

# SUSTAINABLE TRANSPORTATION THROUGH ENABLING PARTNERSHIPS

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## ABSTRACT

Transport is one of the biggest opportunities for economic development, whilst simultaneously being a large contributor to climate change. Urbanisation and auto-based urban sprawl create environmental and economic challenges, including traffic congestion, Greenhouse gas emissions and local air pollution. The public sector is often hindered by numerous bottlenecks to achieve sustainability, leading to the formation of partnerships to achieve complementary investments for improved sustainability. The objective of the paper is to assess barriers for sustainability in South Africa and provide innovative ideas for improving sustainability through partnerships. Through desktop analysis, several issues hindering sustainability were highlighted, and innovative ideas were then selected to encourage partnership formation. For sustainability to be met, an entity should be established to facilitate partnerships, embrace innovations, provide incentives to attract private capital and ensure effective infrastructure is in place.

## 1. INTRODUCTION

Transport enables connectivity throughout the social system, facilitating trade, improving social equity, enhancing rural-urban linkages and market access. A reliable and efficient transport system forms the pillar for the development of any national or regional economy (Li et al., 2016). However, transport also brings negative environmental, social and health impacts. Sustainable development is one of the most cited global challenges of our time. Essentially, sustainable transport can be defined as the capacity to support the mobility needs of people, goods and information in a manner that is resource efficient. Sustainable development has also been referred to as meeting the needs of the present generations without compromising the needs of future generations (WCED, 1987). Sustainability has been specified as having three dimensions: 1) Economic sustainability, 2) Environmental sustainability and 3) Social sustainability (Carter, 2007). Firstly, economic sustainability refers to the provision of goods, employment, and effects on the economy. Secondly, environmental sustainability refers to the environmental balance between human emissions and resource use. Thirdly, social sustainability refers to needs for social equity and inclusive accessibility.

The global population has seen substantial growth, by an estimated 81 million people per year, affecting the consumption of goods, services and mobility needs of commuters (WPP, 2012). Road transport is the most essential form of mobility, enabling the first and last kilometre of movement between a variety of modes. The International Transport Forum (2017) states that road freight volumes are forecasted to grow by 300% in the next 30 years. Additionally, global transport related greenhouse gas emissions (GHG) are forecasted to double by 2050 in the absence of effective policies (Ang & Marchal, 2013). Social pressure is therefore placed on governments, businesses and individuals to make

themselves more sustainable. Organisations often lack specific knowledge or resources to improve their sustainability, leading to the formation of sustainability partnerships to fill the resource gap. Partnerships for sustainability involve two or more organisations collaborating for mutual benefits or goals. These partnerships often include a collaboration between private corporations, non-profits within the industry and government institutions. However, multiple sectors have also proven to pair for cross-sector partnerships. Companies, both public and private, are progressively expected to collaborate with each other to address social and environmental problems.

Transport accounts for an estimated 23% of global carbon emissions, of which road and aviation are the largest contributors, totalling 72% and 11% respectively. For example, amongst the COVID-19 pandemic which advised social distancing and movement restrictions, China's emissions fell by an estimated 25% at the start of this year (Myllyvirta, 2020). Furthermore, passenger vehicle traffic in the United States was reduced by 38%, indicating a further reduction in traffic related emissions. The transport sector in South Africa accounts for 10.8% of the country's total GHG emissions, with road transport being the dominant share of these emissions at 91.2% (DEA, 2010). The South African Department of Transport has therefore aimed to reduce the total GHG emissions in the transport sector by 5% by 2050 (DOT, 2018). These statistics indicate that the road sector offers the greatest opportunity for improved sustainability.

This paper is structured in to four sections. Following the introduction, section 2 provides a brief review of existing challenges which constrain sustainable transport. Section 3 provides innovative solutions to enable partnerships within and beyond the transport sector. This paper concludes by recommending the potential that partnerships possess to enhance transport sustainability.

## **2. CHALLENGES FOR SUSTAINABLE TRANSPORT**

### 2.1 Spatially Challenged Economy

South Africa has been described as a 'spatially challenged' economy (CSIR, 2013). Former apartheid policies left behind a structure of poorly integrated transport networks, resulting in large spatial disparities for majority of commuters which experience significant daily travel from home to work. The legacy of these policies placed the low-income population on the urban periphery, resulting in poorer communities spending proportionately more on transport. For example, public transport in the City of Cape Town (COCT) has been cited by Hitge and Vandershuren (2015) to require three times the amount of travel time as private transport. Average travel distances for Cape Town commuters' records between 9 to 23km, however low-income commuters are located on average between 45-70 km from their place of work. Findings from the NTHS (2013) indicate that more than two-thirds of households from the lowest income quintile spend more than 20% of their monthly household income per capita on transport costs. On the other end of the spectrum, approximately 6% of commuters in households from the highest income quintile were likely to spend more than 20% on their monthly household income per capita on transport. The integration of urban transport planning and land-use strategies is a key factor in managing growth in transport demand and emissions (IPCC, 2014).

### 2.2 Market Externalities

One commonly noted problem of road users is the lack of account for external costs incurred by the user. These external costs are not part of supply or demand decisions

within the transport market and include congestion, accidents, emissions, noise and aesthetic factors which negatively affect present and future generations. Difficulty lies in the determination of external costs as they are difficult to measure, and therefore road users often do not pay the full costs for which they incur.

Research indicates that vehicle ownership and the demand for transport is increasing regularly in South Africa (GIZ, 2015). The most used transport mode for work was a private car (33.7%), followed by taxis (24%) and walking (20.4%). Approximately 67% of public transport commuters rely on minibus taxis as their primary mode of transport, indicating a large demand for road-intensive transport in the country (DOT, 2016). The disproportionate modal share of South African commuters' places strain on road infrastructure. The rapid growth of urbanisation in developing countries has also placed additional strain on existing transport infrastructure, leading to traffic congestion. Large spatial disparities require significant daily travel, contributing to heavily congested roads. For example, congestion in Cape Town is the highest in South Africa at a level of 35%, a 5% increase compared to the 2017 Traffic Index (TomTom, 2020). A 35% rate of congestion corresponds to 35% extra travel time for a trip, when compared to a situation of free traffic flow.

### 2.3 Market and Institutional Barriers

Market and institutional barriers pose investment risks that limits the role of the private sector in urban public transport. Transport projects have various risk factors that can correlate with changing economic, social and political conditions. Commonly cited risks include long periods between initial investment and financial return, long amortisation periods, irreversibility of investment due to high sunk costs, uncertainty impacts of concurrent investment on demand and the returns only flow after the completion of infrastructure. Other notable factors that repel private investment is the uncertainty of demand levels, substantial cost overruns and the threshold of returns. The returns from the investment are subject to the law of diminishing returns (LODR) and therefore, a point will arise where the level of benefits gained is less than the amount of money or energy invested. This is especially true in developing countries with a high population and low capital (machinery, infrastructure), whereby low growth occurs from an excess of workers and a shortage of factories. LODR is used to explain the stagnating economic growth in countries.

## **3. STRATEGIES FOR SUSTAINABLE TRANSPORT THROUGH PARTNERSHIPS**

Mission-driven initiatives and partnerships have the potential to collaborate and mitigate major environmental and social issues. However, their development is often hindered by financial constraints, lack of certain skills and privacy concerns. For example, The United Nations, in collaboration with IRU, The World Road Transport Organisation, co-created the Global Partnership for Sustainable Transport – an effort dedicated to highlight environmental issues. The 3i strategy was cited by IRU Secretary General Umberto de Pretto, with emphasis on incentives, innovation and infrastructure to achieve their Sustainable Development Goals (IRU, 2016). The 3i strategy highlights the importance of governments to provide business incentives to accelerate the entrance of innovative technologies, as well as sufficient infrastructure to reduce bottlenecks, inefficiencies, and its resulting congestion.

### 3.1 Promote Technology Use and Data Collection

The use of technology will form the backbone for current and projected mobility. In the age of digitisation, data has become more valuable than ever – forming a baseline for projected market trends. By capturing transport data, entities can build a better understanding of mobility patterns, which can identify gaps in current infrastructure. The use of mobile devices is at an all-time peak and this number is expected to increase substantially. Mobile devices offer huge opportunities for mobility information on a large scale. The government should invest in research and sustainable development, by partnering with academia and data providers to conduct more frequent data collection. By having access to real time data, economists and transport planners are more equipped to make informed forecasts and implement reactive solutions to aid long term sustainability goals. Furthermore, with the use of theoretical models, transport planners can assess the subsequent impact of transport on other sectors of the economy. For example, Agenor and Neanidis (2011) created an endogenous growth framework to assess the optimal allocation of government expenditure between education, health and physical infrastructure.

### 3.2 Establish a Government Entity to Facilitate Partnerships

Currently, the formation of partnerships is in the hands of private companies and local governments. A third-party entity can identify gaps in transport sustainability, calculate the economic costs and benefits of the needed improvement and act as the critical link between partners. By establishing a third party to facilitate the collaboration of multiple stakeholders, a clear partnership framework can be created, identifying the expectations of each party and holding them accountable. A government entity, which specialises in collaboration, can integrate both horizontally amongst sectors and vertically amongst different levels of government. A commonly cited term 'A-S-I', was embraced by German parliament in 1994 and used to structure policy measures to reduce the externalities caused by transport. The A-S-I approach consists of three categories, namely, Avoid/Reduce, Shift/Maintain and Improve. Firstly, 'the avoid/reduce' refers to the improvement of the transport system in terms of efficiency. Through effective urban planning and transport-orientated development, trip length and motorized travel can be reduced. Through compact development of cities, districts must become better connected. Secondly, the 'shift/maintain' refers to the need to improve individual trip efficiency, particularly shifting to more energy efficient modes of transport. Buses, rail and other public transport modes generate lower emissions per passenger kilometre when compared to private low occupancy vehicles. Maintaining active or non-motorised transport (NMT) has huge potential for mitigating the effects of the congestion, pollution and the ever-increasing need for transport infrastructure. Thirdly, to 'improve' fuel efficiency and vehicle technologies. Strong public transport systems reduce traffic intensity, which is correlated with road traffic fatalities and noise related health impacts.

### 3.3 Incentives for Private-Public Partnerships

One of the biggest barriers for private investment in sustainable public transport is the less attractive risk to return ratio associated with financing transport projects. Particularly speaking, transport infrastructure requires significant capital investment, lengthy development timelines and long payback periods. Additionally, a low-cost system to collect revenue from road users is not readily available to investors. Road infrastructure often cannot be supplied at an acceptable profit. Private and public partnerships (PPP) have the potential for large capital and skill accumulation. The public sector may seek private

investment in public transport for several reasons: mainly operational expertise, financial capacity and efficiency. The cost of capital for the public sector is typically lower than the private sector, but the private sector often has greater experience and the capability to deliver suitable financing with high value for money (Bouef, 2003). Infrastructure is seen as a public good and often overlooked by the private sector, however it enhances the productivity of private factors of production which can benefit long run efficiency. In order to attract private capital, public entities should reduce risk for investors. To mitigate the risks for investors, public entities can utilize numerous instruments to minimize risk. These instruments often include financial and non-financial guarantees, local currency loans, lines of credit, concessional finance and derivative products (Venugopal & Srivastava, 2012).

Partnerships have the potential to reduce externalities, create benefits and reduce risks by collaborating for a common goal. Partnerships are common practice for parties aiming to strengthen their corporate social responsibility, improve their effectiveness and efficiency. Partnerships between infrastructure suppliers and the transport sector can increase the efficiency of the transport network and reduce the prices of production inputs. By collaborating, skilled labour and material costs become lower and increasing the capacity for transport infrastructure can improve the level of service experienced by commuters. By building cross-sector partnerships, parties can consolidate for combined value, by establishing complementary investments. Collectively, partnerships have the potential to create a network of solutions to improve transport sustainability.

### 3.4 Refine Existing Cost Recovery Methods

It is a widely accepted economic principle that, to ensure the efficient allocation of scarce resources, the consumers of these resources should bear the actual costs for which they incur or consume. Therefore, to be truly sustainable, accurate accounting of user costs is essential. When it comes to sustainability there is a necessity to account for the externalities caused via the movement of goods, people and information. Sound accounting is of great importance when it comes to the measurement of these externalities. Ensuring that the correct cost recovery methods are in place is necessary for the maintenance and upkeep of existing infrastructure. With the foreseeable uptake of electric vehicles, road cost recovery methods will need to be refined to cater for these vehicles as they are technically exempt from a fuel tax. In the case of externalities, social costs can be avoided by appropriate pricing policies that ensures that the users pay for the environmental costs for which they incur. Another important cost collection tool would be the employment of a standardised platform for collecting road user charges, as it ensures an efficient fee collection for effective public investment in infrastructures and systems.

## **4. CONCLUSION**

There is no singular solution for transport sustainability, but rather a tailored strategy for a specific country's characteristics. A mix of instruments and specific policy design will need to be created to ensure the sustainable development of transport investments. Transport stakeholders should focus on innovation to improve system efficiency through technology, incentives to attract capital and infrastructure to facilitate the movement of passengers and freight. There is a clear need for continued investment in large scale infrastructure to improve the operations of the formal public transport system, as well as investment in improved operational systems in terms of fare payments, security and other quality factors that would attract commuters to modes of public transport. The investment in transport infrastructure will provide direct benefits to the sector, as well as broad economic benefits

that extend beyond the sector. Whilst partnerships are an effective way to improve transport sustainability on an organisational level, importance lies in the monitoring and evaluating the progress. Therefore, an entity should be employed to identify current gaps in sustainability and act as the mediator between potential partnerships. Individuals are encouraged to avoid, shift, or improve their travel habits to mitigate the externalities for which they incur. Transport policies should pursue an integrated approach, by balancing economic, social and environmental needs with transport investment to encourage users to make use of non-motorised transport in combination with mass transit modes, to reduce congestion, recoup returns on infrastructure investment, promote intermodal transport and reduced vehicle fatalities.

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