

Editorial

Advancing Applied Research in High Volume Transport in Low-Income Countries in Africa and South Asia

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Abstract: The Department for International Development (DFID) is funding the High Volume Transport (HVT) Applied Research Programme. This programme is an integral component of the UK response to delivering transport and mobility that is accessible, efficient, safe, and green in the low-income countries (LICs) in Africa and South Asia. The first part of the HVT programme produced an up-to-date and comprehensive state of knowledge on high volume transport in these countries. This Special Issue presents a selection of papers to cover key research priorities identified in road and rail transport, low carbon transport, and gender and inclusive transport. The state of knowledge has produced a sound basis for setting priorities for applied research in the second part of the programme. Applied research is directed to delivering high volume transport that contributes to economic growth and social development, and that is more resilient to the impact of climate change in LICs in Africa and South Asia.

Keywords: accessible road and rail infrastructure; efficient transport services; transport corridors; green transport; low carbon transport; road safety; disability and mobility; gender disparity; vulnerable groups

1. Background

Research on transport in low-income countries (LICs) is a strategic priority for the UK Department for International Development (DFID) because accessible, efficient, safe, and green transport is imperative to economic growth, social development, and the environment. Since the transport sector is one of the largest recipients of aid in almost every LIC and DFID focus countries, DFID is committed to ensuring that spending on transport is effective. Every one percent gain on the cost effectiveness of transport infrastructure is worth potentially US \$1 billion each year in Africa. Thus, there is an ongoing and urgent need for research that will contribute to meeting the emerging and changing conditions in many LICs, and to ensuring the transport sector works better in these countries to achieve the UN Sustainable Development Goals (SDGs).

2. Research Objectives

DFID development priorities are aligned with the UN SDGs and to this end, DFID is a leading partner in the Sustainable Mobility for All (Sum4All) Consortium. Sum4All partners are committed to ensuring transport plays its critical role in supporting LICs to reach their SDGs by seeking innovative ways to make transport accessible, efficient, safe, and green.

2.1. Universal Access

One billion people in LICs have no access to an all-weather road [1]. This means about 70% of Africa's rural population—some 450 million people—are isolated from economic activity, employment, and basic provisions of health and education [2]. Meanwhile, the urban population in developing countries, which is expected to rise by two billion people by 2045, has rapidly outstripped the capacity growth of public transport [2]. Thus, transport infrastructure and services urgently need adapting and extending to meet these pressing mobility and access needs of people in LICs in Africa and South Asia. Adequate access includes safe mobility for women, people with disabilities, and other vulnerable groups.

2.2. Efficiency

Missing links in strategic transport networks connecting LICs in Africa and South Asia make transport more costly, render trade uncompetitive, and stifle economic growth. LICs in Africa, particularly the landlocked countries, are the hardest hit, with intra-African trade only 15% compared to 61% in South Asia [3]. This means African consumers pay more for goods because 40% of the price of goods is transport costs. Although vehicle and mainly fuel efficiency improved in the period between 2005 and 2015, progress has stalled recently, reducing the potential benefits to goods and passenger transport particularly in urban areas. Thus, better transport connectivity and lower transport prices will benefit manufacturers, commerce, farmers, consumers, and passengers alike.

2.3. Road Safety

Low and middle-income countries account for 90% of global road fatalities, yet own only 50% of the world's road vehicles [1]. The fatality risk is 20 times higher for motorcyclists than for car occupants, and 7 and 9 times higher for cyclists and pedestrians, respectively. By far the highest number of global traffic fatalities (40% to 50%) occur in urban areas, and is rising faster in LICs [2]. These high fatality and injury rates cost 3% of GDP in most LICs and place a heavy demand on hospital and health budgets. They also damage the livelihoods of countless families in LICs in Africa and South Asia.

2.4. Green Transport

Between 2000 and 2016, greenhouse gas (GHG) emissions from all transport modes increased by 86% in Africa and 92% in Asia, primarily driven by increases in motorised passenger and freight transport; whereas transport emissions decreased by 2% in OECD countries [4]. Consequently, air and noise pollution is a health hazard in many LIC cities. Traffic congestion, low quality fuel, and poorly maintained trucks and motorcycles contribute to pollutant levels in excess of levels set by the World Health Organisation. Thus, LICs need to adapt transport policies, to adopt new technologies, and to boost urban transport efficiency in ways that will reduce GHG emissions and improve health in urban cities and urban areas.

3. Methodology

In November 2017, DFID launched the High Volume Transport (HVT) Applied Research Programme as part of the UK response to deliver transport and mobility that is accessible, efficient, safe, and green. HVT is a five-year research programme backed by UK Aid funding of £14 million. The first part of the programme assessed the State of Knowledge in four thematic areas: (1) long distance strategic road and rail transport; (2) urban transport; (3) low carbon transport; and (4) gender, inclusion, vulnerable groups, and road safety.

Following a competitive call, HVT commissioned research suppliers to review current research in order to establish future directions for research that will contribute to meeting the development goals for transport in LICs. The findings of the literature reviews were examined and tested with LIC stakeholders in Africa and South Asia using qualitative and quantitative questionnaires, as well as

physical and virtual interviews. Participatory workshops were held in Bangladesh, Kenya, Tanzania, and Malaysia. This comprehensive testing and analysis resulted in the identification of priority research areas and key topics for applied research to be carried out in the second part of the HVT programme that started in January 2020.

4. Future Research Directions

The first part of the HVT programme revealed a wide range of research topics, as shown in the representative papers presented in this Special Issue. The selected papers cover key research priorities in road and rail transport, low carbon transport, and gender and inclusive transport with regard to universal access, efficiency, safe, and green transport in LICs in Africa and South Asia.

4.1. Road Infrastructure

A technical and contractual review of the use of recycled road pavement materials and inexpensive, non-conventional materials identified a range of road designs based on these materials in temperate and tropical climates [5]. However, little agreement was found on the use of non-conventional materials and on appropriate contractual arrangements to mainstream their use in road pavement construction. The contractual methods assessed were mainly public-private partnerships (PPPs) and “alliancing”, a new form of PPP. However, to gain cost and environmental benefits of using recycling road pavement and non-conventional materials, two research areas were identified that would contribute to green transport. One is to gain more insight into the design and specifications of these materials for water-resilient roads, and the other is to establish guidelines for financial, institutional, and contractual arrangements for sustainable PPPs.

4.2. Railway Infrastructure

LICs in Africa and South Asia are investing, mainly with Chinese funding, in new railway lines to replace deteriorating infrastructure built in the 19th and 20th centuries [6]. However, many rail infrastructure projects are driven by international supplier preference to create continent-wide networks, rather than effective interoperable regional networks. A new technical strategy that focuses on national and regional networks would contribute to more efficient and greener alternatives to road transport. To this end, technology and standards need to be adapted to increase railway interoperability and thus to improve access to more competitive railway services. To support this strategy, the research priorities have been identified as comprehensive data collection on rail network conditions and performance; development of affordable technologies for LICs; and harmonisation of technical standards to facilitate cross-border operations.

4.3. Road and Rail Transport Services

A comprehensive review identified multiple barriers to the efficiency and safety of road and rail services in LICs in Africa and South Asia. These barriers range from unregulated driver hours, inadequate road safety standards, vehicle overloading, inappropriate railway concessioning; they also include low skills and capacity in the public sector, and poor cross-border road and rail services. Overcoming these barriers will improve efficiency, widen public access to road and rail services, and contribute to better road safety. Based on best practice worldwide, research priorities have been identified as systematic study in LIC transport services, development of new technology and e-border systems at border crossings, improvement of management of rail infrastructure and services in concessions, and assessment of railway regulatory frameworks and railway authorities [7].

4.4. Transport Corridors

The review of transport corridors in LICs in Africa and South Asia focused on corridor development in the light of trade investment, governance, and management of cross border and corridor operations [8].

The review also covered the impact of transport corridor development on the rural economy and inclusive employment, trafficking of women, and the spread of HIV/AIDS and other sexually transmitted diseases. Research in these priority areas would contribute to improving efficiency, increasing access, and providing safer mobility for women and vulnerable groups. As few studies have been conducted on the socio-economic impacts of transport corridors, the research priorities identified focus on the uneven corridor investment outcomes across geographical locations and population groups. The research priorities include modelling distributional impacts of regional transport investment, regulatory corridor governance and management, and gaining better insight into the negative social externalities of transport corridors.

4.5. Low Carbon Transport

In an assessment of the current status, feasibility, and potential of low-carbon transport measures, ten “quick-wins” for sustainable development and green transport were identified [9]. These quick wins range from better fuel economy and pricing incentives as well as the introduction of electric two- and three-wheelers to making urban mobility more sustainable and the promotion of non-motorised transport. Directed to integrating national transport and climate change policies, the applied research priorities identified are to assess the design and implementation of cost effective quick wins. In addition, greater coordination between transport agencies, vehicle manufacturers, and energy suppliers would build a cohesive low carbon strategy in LICs.

4.6. Mobility of Vulnerable Groups

4.6.1. Gender Disparity

The review of gender inequality in mobility and transport focused on spatial and transport planning, and mobility in newly emerging smart cities [10]. Gender disparities in transport were found to have impacts on young girls’ and women’s access to education, employment, health services, and well-being and consequently affect income levels and livelihood outcomes. Transport disparities were found to be higher in cities where more women pedestrians were involved in road traffic accidents, and innovations in smart mobility tended to benefit men more than women. Furthermore, women were found to be under-represented in transport and urban planning, thus further compounding transport gender disparities. Thus, delivering accessible transport and safe mobility that would ensure better access to health and education services and jobs, creating better livelihoods for women, is important. The review identified 11 priority research areas to tackle this gender disparity in transport, highlighting the need to integrate quantitative and qualitative data in knowledge generation and decision making.

4.6.2. Disability and Mobility

Equitable and inclusive transport for people with disabilities were identified as key issues in urban, rural, and long distance journeys, as well as affordability of transport services and availability of special transport services for people with mobility difficulties. The findings of the literature review showed knowledge gaps on the barriers to accessible and inclusive transport and an urgent need for extensive research on inclusive transport in LICs and on effective ways to monitor it [11]. The research priorities include ensuring the needs of adults and children with disabilities are better understood, as well as how to involve them in planning and setting standards for transport services. In addition, training in disability awareness needs to be developed for public and private sector transport providers, as well as adapting technology to better facilitate access and safe mobility for all people with disabilities.

4.6.3. Older People

Little is known about the mobility needs of older people in LICs [12]. The literature review has shown how health, gender, and social well-being are influenced by their mobility and transport. Transport can be a barrier to access to health services and may involve multiple journeys to different

health centres. Furthermore, socially isolated old people without inadequate support in urban and rural areas call for innovative transport services. Consequently, research priorities that would benefit the access and mobility of older people include collection of gender and age-disaggregated data, gaining insight into transport's role in affordable access to health services and job opportunities, new approaches to involve older people actively in research, and the use of new technology to explore spatial barriers to urban services.

4.6.4. Children and Youth

Limited access to transport was found to restrict the mobility of children and youth from poorer households in LICs and thus impact on their livelihood potential and life chances [13]. The literature review covered journey patterns of schoolchildren in rural and urban areas, transport access and affordability for young workers, and the safe mobility of vulnerable children, cyclists, and motorcyclists. Research priorities for better access to safe and affordable mobility include engaging the young in research and the outcomes, assessing transport infrastructure and services interventions; developing approaches to transport subsidies; assessing job opportunities for young people, particularly the poor and women; and the use of mobile technology to change travel patterns.

4.7. Road Safety

The review of road safety focused on data collection and management, traffic engineering, and safety policy aspects in 10 key areas of safety, thus providing a holistic approach to road safety [14]. Key research focuses identified are to gain more insight into underreported road crashes; traffic injuries and resulting disabilities; the cost of road crashes; vehicle safety and risks in the different composition of vehicle fleets; social and behavioural approaches to road safety in LICs; and capacity building in all aspects of safety. Four initial steps for better road safety were identified: improving the quality of data collection and analysis; raising public awareness of road crash reporting, as well as examining data analysis techniques; and using proactive measures to prioritise investments.

5. Conclusions

The literature reviews have produced up-to-date and comprehensive state of knowledge on high volume transport in LICs in Africa and South Asia. The review findings focus on the DFID priorities of universal access to transport, efficient transport networks and services, and safe and green transport for all. Thus, the first part of the programme provides a sound basis for setting applied research priorities. These priorities are directed to delivering high volume transport that is more accessible, more efficient, more inclusive, and more resilient to the impact of climate change in LICs across Africa and South Asia.

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References

1. World Bank. Available online: <https://www.worldbank.org/en/topic/transport/overview> (accessed on 28 March 2020).
2. Sustainability Mobility for All (Sum4All). Available online: <https://sum4all.org/priorities/universal-access> (accessed on 28 March 2020).
3. Africa Transport Policy Program (SSATP). Available online: <https://www.ssatp.org/topics/regional-integration> (accessed on 28 March 2020).
4. SLoCaT (2018). Transport and Climate Change Global Status Report 2018. Available online: <http://slocat.net/tcc-gsr> (accessed on 11 May 2020).

5. Thom, N.; Dawson, A. Sustainable Road Design: Promoting Recycling and Non-Conventional Materials. *Sustainability* **2019**, *11*, 6106. [[CrossRef](#)]
6. Blumenfeld, M.; Wemakor, W.; Azzouz, L.; Roberts, C. Developing a New Technical Strategy for Rail Infrastructure in Low-Income Countries in Sub-Saharan Africa and South Asia. *Sustainability* **2019**, *11*, 4319. [[CrossRef](#)]
7. Wheat, P.; Stead, A.; Huang, Y.; Smith, A. Lowering Transport Costs and Prices by Competition: Regulatory and Institutional Reforms in Low-Income Countries. *Sustainability* **2019**, *11*, 5940. [[CrossRef](#)]
8. Quium, A. Transport Corridors for Wider Socio-Economic Development. *Sustainability* **2019**, *11*, 5248. [[CrossRef](#)]
9. Bakker, S.; Haq, G.; Peet, K.; Gota, S.; Medimorec, N.; Yiu, A.; Jennings, G.; Rogers, J. Low-Carbon Quick Wins: Integrating Short-Term Sustainable Transport Options in Climate Policy in Low-Income Countries. *Sustainability* **2019**, *11*, 4369. [[CrossRef](#)]
10. Uteng, T.; Turner, J. Addressing the Linkages between Gender and Transport in Low- and Middle-Income Countries. *Sustainability* **2019**, *11*, 4555. [[CrossRef](#)]
11. Kett, M.; Cole, E.; Turner, J. Disability, Mobility and Transport in Low- and Middle-Income Countries: A Thematic Review. *Sustainability* **2020**, *12*, 589. [[CrossRef](#)]
12. Gorman, N.; Jones, S.; Turner, J. Older People, Mobility and Transport in Low- and Middle-Income Countries: A Review of the Research. *Sustainability* **2019**, *11*, 6157. [[CrossRef](#)]
13. Porter, G.; Turner, J. Meeting Young People's Mobility and Transport Needs: Review and Prospect. *Sustainability* **2019**, *11*, 6193. [[CrossRef](#)]
14. Heydari, S.; Hickford, A.; McIlroy, R.; Turner, J.; Bachani, A. Road Safety in Low-Income Countries: State of Knowledge and Future Directions. *Sustainability* **2019**, *11*, 6249. [[CrossRef](#)]



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