Urban Heat

Corridor developments along transportation corridors threaten the achievement of SDG 12 and 13 as they are known to be the major cause of urban heat islands. Urban heat island is a problem that occurs when urban areas suffer greater temperatures than surrounding rural areas due to human activity and the built environment is also referred to as the urban heat island (UHI) effect. Corridor developments are seen in most developing countries as catalyst for development of paved urban surfaces including buildings, pavements, and other sheltered surfaces that often trap heat, resulting in regions with noticeably higher temperatures than those around them (Parra, 2019). The thermal characteristics of building materials and the energy used for heating make these higher temperatures worse, especially at night (Parra, 2019). Urban heat islands have a

substantial negative influence on both human health and the environment. They may also raise building energy demands and cooling expenses as observed by Afrin (2020).

## 2.2 The Problem of Greenhouse Gas Emissions

The other problem that is associated with massive developments along transportation corridors has been identified in literature as greenhouse gas emissions (Sowgat, 2016). Increased traffic activities along corridor developments have meant rapid growth in greenhouse gas emissions. Because vehicles emit CO<sub>2</sub>, NO<sub>x</sub>, and particulate matter, among other pollutants, into transportation corridors (Marshall, 2022). They contribute immensely to the pollution of the air that human being and other animals breathe. Residents of the neighborhood in the corridor regions of developing countries characteristically suffer from respiratory illnesses, cardiovascular illnesses, and other disorders because of such emissions. This coupled with poor healthcare infrastructure and facilities has often undermined the achievement of SDG 3 which strives to ensure health and wellbeing for all. In extreme cases the consequences have been to alter the climate with dire consequences on the achievement of such as SDG 12 (Responsible consumption and production) and SDG 13 (Climate action).

## 2.3 The Problem With Traffic Congestion and Deterioration of Pavement Quality

The other challenge is that of increased traffic congestion that is often seen along major transportation corridors of developing countries as a result of increased economic activities that promotes high levels of vehicle ownership. This in turn results in increased wear and tear of the road pavement surface. According to (Parra, 2019), the abrasion of road surfaces is impacted by both increased traffic and environmental factors including CO<sub>2</sub> emissions and climate change.

Traffic congestion is a widespread and expensive issue that has a big influence on the social, environmental, and economic spheres. Numerous variables contribute to its causation, such as the erratic and unpredictable nature of traffic circumstances. A comprehensive strategy is required to handle this problem, one that involves building new high-capacity urban arterial road links, promoting public transit, and developing traffic management and local area programmes. Additionally, it emphasises the necessity of a system for controlling demand and enhancing road infrastructure (Stepanchuk, 2016). Technological advancements combined with traffic management strategies are seen as options available to policy makers in developing countries that can help lessen the negative effects of congestion.

## 2.4 Environmental Degradation in Corridor Regions

Transportation corridor regions of most developing countries are characteristically associated with increased human activities that often result in environmental degradation. New developments often threaten the environmental integrity of ecologically sensitive areas such as wetlands, rivers and streams, slopes, and urban forest among others. Achieving environmental justice is not a priority of economic agents who are primarily concerned about maximizing developments and economic returns at the expense of the integrity of the environment. As a result, both life on land and below water is threatened through such human induced practices as pollution, illegal waste disposal and illegal extraction of resources such as sand in ecologically fragile rivers and streams such as what is happening in South Africa. Environmental degradation in corridor regions is not only compromising the achievement of SDG 14 (life below water) and (SDG 15 life on

land) but also has far reaching consequences on resulting inequalities in terms of accessing resources on land and below water, food security and poverty. If SDG 1 and 2 (of ending poverty and hunger) is to be achieved along corridor regions, it is imperative that environmental degradation and its long-term consequences on poverty, income inequalities and food security be addressed.

### **3. SUSTAINABLE PLANNING INTERVENTIONS TO PROBLEMS ASSOCIATED WITH TRANSPORT CORRIDOR DEVELOPMENTS**

#### 3.1 Sustainable Planning Interventions to Dealing With the Urban Heat Problem

The sustainable planning interventions that can be applied to alleviate the problem of urban heat in corridor regions are diverse as reiterated by Wollschäglér and MacLachlan (2022). One solution is to promote the use of blue-green infrastructure to level the effect by introducing a cooling effect to offset rising temperatures. Afforestation programmes aided by data-driven approaches that integrate earth observation and climate data into the urban models may also help to optimize tree placement – a development that is known to maximize the cooling effect of the surrounding environs. Another intervention measure dubbed the MOVE (2023) put emphasis on the important role that green infrastructure and upcycling materials like reflective street pavements and skirted fascia's can play in overcoming the problem of increased urban heat along corridors. Sowgat (2016) points out to the cruciality of urban design interventions not confined to pedestrian facilities, street trees, and green spaces among other things, in new planned residential precincts. These measures, if implemented in synergy, can mitigate the city thermal island phenomenon, and promote sustainability of urban environment.

#### 3.2 Sustainable Planning Interventions to Dealing With Greenhouse Gas Emissions

Many planned interventions which aim at decreasing greenhouse gas emissions in developing countries, including South Africa's Road transportation sector are available. Kaya (2024) believes that this can be done by decreasing the number of motor vehicle travel in the day-to-day life and by optimizing the performance of road freight transport. Fransen (2024) stresses that the shift of freight from road to rail could be another viable option. Parra (2019) sees the utilization of improved efficiency petrol and diesel internal combustion engines, and biofuels that are currently tapped in various countries as key to reducing the emission of hazardous gases by vehicles. Fransen (2024) has also suggested the positive role that the Clean Development Mechanism (CDM) approach play as an innovative intervention in which industrialized countries are encouraged under the Kyoto protocol to invest projects that reduce carbon emissions in developing countries such as South Africa by way of compensating for excess carbon emissions. Such and other interventions, if put in place, can, to a large degree, contribute to the lowering of emission of greenhouse gases in corridor regions of developing countries such as South Africa.

#### 3.3 Sustainable Planning Interventions to Dealing With Increased Energy Consumption.

Promoting compact developments around corridor regions may limit travel time and the consumption of energy. The development of self contained clusters of developments in corridor regions may limit the need to travel long distances to access facilities and services not available in developments along transportation corridors. Urban sprawl that often results in new developments leapfrogging beyond the urban edge and along transportation corridors often results in increased energy costs and must be discouraged. Ribbon

development strategies that may limit the extent of developments along corridors often limit fuel consumption. Implementation of densification strategies such strategies including infilling strategies along corridor regions will promote compact developments that are energy efficient. Other policy interventions may include a conscious effort to include energy costs in the planning of transport projects and programmes of local and metropolitan authorities responsible for corridor regions (Jaramillo, 2024). This approach as observed by Carol (2022) will permit an assessment of the relationship between, passenger travel dynamics new developments and energy costs. Such a nexus will allow modeling the intricate relationships with a view of simulating future ideal scenarios that may limit energy consumption along corridors. The option of an ultra-light rail line to cut down on dependence on imported oil, may not only limit energy consumption but may also help relieve the problem of traffic congestion in corridor regions (Jaramillo, 2024).

### 3.4 Sustainable Planning Interventions to Combating Increased Traffic Congestion

One option to address the problem of traffic congestion is to introduce a wide variety of traffic calming measures ranging from speed humps, intelligent traffic signaling, through to the introduction of localized one-way streets, Afrin and Yodo (2020). The other alternative is to deploy satellite navigation and remote sensing technologies that may help monitor traffic flow and timeously detect areas of traffic flow conflict. Targeted interventions to resolve such traffic flow areas of conflict may then me guided by the generated data. The same technologies can be used to detect oil spills on road pavements and other physical defect that may develop on road surfaces. Smart pavement, that have become a recent intervention in some parts of South Africa are another innovative way that can be used to communicate any real time challenges ahead to vehicle drivers (Afrin & Yodo, 2020).

### 3.5 Sustainable Responses to Environmental Degradation

The National Transport Master Plan (2050) of South Africa recognizes the importance of creating a useful checklist to assess the sustainability and environmental impact of transportation policies, initiatives, and programmes as a way of addressing negative environmental consequences (Schoeman, 2013). Furthermore, coordinated land use and transport policy was acknowledged as one of the strategic methods that promote sustainable development, with a focus on the creation of activity corridors that are sensitive to the integrity of the environment (Ahmad, 2024). Such interventions are a useful first step in addressing the environmental degradation linked with transport corridor developments in South Africa.

## **4. CONCLUSION**

To effectively harness the positives associated with corridor developments along major transportation routes it is imperative that concerned planning authorities are educated on the negative effects that poor implementation of associated initiatives may have in terms of climate change related problems, increased traffic congestion, increased emission of greenhouse gasses, environmental degradation, and unattractive pavement distress conditions. Sustainable planning interventions are therefore required to be put in place where such negative externalities are detected. Some intelligent planning options such as the deployment of satellite and remote sensing technologies may require heavy investments from concerned planning authorities. Leveraging private finance through public-private partnership may be a realistic solution to this challenge in addition to forging appropriate partnerships with developed countries that are able to supply such technologies. The proposed interventions may not only ensure sustained gains the

economic development of transportation corridors, transportation efficiency and associated logistics processes, but will also result in the achievements of important Sustainable Development Goals such as SDG 3 (good health and wellbeing); SDG 7 (affordable and clean energy); SDG 11 (sustainable cities and communities); SDG 12 (Responsible consumption and production) and SDG 13 (Climate action) among others.

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