HIGH VOLUME TRANSPORT
APPLIED RESEARCH

INDEPENDENT REVIEW

High Volume Transport Applied Research Programme

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INDEPENDENT REVIEW OF
HIGH VOLUME TRANSPORT APPLIED RESEARCH PROGRAMME

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TABLES

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ABBREVIATIONS

ADB	–	Asian Development Bank
AFCAP	–	African Community Access Partnership
AfDB	–	African Development Bank
AsCAP	–	Asia Community Access Partnership
BRT	–	bus rapid transport
CRISP	–	Climate Resilient Sustainable Road Pavement Surfacings
DAC	–	Development Assistance Committee (of OECD)
DFID	–	Department for International Development
DfT	–	UK Department of Transport
EEG	–	UK Energy and Economic Growth research programme
FCDO	–	Foreign, Commonwealth & Development Office
GHG	–	greenhouse gas
GIZ	–	Deutsche Gesellschaft für Internationale Zusammenarbeit
gTKP	–	Global Transport Knowledge Partnership
HDM	–	Highway Development and Management Model
HVT	–	High Volume Transport Applied Research Programme
IFI	–	international financial institution
ITDP	–	Institute for Transportation Policy and Development
ITF	–	International Transport Forum
km	–	kilometre
KTN	–	UK Knowledge Transfer Network
LAMATA	–	Lagos Metropolitan Area Transport Authority
LMICs	–	low- and middle -income countries
MDB	–	multilateral development bank
NIHR	–	UK National Institute of Health Research
NDC	–	nationally-determined contribution
NGO	–	nongovernment organisation
ODA	–	official development assistance
OECD	–	Organisation for Economic Cooperation and Development
ORN	–	Overseas Road Note
PRO	–	programme responsible owner
ReCAP	–	Rural Roads and Transport Services for Communities in Low-Income Countries Programme
RED	–	Research and Evidence Directorate
RIDE	–	Research on Infrastructure in Developing Economies
PMU	–	programme management unit
RQ	–	research question
RPC	–	research programme consortium
SDG	–	Sustainable Development Goal
SEACAP	–	Southeast Asia Community Access Programme
SLoCaT	–	Partnership on Sustainable Low Carbon Transport
SOK	–	state of knowledge
SuM4ALL	–	Sustainable Mobility for All
TDI	–	transport decarbonisation index
ToC	–	theory of change
TOD	–	transit-oriented development
TOR	–	terms of reference
T-TRIID	–	Transport-Technology Research and Innovation for International Development

T-TRIG – DfT Transport Technology Research and Innovation Grant
TRL – Transport Research Laboratory
UN – United Nations
UNEP – United Nations Environment Programme
VfM – value-for-money
WRI – World Resources Institute

EXECUTIVE SUMMARY

E1. The High Volume Transport Applied Research Programme (HVT) of the United Kingdom (UK) Foreign, Commonwealth & Development Office (FCDO) is scheduled for completion in January 2025. An external review of the programme was prepared between September and December 2024. The review examines programme performance and identifies lessons for formulation of future research on transport in low- and middle -income countries (LMICs).

E2. The Department for International Development (DFID) began preparing HVT in 2014.[1] It had previously financed several successful programmes of transport research on rural access in LMICs. A further rural access programme, the Rural Roads and Transport Services for Communities in Low-Income Countries Programme (ReCAP), was approved in 2014. These programmes established effective approaches to developing and adapting promising rural transport technologies and methods for use in LMICs, and achieving high uptake by embedding the results of research in LMIC policies, programmes, national engineering manuals and guidelines. Partner countries were closely involved in the selection of research projects.

E3. In the two decades preceding formulation of HVT, there were significant changes in international thinking on the role of transport in sustainable development and the need to mitigate its adverse effects. By the early 2010s, multilateral development banks (MDBs) and other development partners adopted sustainable transport (or sustainable mobility) as the guiding principle for their transport operations in LMICs: transport that is accessible, efficent, safe and green. They also expanded support for more sustainable types of transport including urban public transport, railways, and inland waterways; and gave more attention to addressing the cross-cutting issues of access, inclusion, safety and climate change. When world leaders approved the United Nations (UN) Sustainable Development Goals (SDGs) in 2015, these included, for the first time, targets to track progress in making transport more sustainable and low-carbon. Sustainable Mobility for All (SuM4All), a multi-stakeholder global coordination and tracking mechanism led by World Bank, was established to support implementation of the transport SDGs.

E4. Having been influential in the international dialogue on setting transport SDG targets and establishing SuM4All, DFID identified potential to use its transport research expertise to support priority aspects of the emerging agenda on developing sustainable, low-carbon transport in LMICs. Partner countries had also been indicating considerable needs for research on non-rural aspects of transport. Through the HVT programme, approved in 2015, DFID provided up to £14 million for applied research to develop and adapt methods and technologies for improving parts of the high-volume transport system in LMICs. The HVT research would cover four broad themes: (1) long distance strategic road and rail transport; (2) urban transport; (3) low carbon transport; (4) gender, vulnerable groups and inclusion in high volume transport.

E5. As this was the first time DFID had financed a dedicated programme of research on high volume transport, HVT would combine exploratory research to improve understanding and raise awareness, development of an overarching research agenda, and research on an initial set of priority topics, while leaving other parts of the agenda for other research programmes in future. A two-part approach was adopted to implementation. In Part 1, HVT would review the state of knowledge (SOK) on four HVT themes, and identify opportunities for Part 2 research that could potentially lead to transport improvements affecting large numbers of people. Part 2 would focus

[1] DFID and the Foreign and Commonwealth Office were merged to create FCDO in September 2020. This review generally refers to DFID when discussing HVT activities prior to the merger date and uses FCDO for activities after that date.

on implementing research projects, and supporting research uptake, capacity building and knowledge management.

E6. The theory of change (ToC) defined the results chain and assumptions through which HVT programme inputs were expected to lead to research outputs, outcomes and impact. After identifying research priorities in Part 1, the outcome of Part 2 research projects would be a strengthened evidence base on sustainable transport in LMICs, supported by LMIC capacity building, and knowledge uptake and knowledge management strategies. Impact would be achieved through uptake of the improved technologies and approaches in LMIC policies, national manuals and guidelines, and as part of investment projects financed by LMIC governments, MDBs and other financing institutions. The main risk was that the programme would have limited influence on policy and decision-making by LMIC governments, multilaterals and other investors. To mitigate this risk, HVT would work closely with multilaterals, recipient governments and the wider research community and would be guided by a dedicated research uptake strategy.

E7. The business case defined HVT implementation arrangements in broad terms. Several possible implementation models were indicated, including contracting a service provider or research programme consortium (RPC) to deliver the programme and undertake most of the research; and contracting a managing agent to operate a programme management unit (PMU) that would competitively procure research suppiers to carry out HVT research projects. A technical advisory panel would support quality assurance and provide technical advice. Programme-level decision making and oversight would be the responsibility of DFID and an executive body/research management committee. DFID and the PMU would be represented but no indications were given of other members. A research management committee would oversee the selection and management of research projects. Its membership was not indicated.

E8. In practice, DFID initially tried to procure an RPC but received no suitable bids and therefore reverted to procuring a PMU managing agent. A technical advisory panel was established to provide quality assurance support during programme implementation. A programme steering committee met several times in Part 1 but does not seem to have involved LMICs, MDBs or other external stakeholders. Its activities were discontinued during the Covid-19 pandemic and bilateral programme management meetings between FCDO and the PMU were used to steer the programme. Although referred to in the business case, a research steering committee was not established.

E9. It took nine years to implement HVT, compared with five years in the business case. The main causes of delay were that (i) procurement of the PMU managing agent was completed a year late, partly because DFID first tried to procure a RPC but received no suitable bids; (ii) Part 1 took about four months longe than planned; (iii) it took six months for DFID to give the instruction to proceed with Part 2; (iv) the Covid-19 pandemic began less than six months into Part 2, and over the next 18–24 months the imposition of restrictions in most countries led to delays in contracted research projects and deferral of other projects until restrictions were lifted. Further delays were caused by HVT budget cuts in 2020 and 2023 as part of overall budgetary adjustments by the UK government. These led cancellation of an open call for research in Asia and reduction in the scope of Part 2 research in the final two years of the programme.

E10. During implementation there were three changes of DFID/FCDO programme responsible owner (PRO), and two changes of PMU team leader. There was also turnover of other PMU staff, including project managers, technical leads and communications specialists. In Part 1 and the early stage of Part 2, PMU technical leads helped to shape the research programme and provided useful guidance to research suppliers. Later in Part 2, the technical leads were replaced with

research project managers whose role was to supervise delivery of research projects. Given the long duration of the programme, some staff turnover was be expected. There was also significant turnover during the Covid-19 pandemic. Takeover of the PMU managing agent by another company (footnote 8) also contributed to some staff turnover.

E11. HVT was the first DFID/FCDO transport research programmes to make extensive use of procurement through open calls. The Part 2 procurement plan envisaged that two-thirds of research would be procured in open calls and one-third in defined/direct calls. The open calls attracted significant interest from research suppliers. One of the limitations was that some of the open calls had a very broad scope with only brief terms of reference (TOR). In such cases, the projects and research countries were selected by the research suppliers, often without involvement of LMIC governments or other LMIC institutions. This generated a diverse scatter of projects with few linkages between projects, and often made it more difficult to achieve LMIC uptake and capacity building, and to attribute such achievements to the project. Many of the larger open call projects were carried out by experienced research suppliers that had longstanding relations with LMIC transport authorities and were able to identify research projects that were aligned with country priorities.

E12. By April 2024, HVT had approved a total of 99 projects for £10.8 million. These are summarised by research project category in Table E1. Part 1 included 13 projects for £1.3 million to prepare SOK studies and other studies to determine research priorities for Part 2. A pilot subprogramme of ten small-scale Transport-Technology Research and Innovation for International Development (TRIID) projects was also included. The 30 projects within the main Part 2 research programme accounted for 62% of total HVT research spending. Other subprogrammes included research to support the global sustainable transport agenda and small-scale open calls for Covid-19 response and recovery projects and a second phase of T-TRIID.

Table E1: Number and cost of HVT projects by research project category, April 2024

	HVT Programme [a]		
Research project category	**Projects**	**Cost (£)**	**Main focus of research projects**
Strategic positioning	13	1,281,730	SOK studies of the four broad HVT themes, country scoping studies, policy brief
T-TRIID 1	10	289,416	Small technology innovation projects
Part 2 research	30	6,681,429	The main research programme on the HVT themes and cross-cutting themes mainly awarded through open calls
COVID-19 response and recovery	21	504,975	Small research projects on the effect of Covid-19 on transport in LMIC, and the options for response and recovery
T-TRIID 2	9	344,396	Small technology innovation projects
Global sustainable transport agenda	7	821,438	Studies contributing to larger agendas of global-level research
Uptake support	6	305,556	Research dissemination, participation in global conferences, awareness raising among LMIC parliamentarians
Programme management	3	568,171	Quality assurance, T-TRIID management
Total	**99**	**10,800,111**	

T-TRIID = Transport-Technology Research and Innovation for International Development.
[a] The PMU awarded three further research projects after April 2024. These were not considered by the review due to lack of available reports and other data.
Source: PMU project database; Consultant.

E13 HVT included small, medium and large-sized projects. The T-TRIID and Covid-19 studies financed relatively large numbers of small-scale projects, each with funding less that £50,000. The SOK studies were medium-sized, generally costing between £270,000 and £320,000. Many of Part 2 research studies were also medium-sized, costing between £100,000 and £200,000. There were also nine large Part 2 projects each costing between £450,000 and £650,000.

E14. In terms of transport subsectors, about 39% of research spending was on sectorwide research, 29% on urban transport, 18% on roads, and 7% on active mobility and paratransit and 7% on railways and roads plus railways.

E15. All HVT projects included cross-cutting themes. Climate change was the leading cross-cutting theme and was included in projects accounting for 50% of HVT research spending. Other cross-cutting themes were inclusion (24% of research spending), decision support systems and data (15%), road safety (4%), and studies covering all the main HVT cross-cutting themes (7%). Studies on inclusion examined gender, disability, children and elderly, and other disadvantaged and vulnerable groups.

E16. In terms of geographical focus, about half the research expenditure was on country-level research and half was on global and regional projects. About 38% of research expenditure was on country-level research covering several partner countries, while 12% was on projects in a single partner country. Many of the single-partner country projects were small-scale T-TRIID and Covid-19 response and recovery projects. Global and regional projects prepared various guides and toolkits intended for use by multiple LMICs, and studies contributing to the global agenda on sustainable transport. Several larger regional projects examined regionally-applicable solutions based on field-research in multiple partner countries. While some of the global and regional projects included country-level research, others were based on literature reviews, desk studies and remote surveys.

E17. Nine of the 30 HVT partner countries accounted for 85% of country-level research spending: Ethiopia, India, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda and Zambia. In these countries, HVT research spending ranged from about £267,000 to £973,000. Most of the other 21 partner countries received only limited research support through the programme, with average research spending of £67,000 per country. The country focus of many of the research projects was selected by the research suppliers in their open call submissions rather than by a deliberate allocation of research funding among the partner countries. Most countries that received higher levels of research spending had participated in previous DFID rural access research programmes. Most of the other countries had little past involvement in DFID transport research programmes and only limited efforts were made to build engagement and identify research opportunities in these countries.

E18. The review of research quality and innovation, and research uptake, examined a sample of 66 of the 99 HVT research projects accounting for 84% of total HVT research cost. Assessments of sample projects were based on reviews of project reports and other published materials, interviews with research suppliers, and interviews with FCDO staff, PMU staff, LMIC officials, MDB officals and others.

E19. The quality and innovation of sample projects, and the extent of research uptake, were assessed qualitatively relative to project size. Based on the assessments, projects were rated high, moderate or low both for quality and innovation and for research uptake. For example, projects rated high for uptake had evidence of substantial existing or expected uptake, projects

rated moderate had evidence of uptake but only on a modest scale, and those rated low had no evidence of uptake.

E20. The assessment of project quality and innovation took into consideration the suitability of the research team, approach and methods to produce useful research outputs relevant for addressing gaps in high-volume transport provision in LMICs; the quality of reports and other research outputs; and the inclusion of innovative aspects of research, such as new methods and technologies suitable for use in LMICs.

E21. The assessed quality and innovation of sample projects was high. All sample projects produced research of high or moderate quality. Some 85% of sample project expenditure was on high quality projects, with 15% on moderate quality projects, and no projects of low quality. There was also a clear improvement in rated quality from Part 1 to Part 2. This was linked to more research suppliers becoming aware of the programme, and also reflected project management and report editing support by the PMU and inputs from the technical advisory panel.

E22. The Part 1 SOK studies provided fairly comprehensive reviews of the literature, issues, research gaps and priority areas for future research. The county scoping studies were of moderately good quality but many of the proposals were high-level, with less consideration of how research could be linked to government policies and plans.

E23. Three of the nine T-TRIID 1 projects were of high quality. These included three innovative projects that developed GPS tools for public transport and a community-based road safety intervention. The six moderate quality projects covered development of software tools and conversion of vehicles to clean fuel.

E24. Eight of the Covid-19 sample projects were of high quality and three of moderate quality The researchers were mainly academics and consultants from partner countries. Many studied the effects of the pandemic on people's mobility, focusing in particular on vulnerable groups. Building upon the transport issues revealed by the Covid-19-related research, some of the researchers developed proposals for improving public transport in the post-pandemic period.

E25. The quality and innovation of projects in the main Part 2 research programme was consistently high—with 22 sample projects rated high and one rated moderate. Many of the projects were relatively large. These included research on updating Overseas Road Note (ORN) 31 on pavement design, updating of ORN21 on provision for disabilities, Climate Resilient Sustainable Road Pavement Surfacings (CRISP) project, decision-support systems for resilient transport in LMICs, informal transport services, women's use of public transport, tools for addressing women's sexual harassment in public transport, transit-oriented development, and urban transport planning using mobile phone data. There were also a series of smaller high quality projects on walking and cycling in Africa, support for development of the updating of the Highway Development and Management Model (HDM), low emission zone proposals in India, and a study on women's role as providers and passengers of electric two- and three-wheelers. Projects often involved extensive research in partner countries.

E26. Project quality improved significantly from T-TRIID1 to T-TRIID 2. Seven T-TRIID 2 sample projects were of high quality and one of moderate quality. This was partly because more research suppliers were now aware of HVT, and also reflected efforts by FCDO and the PMU to select projects with strong partner country linkages and prospects for achieving uptake. Many of the projects were to improve aspects of inclusive public transport and active mobility and paratransit in LMICs. Some researchers developed close cooperation with LMIC authorities,

generally at city level, and were therefore well-informed of local policies and plans, with greater access to government decision-makers. An innovative project in Kampala developed a multi-faceted initiative to tackle the problem of vehicle emissions arising from poor vehicle maintenance.

E27. Many of the HVT research projects to support the global sustainable transport agenda were initiated late in the programme and had not produced significant outputs by the time of review. The two projects in the review sample were both large and high quality. These covered development of a transport decarbonisation index (TDI) for use in LMICs, and improving LMIC access to climate finance for transport. The research suppliers were international non-profit organisations that run their own programmes on low carbon transport and climate finance.

E28. The four uptake support projects in the review sample were of high quality. Two arranged roundtables with LMIC parliamentarians on issues about transport and climate change. Other researchers produced an excellent guide to HVT research findings, and ran an innovative challenge competition for young engineers on how to make transport sustainable and low-carbon.

E29. Further analysis of project quality within the project sample indicates that country-focused projects were often of better quality than global and regional projects, and multi-country projects; and projects below £50,000 had a lower average quality rating. The rated quality of research by research suppliers from Africa and Asia was the same as for developed country suppliers.

E30. The assessment of research uptake examined evidence of uptake as of October 2024, shortly before HVT programme completion. For projects that included country-level research, it was possible to corroborate whether the project had attracted interest from partner country authorities, MDBs and others; and if work had continued after the research project or activities ended when HVT contract resources were fully utilised. In some cases, it was possible to obtain fairly detailed evidence of project uptake while in others a degree of judgement was needed, particularly if the research was still ongoing or only recently completed. In the case of research that contributed to global-level initiatives, interviews with relevant stakeholders were used to clarify the status of the global work that HVT projects contributed to, the level of interest and support expressed by global-level stakeholders, and the possible paths and timeframes for uptake.

E31. The review examined the extent of existing and likely uptake of research from sample projects. Since the size of the research projects varied considerably, uptake was assessed relative to project size. A third of research expenditure was on projects with high assessed uptake, a third on moderate uptake projects, and a third on low uptake projects. The project categories with highest uptake were the Part 2 main research projects and T-TRIID 2 projects. Roughly half of research spending on these categories was rated high uptake. The T-TRIID 1 projects and Covid-19 projects had lowest uptake, with more than three-quarters of research spending attracting little or no uptake.

E32. Several factors contributed to the overall level uptake of HVT research projects. In a large research programme, not every project will produce improvements capable of attracting uptake. This is particularly true for small-scale competitions such as T-TRIID and the Covid-19 response and recovery projects. Although the ToC assumed significant interest from LMIC governments, MDBs and other stakeholders, HVT did not include arrangements for them to be involved in steering the programme and selecting research. Country-level uptake also depended on research suppliers building close working relations with relevant partner country institutions whose support would be needed for uptake. Some open call projects covered topics that interested the

researcher but had less connection to country-level policies and plans. Some projects prioritised research without giving much attention to identifying a realistic uptake channel.

E33. In assessing the underlying performance of the programme in terms of uptake, it is useful to consider the research projects conducted after Part 1 and excluding the Covid-19 response and recovery projects as the Part 1 SOK and scoping studies were not intended to directly lead to country-level uptake, T-TRIID 1 was a pilot phase to explore the potential of small-scale transport technology competitions, and the Covid-19 studies focused more on understanding thow the pandemic was affecting mobility rather than on producing new approaches suitable for country-level uptake. The resulting subgroup of 37 sample projects covers the Part 2 main research programme, T-TRIID 2, uptake support, and support for the global sustainable transport agenda. These projects accounted for 69% of total HVT research expenditure. For this subgroup, 44% of subgroup research expenditure was rated high uptake, and 25% was rated moderate uptake. While leaving room for improvement in future, these are satisfactory levels of rated uptake, particularly for a first programme in a complex, new field of research.

E34. While not all projects attracted high levels of research uptake, some individual HVT research projects, such as ORN31 and HDM, are expected to attract very high uptake that will lead to enormous cost savings and benefits for LMICs. In such cases, the cost savings and other benefits arising from a single HVT project are expected to be many times higher than the cost of the research programme. Examples of such projects are provided below in para. E36.

E35. The four SOK studies in the review sample were mainly intended to support the strategic positioning of the programme but also made a moderate, indirect contribution to country-level uptake by influencing the types of research gaps addressed by research projects. Few of the short country scoping studies attracted much buy-in from partner country authorities or had much influence on choice of HVT research projects.

E36. Among the nine T-TRIID 1 projects in the review sample, two projects achieved high uptake. One was a project on Promoting Safety in Urban Transport used innovative mobile phone apps to track the safety of public transport on minibuses. The Kids' Court project successfully trialled a community-based approach to vehicle speed limit enforcement that changed driving behaviour and raised community awareness about road safety. The other seven T-TRIID 1 projects had low uptake. In some cases, technology prototype trials were inconclusive and funding ran out. In others, the T-TRIID 1 support only covered a small part of the project development process, and there were no indications of further funding being available.

E37. Two of the eleven small-scale Covid-19 projects in the review sample achieved moderate country-level uptake. One project worked closely with Delhi authorities to develop guidance proposals and a toolkit on gender equitable public transport in the city. Another project developed training modules on reform of urban transport systems in India that were incorporated in the National Urban Learning Platform. The other nine Covid-19 projects had low uptake. Many produced useful country-level case studies on the effects of the pandemic on people’s mobility, but few had involvement or support from government authorities. Other projects produced best practice studies—for example on motorcycle taxi safety, equitable public transport, and activity mobility—but did so without involving partner countries. In such cases, the research ended when HVT project budget was fully utilised.

E38. Uptake of improved significantly from T-TRIID 1 to T-TRIID 2. Five of the eight T-TRIID 2 were rated high for uptake and two were rated moderate. The high uptake projects involved LMIC-based researchers working closely with country transport authorities to develop improved

approaches. Four projects on safer and more inclusive urban public transport attracted substantial uptake in government and city plans. The emissions testing project in Uganda has grown in scale and ambition, and attracted further funding. The two moderate-uptake T-TRIID 2 projects produced high quality research to develop an urban transport planning tool, and a gendered approach to addressing adaptation capacity to hot weather conditions in India. The tool was used by World Bank staff in Bangladesh. The hot weather study was prepared working closely with city. It was only completed shortly before programme completion, and may have potential for high uptake in future.

E39. There was high uptake of the large Part 2 research subprogramme that accounted for 62% of total HVT research expenditure. Ten projects were rated high for uptake, six were rated moderate, and seven were rated low. Many of the high uptake projects were large projects conducted by experienced research suppliers to address a major research gap. In all cases of high uptake, there was significant involvement of country partner authorities in the research and this contributed to eventual uptake.

E40. Some high-uptake Part 2 research projects are expected to lead to enormous cost savings and economic benefits in LMICs. The updating of ORN31 has already been incorporated in national road design manuals and guidelines in multiple LMICs, including Ethiopia, Kenya, Nigeria, Mozambique and Bangladesh. This is expected to eventually influence over £20 billion of road construction financing each year, leading to enormous savings in the road life cycle costs. The CRISP project developed improved, climate-resilient road pavement designs using locally available materials. Ethiopia's national road authority was closely involved in the research and is expected to incorporate the research in its national manuals. There is also potential for uptake in other LMICs. Assuming that only 10% of the 350,000 km of bitumen surfaced roads in Sub-Saharan Africa would use the designs, a previous study estimated that improved pavement designs could lead to £93 million of annual savings in LMIC road provision costs. In the case of the HDM research, HDM-4 is currently used to appraise about $20 billion of road investments each year. Once HDM-5 becomes available, it will be widely used and its improved completeness, quality, accuracy and reliability will lead to enormous economic benefits for LMICs through selection of better investments and deferral of proposals that are not feasible and sustainable. Using the SHE CAN tool developed by the HVT Empower 1 and 2 projects, gender-inclusive principles have been mainstreamed in LAMATA which applied them in introducing measures to reduce women’s sexual harassment. LAMATA’s public transport services carry between 1.5–2.0 million passengers each day, so these improvements are having large scale effects on reducing women’s exposure to sexual harassment in public transport. The SHE CAN tool is also being used in several other African countries.

E41. The two sample projects to support the global sustainable transport agenda were rated moderate and low for uptake. The transport climate finance study was useful but was one of many studies contributing to dialogue on climate finance so it is hard to attribute more than moderate uptake. Although the transport decarbonisation index (TDI) produced high quality research and TDI is an innovative concept, further development, trialling and LMIC capacity development would be needed if a feasible index is to be developed and attract interest and support from LMICs.

E42. Two of the four uptake support projects were rated moderate for uptake and two were rated low. Although these projects were high quality, most were commissioned fairly late in the implementation period. Unless the projects are continued through some other means, it will be difficult to retain user interest once HVT has been closed. The two transport and climate change roundtables helped to raise awareness among a group of interested LMIC parliamentarians but were not intended to influence uptake at country-level.

E43. The review compared the research uptake channels envisaged in the ToC with the actual uptake channels for HVT research. While the ToC envisaged that research would lead to tangible improvements in transport in LMICs, it did not clearly define the channels through which uptake would take place. In practice, for projects to produce high quality research with likelihood of country-level uptake, they needed to work closely with LMIC authorities and align the research to fit with country-level policies, plans and programmes. If uptake was to take place as part of MDB financing programmes, the research programme needed to have a systematic approach to identifying research that could be linked to MDB financing pipelines at country-level. The HVT experience of global projects suggests that they often involve relatively complex arrangements for coordination and implementation, and extended time frames, but can produce major improvements if the initiative is well-conceived and adequately resourced.

E44. A further uptake channel that was given considerable attention during HVT implementation is publication of articles in peer reviewed journals. In some sectors and fields of research, this is a leading channel for research uptake. However, the review found little evidence of it being effective for uptake of research on transport in LMICs. None of the interviewed research suppliers and senior academics supported this idea.

E45. In the absence of well-defined uptake channels in the ToC, the logframe gave too much emphasis to citations, publications and attendance at various kinds of partner events. It was also unnecessarily detailed. FCDO set fairly ambitious annual targets which were generally met or exceeded by the PMU. This reinforced the overemphasis on production of publications and participation in events. There were no logframe indicators tracking how research suppliers were working with LMIC authorities to arrive at proposals capable of attracting uptake, nor of MDB pipeline projects using HVT research, and there were no indicators reflecting the uptake channels for global-level projects. There was also no logframe tracking and targeting of the involvement of LMIC research suppliers and researchers in HVT research projects.

E46. A recent uptake support study examined 150 publications produced by a sample of 40 of the 99 HVT research projects. About half the publications were project reports, a quarter were peer-reviewed journal articles, and 13% were policy briefs and policy documents.

E47. FCDO and the PMU used participation in major international transport conferences to promote HVT, disseminate research findings, and hold meetings with attending representatives of LMICs, MDBs and other stakeholders. HVT made major contributions at several leading international conferences, including organising a special session on disability-inclusive transport that won the World Road Association award for best session at the World Road Congress in 2019; coordinating a programme of side-events at COP 26 in 2021; presenting a series of papers at the UNEP Africa Regional Forum in 2022, and co-hosting an official side-event at the International Transport Forum Summit in 2023.

E48. HVT publications attracted about 104,000 cumulative downloads. Some 89% of downloads were journal papers. Most were downloaded from third-party journal sites. Of the 15,892 publication downloads from the HVT website, 64% were research reports, 17% were manuals and 13% were editorials. The guidelines produced by ORN31 project and the editorial from the HVT special edition of Sustainability accounted for nearly half of these downloads.

E49 The PMU arranged many webinars and online events to disseminate research and developed online peer network for collaboration among HVT researchers. Such approaches were

especially useful when Covid-19 restrictions were in place, but people's level of engagement in these online events is often quite low which has reduced their quality and usefulness.

E50. HVT's main contribution to capacity building was through engagement of LMIC research suppliers and researchers in the research programme. In practice, LMIC research suppliers only accounted for 17% of research expenditure and developed country suppliers accounted for 83%. Only one of the top-ten research suppliers was from a LMIC. There were, however, several examples of high-performing LMIC research suppliers that graduated from smaller HVT projects (especially T-TRIID and Covid-19 projects) to larger research projects later in the programme, including research suppliers from Ethiopia, Uganda and India. Many country-level research projects also included a training workshop for partner country stakeholders. A range of online trainings, tools and webinars were also produced.

E51. Based on the findings of the review, and assessment of the 10 RQs, the overall performance of the HVT is rated **successful**. The ratings for the four DAC evaluation criteria are **relevant**, **effective**, **efficient** and **sustainable**.

E52. In conclusion, the review finds that through HVT, FCDO successfully realigned and broadened its transport research to address the wide-ranging research needs for developing sustainable, low-carbon transport in LMICs. The programme produced a variety of high-quality applied research and achieved satisfactory levels of uptake and sustainability. The benefits of the research to LMICs far exceeded the programme costs. The main weakness was that some projects lacked LMIC involvement and support, which reduced their relevance and prospects for uptake. This can be addressed in future by defining the uptake channels in the ToC more clearly, involving partner countries and MDBs in research selection and oversight, developing an overarching research programme to guide programme activities, and using open calls selectively and with more guidance on choice of topic and partner country.

E53. There is a good case for FCDO to support further research on high-volume transport in LMICs in future. Improved high-volume transport will be essential if the SDG transport targets are to be met in LMICs, HVT uncovered major gaps in knowledge that will require considerable further research, and FCDO is one of the only development partners that finances transport research. The expected benefits of further research are likely to greatly exceed the cost of research. There would be potential for improving programme coherence and efficiency if future FCDO transport research is provided through a single, comprehensive programme on sustainable, low-carbon transport—encompassing high-volume transport, rural access and other transport subsectors such as ports and shipping, railways and freight logistics.

E54. Several lessons are identified for design of future transport research programmes:

- **Transport research needs**. HVT identified a wide range of transport research needs across the main themes and cross-cutting themes of high-volume transport. The performance of research projects supported by HVT and previous UK transport research programmes in LMICs shows that good research on high-volume transport can attract high uptake, and deliver large cost savings and economic benefits. Considerable additional research is needed to help LMICs develop sustainable, low-carbon transport systems and attain the SDG targets for transport and FCDO is one of the only development partners that finances transport research.

- **State of knowledge**. The SOK studies prepared by HVT will remain valid for some years so a further programme covering high-volume transport can proceed to commencement of research without an initial phase of conducting SOK studies.
- **ToC uptake channels**. FCDO should refine its ToC uptake channels for transport research, giving less emphasis to publication of journal articles and including channels for uptake by LMIC institutions, through MDB financing pipelines and as part of global transport agendas and initiatives.
- **Streamlining programme management.** A PMU managing agent successfully delivered the programme but this entailed a large number of procurements and considerable contract administration. If a suitable RPC could be identified to deliver the research programme, it could potentially improve overall strategic direction, coherence and implementation efficiency (e.g. not necessary to procure a separate research supplier for each project). A reputable non-commercial or philanthropic transport research organisation with experience in LMICs might be well suited to this role, and might also be able to draw upon other sources of financing to expand the reach of research activities and potential to offer a home for completed FCDO research beyond programme closure. If it is not possible to procure an RPC, programme management could be simplified by reducing the number of research contacts and increasing average contract size, and by establishing a well-defined overarching research programme.
- **Governance and implementation arrangements.** HVT projects that lacked involvement and support from partner country institutions seldom attracted uptake. This can be addressed in future by including LMICs and MDBs in research selection and programme oversight. Arrangements for research selection and programme oversight should be agreed with partner countries, MDBs and other stakeholders before programme startup. Another idea might be to decentralise some or all of the PMU functions to two or three subregional offices (e.g. East and West Africa, Southern Africa, South Asia). These could serve as hubs for country-level engagement, on-the-ground mentoring and quality assurance of LMIC research suppliers, training and dissemination activities.
- **Linking research to MDB financing pipelines.** MDBs continue to be receptive to linking FCDO transport research to their country-level financing programmes. This is particularly useful at the pre-concept stage when there is more flexibility to incorporate research findings in project design. Future research programmes should develop a systematic approach for linking research to MDB advance transport financing pipelines.
- **Selection of partner countries.** Programme coherence would be improved and country-level engagement deepened if the number of partner countries was initially limited to a core group of, say, 10–12 core countries, based on their identified research needs and expressed interest in making use of FCDO transport research. Selection of core countries should be completed before programme startup.
- **Capacity building.** FCDO should be more ambitious about increasing the role of LMIC research suppliers and should track progress in the logframe. This could be supported by making adjustments in tender provisions (e.g. developed country research suppliers to form joint ventures with LMIC research suppliers, applying an LMIC preference factor). Drawing on the approaches to capacity building used by some other development partners such as Germany's Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), another option might be the recruit a small group of talented young LMIC researchers to be members of the programme management team.

- **Transport technology innovation competitions**. Through the T-TRIID subprogramme, HVT demonstrated that small-scale seed financing of transport technology research can play a useful role in introducing innovative transport technologies in LMICs. Support of this kind should be included in FCDO's next transport resaerch programme.
- **Support for global level research initiatives on transport in LMICs.** There will be continuing needs for global research in future. FCDO should continue to be selective about which global projects it supports.

E55. Based on the review, some indications are provided on important areas for further transport research in future:

- **Low-carbon transport.** Given the need for LMICs to shift to low-carbon forms of transport, and the role of climate finance in supporting this shift, further research should work more closely with individual LMICs, groups of LMICs, and MDBs to develop improved low-carbon transport policies and programmes capable of attracting financing and uptake. As long-distance freight is a major contributor to transport emissions, freight and freight logistics should be included as a focus for research.
- **Climate adaptation and resilience.** HVT confirmed that LMICs have enormous and urgent needs for research on climate adaptation and resilience of transport infrastructure, and that high quality research on climate adaptation can produce very large benefits. Most of the HVT work focused on high-volume roads. There are also comparable needs for climate adaptation research in other aspects of transport including railways, ports, and mass transit.
- **Roads.** UK-funded road engineering research is well-established and has achieved high uptake through HVT and previous transport research programmes, leading to large benefits for LMICs. HVT confirmed there are large additional needs for research on roads in LMICs. A number of overseas road notes (ORNs) will need to be updated in future and have potential to attract high uptake. There is also potential for non-engineering research on issues affecting the accessibility, convenience, competitiveness and safety of long-distance road transport services. The most recent FCDO rural access research programme (ReCAP) showed that LMICs continue to have large needs for research on rural access.
- **Railways**. HVT did comparatively little research on railways. As railways have significantly lower emissions than road transport, more research is needed on how to shift traffic from road to rail by making LMIC railways more attractive and competitive for customers, and addressing critical impediments (e.g. last mile connections, multimodal freight hubs, border crossing arrangements). Modelling of railway freight flows could support continental initiatives to tackle long-distance railway freight bottlenecks in Africa. Research is also needed on climate-proofing LMIC railway infrastructure and facilities.
- **Urban transport systems.** HVT research demonstrated the potential for research on BRT and TOD to deliver large scale benefits in LMIC cities. Studies on paratransit and active mobility also raised awareness of the need for integration with formal pubic transport systems. LMIC cities have large needs for further research to support improved policies and programmes on urban transport.
- **Decision-support, policy-support, and technology and innovation.** These were important cross-cutting research themes and will remain relevant for future research. HVT

demonstrated the potential for small-scale transport technology competitions to provide a low-cost way of attracting potentially innovative projects.

- **Inclusive urban transport services**. Research on this cross-cutting theme produced notable uptake (e.g. SHE CAN tool) and raised awareness about inclusion issues, including with respect to gender, age, disability and for disadvantaged and vulnerable group. Such work is still at an early stage and further research is needed to realise the potential for inclusive urban transport services. Future research should engage closely with LMIC city authorities and other key stakeholders to help bring about changes needed in policy and practice.
- **Road safety.** Building upon the UK's longstanding support for road safety in LMICs, HVT produced high-quality guidelines on road safety and conducted useful studies on adapting urban streets to improve safety for paratransit and active mobility. Future research should work closely with partner country national road authorities and road safety agencies, and with city authorities responsible for urban road safety.
- **Private sector participation in transport investment in LMICs.** As LMIC needs for transport investment significantly exceed the financing capacity of LMIC governments and development partners, research is needed on how to mobilise private finance at scale to support inclusive, sustainable transport infrastructure and services.
- **Transport climate finance for LMICs.** LMICs lack the capacity to finance all the investments they need for climate mitigation and adaptation, and therefore need to gain access to concessional climate finance. Further global-level research is needed to identify and address the obstacles faced by LMICs seeking transport climate finance. Country-level research is also needed to help LMICs develop effective models for attracting climate finance for investment in sustainable transport.

I. INTRODUCTION AND BACKGROUND

A. Introduction

1. This report presents the findings of an external review of the High Volume Transport Applied Research Programme (HVT) financed by the United Kingdom (UK) Foreign, Commonwealth & Development Office (FCDO). The review examines the performance of HVT and identifies lessons for FCDO to consider when formulating future programmes of applied research on transport in low- and middle -income countries (LMICs).[1] The review was conducted between September and December 2024, ahead of HVT programme completion in January 2025.

B. Objective of review

2. The objective of the review was to examine the performance of the HVT programme in achieving its intended objectives and to identify lessons for future FCDO research programmes. Programme performance is assessed using the evaluation criteria of the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD), and the ten research questions (RQs) provided listed in Part B of the TOR. Drawing upon the findings of the review of HVT research projects, the TOR also required preparation of an HVT human success story on climate change and transport. The TOR are in Appendix A.

C. Defining research

3. Based on the UK Government Research Excellence Framework, FCDO defines research as "a process of investigation leading to new insights, effectively shared." This includes "work of direct relevance to promoting international development objectives and FCDO's core development objective of leading the UK's work to end extreme poverty; the invention and generation of ideas, images, performances, artefacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction." It excludes routine testing and routine analysis of materials, components and processes such as for the maintenance of national standards, as distinct from the development of new analytical techniques, and development of teaching materials unless they embody original research (DFID 2017a).

4. This definition of research is broad and encompasses a wide range of potential research in the transport sector including primary research involving collection and analysis of primary data; and research on adaptation of existing technologies and best practices for use in LMIC settings.

D. Approach and limitations of the review

5. As explained in Chapter IV, to assess individual HVT research projects, the review examined a sample of 66 of the 99 research projects approved by April 2024. In view of the large size, this provided a reliable basis for evaluating the performance of the programme. In examining the sample projects, the review drew upon spreadsheet databases of HVT research projects and publications provided by the project management unit (PMU)[2] together with research reports,

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[1] In the HVT business case, annual reviews and research reports, the terms low- and middle -income countries income countries and low-income countries are both used when referring to the HVT programme beneficiary countries. Since the beneficiary countries included both low-and middle -income countries, the former term is used in this review.

[2] "HVT geocoding (Ver.8.0).xlsx" and "Publications Index.xlsx."

publications and other materials downloaded using the HVT website's publications search function (https://transport-links.com/funded-projects). Details of publications reviewed are in Appendix B.

6. The main tasks of the review comprised (i) in-person and Zoom interviews with FCDO officials and members of the PMU team, (ii) review of HVT publications, (iii) Zoom interviews with research suppliers, (iv) Zoom interviews with LMIC officials and multilateral development banks (MDBs) to corroborate research uptake, and (v) analysis of the performance of HVT projects in terms of research quality and innovation, uptake, and capacity building. There was generally a high response rate to requests for interviews, and interviewees were willing to talk in detail about their experience of the programme. Details of principal persons consulted are in Appendix C.

7. One of the limitations of the review is that projects were assessed soon after their completion when it is often too early to observe the full outcomes and impacts of infrastructure-related projects. For example, when trial sections of road pavement are built to test new designs and materials, the trial sections may need to be monitored for 5–10 years to determine the performance of the pavement. However, only a minority of the HVT projects focused narrowly on infrastructure provision, and those that did were sometimes able to minimise such issues by drawing upon the additional data from other sources. Another possible limitation might arise if project assessments found no prospect of follow-on activities or research uptake but, in practice, this merely reflected time needed for stakeholders to consider, consult and decide on next steps. This possibility was mitigated by interviewing the research suppliers and key stakeholders for each project. Generally, projects needed to have attracted support and financing by the time of completing the HVT research and the research team would be disbanded.

8. HVT projects that had a global and regional focus were harder to assess. Some global projects financed research to contribute to shaping broader global multistakeholder agendas and initiatives on sustainable, low-carbon transport in LMICs. This was often part of initiatives that involved inputs from multiple stakeholders, making it difficult to attribute change to a single HVT research project. Some regional projects developed proposals for use by LMICs in general or by African or Asian LMICs, but did so without working with individual LMICs to tailor the proposals to country context. Interviews with research suppliers and other stakeholders sought to identify any evidence of LMIC or MDB interest in using the outputs of such collaborative and generalised projects at country-level.

9. The coverage of the remaining chapters of this report is summarised as follows:

Chapter II	Programme design;
Chapter III	Programme implementation;
Chapter IV	Research activities;
Chapter V	Uptake of HVT research, capacity building and knowledge management;
Chapter VI	Evaluation of programme performance, conclusions and lessons.

II. PROGRAMME DESIGN

A. Background

1. Previous UK-financed applied research on transport

10. The UK has been financing applied research on transport in LMICs for many years. Before the 1990s, research was undertaken through direct subvention funding of the Overseas Unit of the Transport Research Laboratory (TRL), which built up a respected body of applied research publications including Overseas Road Notes (ORNs) that developed specifications and design manuals for road construction and maintenance in tropical climates (Hine 2019). Among the most influential of these notes was Overseas Road Note 31 (ORN31): A Guide to the Structural Design of Bitumen-Surfaced Roads in Tropical and Sub-Tropical Countries (TRL 1993).

11. In 1990s the research delivery model was changed. The Department for International Development (DFID)[3] introduced competitive bidding for its research programmes. TRL became an executive agency in 1992 and was privatised in 1996 (Hine 2019). Between 2004 and 2020, it financed several large programmes of applied research on transport using an outsourced delivery modality. These programmes focused on improving rural access. Key features of the programmes are summarised below, and further details are provided in Appendix D:

(i) **Southeast Asia Community Access Programme (SEACAP), 2004–2009**. Research in Cambodia, Lao PDR and Viet Nam linked to rural road investment projects being financed by MDBs. Research mainly covered engineering and materials solutions for rural road surfacing and paving, slope stabilisation and maintenance (DFID 2014a).

(ii) **Africa Community Access Programme, Phase 1 (AFCAP1), 2008–14.** Engineering-focused research on rural access in a core group of six African countries. One of the core group of countries, Ethiopia, was implementing a large national rural road programme and AFCAP1 developed a suite of design manuals, specifications and standard bidding documents for the programme.

(iii) **Rural Roads and Transport Services for Communities in Low-Income Countries Programme (ReCAP), 2014–2020.** Research for twelve African LMICs, through the Africa Community Access Programme, Phase 2 (AFCAP2) and five LMICs in Asia, through the Asia Community Access Programme (AsCAP). Nearly half of research expenditure was on engineering research to support national road manuals, guidelines and specifications. The remainder of research helped to build a new evidence base in under-researched fields of rural access, notably on the cross-cutting issues of gender and inclusion, capacity building, knowledge management (ReCAP PMU and Scriptoria 2021).

12. At programme completion, each of the previous transport research programmes was assessed to have successfully producing high quality research that attracted significant uptake by LMICs. This led to cost savings and other benefits valued at multiple times the cost of the research. The incorporation of engineering research outputs in national manuals, guidelines and specifications was a particularly effective method of achieving high levels of uptake in LMICs as

[3] DFID and the Foreign and Commonwealth Office were merged to create FCDO in September 2020. This review generally refers to DFID when discussing HVT activities prior to the merger date and uses FCDO for activities after that date.

it institutionalised the improved approaches for countrywide usage (Van Gijn and Benjamin 2009). This required research suppliers to work closely with the relevant LMIC authorities. In the case of non-engineering research, the initial studies undertaken by ReCAP helped to raise awareness about critical issues affecting access and inclusion. This could potentially lead to significant country-level uptake in future but would require further research and capacity building over a longer period (Duncan 2021).

13. Through the Global Transport Knowledge Partnership (gTKP), approved in 2005, the UK also supported transport knowledge dissemination with a view to encouraging research uptake at country-level. This has included knowledge dissemination on both the engineering and non-engineering aspects of rural access (DFID 2014a; Hine 2019).

14. Since 2015, DFID has financed ieConnect for Impact, a programme within World Bank to evaluate the impact of World Bank transport projects. This has included analytical studies to enhance the expected impact of proposed projects under preparation (World Bank 2020). For some years, the UK has been financing part of the costs of World Bank's Global Road Safety Facility, which recently won the Prince Michael Road Safety Award for the third time. The Department of Health and Social Care has also contributed to this work.

2. UK engagement in new global agenda on transport

15. The period leading up to formulation of the HVT programme was a time of major changes in thinking about transport in international development. Viewed through the paradigm of sustainable development, researchers observed that important impacts and side-effects of transport had been neglected. These included safety, accessibility and enviromental effects, issues over involuntary resettlement and major cross-cutting issues such as climate change, inclusion, gender, and provision for poor and vulnerable groups (ADB 2010; World Bank 2008).

16. For many years support for transport in LMICs had focused mainly on improving transport efficiency by upgrading infrastructure, extending geographical coverage and raising infrastructure capacity to meet future traffic growth. By 2014, when DFID began to prepare HVT, the limitations of this approach were evident. Many developing countries had increased transport efficiency by improving their national transport networks but the gains were not always sustained due to lack of maintenance (Heggie 1995). Although road improvements led to higher traffic and faster vehicle speeds, only limited attention was given to improving road safety, so road crash fatalities and injuries in LMICs increased rapidly (UN 2011). Wider changes in economic activities, demography, settlement patterns and urbanisation had resulted in LMIC cities starting to experience problems of road congestion, air pollution and environmental degradation. In both urban and rural areas of LMICs, people often faced significant problems with the availability, quality, convenience, affordability and safety of public transport services. Such problems were most acute for poor women and other disdvantaged and vulnerable groups.

17. By the mid-2010s, most MDBs changed their approach to supporting transport in LMICs (MDB Working Group on Sustainable Transport 2015). Most now focused on sustainable transport (or sustainable mobility)[4]—transport that is accessible, efficent, safe and green. At the United Nations (UN) Rio+20 Conference on Sustainable Development in 2012, the eight largest MDBs committed to provide $175 billion for more sustainable transport over the next ten years.

[4] The terms "sustainable transport" and "sustainable mobility" may both be used to refer to transport that is accessible, efficient, safe and green. The present review generally uses the former term.

This marked a shift toward increased financing for more sustainable types of transport, including urban public transport, railways, inland waterway transport, road safety, climate adaptation and extending access to transport to all parts of society, including disadvantaged groups. When world leaders approved the United Nations (UN) Sustainable Development Goals in September 2015, the SDG targets included actions to address the neglected aspects of transport.[5]

18. Together with Germany and France, the UK was one of the few countries that engaged directly in the global dialogue to shape a new global agenda for supporting transport in LMICs. The UK (through DFID) was included as a member of the technical working group for the UN Secretary General's High Level Advisory Group on Sustainable Transport that recommended establishing a new global institutional architecture to coordinate international efforts on sustainable transport.[6] DFID then played a prominent role in establishing Sustainable Mobility for All (SuM4All), a multi-stakeholder global coordination and tracking mechanism led by World Bank to support implementation of the transport SDGs. Drawing upon its extensive research on rural access, DFID co-chaired the SuM4All rural access working group and financed preparation of the SuM4All Global Roadmap of Action on Universal Rural Access (SuM4All 2017).

B. HVT business case

1. Preparation of business case

19. DFID's Growth Research Team began to prepare the business case for HVT in 2014. By then, the shift in thinking toward more sustainable types of transport was already well-advanced but the evidence base was weak on many previously neglected aspects of sustainable transport in LMICs. Initial staff inquiries, supported by three Helpdesk rapid assessments of research gaps (Bichou 2014; TRL 2014; Connor and Schmid 2014), indicated that the wider evidence base on transport was "out of date and ignores the special conditions of many low income (tropical) countries and also the developmental impacts." This helped to establish the case for extending the focus of DFID research on transport from rural access to encompass parts of the much larger sustainable transport agenda, including high-volume roads and railways, urban transport, low carbon transport and various aspects of inclusion.

20. Through its previous transport research programmes, DFID developed effective approaches to conducting transport research in LMICs and embedding improved approaches in LMIC policies, manuals, guidelines and investment programmes. Much of the research was on adapting promising technologies and methods from the UK and other advanced countries for use in LMICs. DFID now sought to use similar methods to conduct research on improving other aspects of sustainable transport in LMICs.

21. Although rural access remained an important priority of DFID and within the new transport agenda, it was not included within the scope of HVT. DFID had only recently approved the ReCAP programme to finance further rural access research until 2020, so HVT could focus on other aspects of transport research.

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[5] Transport contributes directly to five SDG targets on road safety (Target 3.6); energy efficiency (Target 7.3); sustainable infrastructure (Target 9.1), urban access (Target 11.2), and fossil fuel subsidies (Target 12.c). It contributes indirectly to seven SDG targets on agricultural productivity (Target 2.3), air pollution (Target 3.9), access to safe drinking water (Target 6.1), sustainable cities (Target 11.6), reduction of food loss (Target 12.3), climate change adaptation (Target 13.1), and climate change mitigation (Target 13.2) (SLoCAT 2024).

[6] United Nations. 2016. *Mobilizing for Development: Analysis and Policy Recommendations from the United Nations Secretary-General's High-Level Advisory Group on Sustainable Transport*. United Nations: New York.

2. Programme scope

22. Under the HVT programme, approved in 2015, DFID provided up to £14 million for conducting applied research projects on the under-researched high-volume parts of the transport system in LMICs.[7] Startup and recruitment was expected to take a year from October 2016 to October 2017, followed by four years of conducting research projects from October 2017 to October 2021. The HVT research was expected to open new opportunities to improve parts of the transport system that affect large numbers of people, and to address climate change, inclusion and other cross-cutting issues (DFID 2016).

23. The HVT business case selected four broad themes for HVT research: (1) long distance strategic road and rail transport; (2) urban transport; (3) low carbon transport; (4) gender, vulnerable groups and inclusion in high volume transport. Within these themes, it identified a range of major issues and gaps in knowledge where research could potentially lead to improved approaches being taken up in LMICs (e.g. climate vulnerability of transport infrastructure, shifting from higher to lower carbon types of transport, transport asset management systems, the planning and operation of mass transit systems, active mobility and paratransit, decision support tools for prioritising low carbon investments and interventions, and providing transport options for poor and vulnerable groups including women and girls, children, elderly people and people with disabilities).

24. Given the breadth of coverage and extent of likely research gaps, together with DFID's lack of experience of conducting transport research on subjects other than rural access, HVT would involve a combination of exploratory research to improve understanding and raise awareness, development of an overarching research agenda, and conducting research on an initial set of priority topics while leaving other topics to be addressed by further research programmes in future.

25. A structured, two-part approach was adopted for programme implementation. In Part 1, HVT would procure leading research suppliers to review the state of knowledge (SOK) on each of the four HVT themes and then use these studies to identify a series of HVT research projects to address major LMIC transport issues affecting large numbers of people and prepared associated strategies for research uptake, capacity building and knowledge management. In Part 2, which was contingent on the successful outcome of Part 1, the main HVT programme transport research projects would be implemented.

26. Table 1 compares the scope of HVT with the main previous DFID transport research programmes. While the programmes had much in common, HVT had a much broader scope as it encompassed all the land transport subsectors except rural access, as well as a range of cross-cutting themes including climate change, inclusion and road safety (Duncan 2020). HVT also covered a much larger number of partner countries (30) than the previous programmes. In spite of its broad scope and country coverage, HVT provided less research funding than the two preceding transport reseach programmes. The size of such programmes had doubled from SEACAP to AFCAP1, and doubled again from AFCAP 1 to ReCAP. However, the research funding approved for HVT was only two-thirds the level of ReCAP.

[7] Additionally, about £4 million was provided for programme management costs.

Table 1: Principal UK-funded programmes of applied research on transport in LMICs

Name	Scope of support	Research funding (£ million)[a]	Duration	Countries supported by research programme
SEACAP	Research on road surfacing and paving options for low volume rural roads, linked to investment projects financed by World Bank and Asian Development Bank	6.0	2004–2009	Cambodia, Lao PDR, Viet Nam (3)
AFCAP1	Research, knowledge dissemination and training on providing safe and sustainable access to poor communities, focusing mainly on conducting engineering trials of different road surfacing options and preparing design manuals, specifications and bid documents for low volume rural roads	14.4	2008–2014	Ethiopia, Kenya, Malawi, Mozambique, Tanzania, South Sudan (6)[b]
ReCAP	Similar to AFCAP1 but with a wider remit to support research on rural access construction, maintenance and transport services, and on cross-cutting issues of capacity building, knowledge management, gender, and inclusion	21.8	2014–2020	**Africa**: Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mozambique, Sierra Leone, South Sudan, Tanzania, Uganda, Zambia (12)[b] **Asia**: Afghanistan, Bangladesh, Myanmar, Nepal, Pakistan (5)
HVT	Long distance strategic road and rail transport, urban transport, low-carbon transport and gender, vulnerable groups, safety and inclusion. Cross-cutting themes of climate change (mitigation and adaptation), policy and regulation, technology and innovation, and decision support/data	10.8[c]	2016–2025[d]	**Africa**: Burundi, Cameroon, Democratic Republic of Congo, Egypt, Ethiopia, Gambia, Ghana, Kenya, Liberia, Madagascar, Malawi, Morocco, Mozambique, Nigeria, Rwanda, Senega, Sierra Leone, South Africa, South Sudan, Tanzania, Uganda, Zambia, Zimbabwe (23) **Asia**: Afghanistan. Bangladesh, India, Myanmar, Nepal, Pakistan, Sri Lanka (7)

AFCAP1 = Africa Community Access Programme, Phase 1, AFCAP2 = Africa Community Access Programme, Phase 2, HVT = High Volume Transport Programme, ReCAP = Rural Roads and Transport Services for Communities in Low-Income Countries Programme, SEACAP = Southeast Asia Community Access Programme.
[a] Direct expenditure on research projects at programme completion using SEACAP, AFCAP1 and ReCAP actuals and PMU estimates for HVT, [b] AFCAP1 also financed some smaller research projects in other African countries, [c] PMU estimate, April 2024, [d] Actual duration after extension.
Sources: Cardno 2020a; DFID 2014a; Duncan 2021; Hine 2019; HVT Project Management Unit data; Van Gijn and Benjamin 2009.

3. Theory of change

27. Within the business case, the theory of change (ToC) defined the results chain and assumptions through which programme inputs were expected to lead to research outputs, outcomes and impact. After identifying research priorities in Part 1, the outcome of Part 2 research projects would be a strengthened evidence base on sustainable transport in LMICs, supported by LMIC capacity building, and knowledge uptake and knowledge management strategies. Impact would be achieved through uptake of the improved technologies and approaches in LMIC policies, national manuals and guidelines, and as part of investment projects financed by LMIC governments, MDBs and other financing institutions. The ToC is shown in Figure 1.

28. According to the ToC, success would depend on several key assumptions:

(i) the programme would attract high calibre research managers;

(ii) with support of DFID staff, links would be made between DFID research, DFID country programmes, other donors, MDBs and LMIC government initiatives;

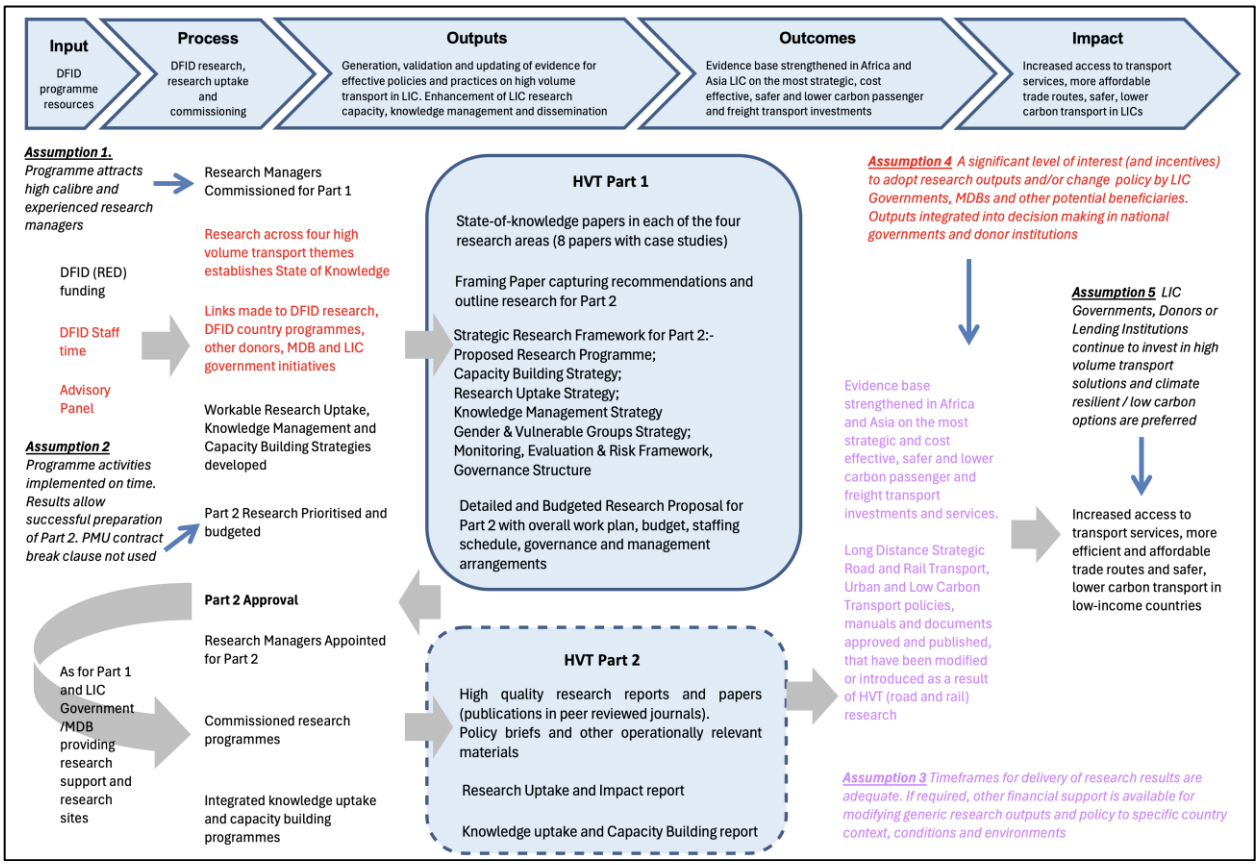
(iii) LMIC governments and MDBs would provide research support and research sites;

(iv) Projects would be given enough time to deliver research results and, if needed, other financial support would be available to further adapt research outputs to LMIC contexts;

(v) Significant interest (and incentives) from LMIC governments, MDBs and other potential beneficiaries to adopt research outputs and/or change policy by, with scope for research outputs to be integrated into the decision making of LMIC governments and donor institutions;

(vi) Governments, donors and lending institutions would continue to invest in high volume transport solutions and would prefer climate resilient and low carbon options (ibid.).

Figure 1: Theory of change in the HVT Business Case



LIC = lower income country, MDB = multilateral development bank.
Source: DFID 2016.

29. The main identified risk was that the programme would have limited influence on policy and decision-making by LMIC governments, multilaterals and other investors (DFID 2016). To mitigate this risk, HVT would work closely with multilaterals, recipient governments and the wider research community and would be guided by a dedicated research uptake strategy.

4. Implementation arrangements

30. The business case discussed several alternative arrangements for HVT implementation. These included having a MDB or UK research council manage the programme, contracting a service provider or research programme consortium (RPC) to deliver the programme and undertake most of the research, and contracting a managing agent to operate a PMU that would competitively procure research suppliers to carry out the HVT research projects. Although the business case did not conclusively state which implementation option would be used, the PMU

option was referred to as the preferred option. A PMU had been used successfully by AFCAP1 and was now being used by ReCAP.

31. The business case provided only limited guidance on how HVT would go about procurement. The services of the managing agent or RPC would be procured based on a request for proposals with detailed TOR. The approach to procurement of research suppliers would be proposed by the PMU as part of an overall plan for Part 2 research to be prepared at the end of Part 1. This was expected to include use of open calls inviting research suppliers to propose innovative technologies and methods for addressing important issues within the HVT themes.

5. Oversight, steering and technical advice

32. Under the SEACAP, AFCAP1 and ReCAP programmes, some form of LMIC buy-in and ownership needed to be established before or during a project if there were to be prospects of uptake at country-level. This was done by working closely with a limited number of partner countries and involving them in an executive committee responsible for programme-level decision-making and oversight and a research steering committee. A technical advisory panel, comprised of respected technical experts in various fields transport, assisted on quality assurance, and provided advice on addressing technical issues on an as-needed basis.

33. The HVT business case adopted some of these implementation arrangements but not all. A research management committee would oversee the selection and management of research projects but no indications were given of its membership. A technical advisory panel would support quality assurance and provide technical advice. Programme-level decision making and oversight would be the responsibility of DFID and an “executive body/research management committee.” While DFID and the PMU were to be represented on this committee, no indication was given of whether LMIC representatives, MDBs or other stakeholders would be included.

III. PROGRAMME IMPLEMENTATION

34. After approval of the HVT business case and recruitment of the PMU, it was the role of the PMU to define detailed implementation arrangements and activities, and to lead and manage programme implementation, as agreed with FCDO. As explained below, although most of the actual implementation arrangements and programme activities were similar to those envisaged in the business case, there were some notable differences.

A. Stages of implementation

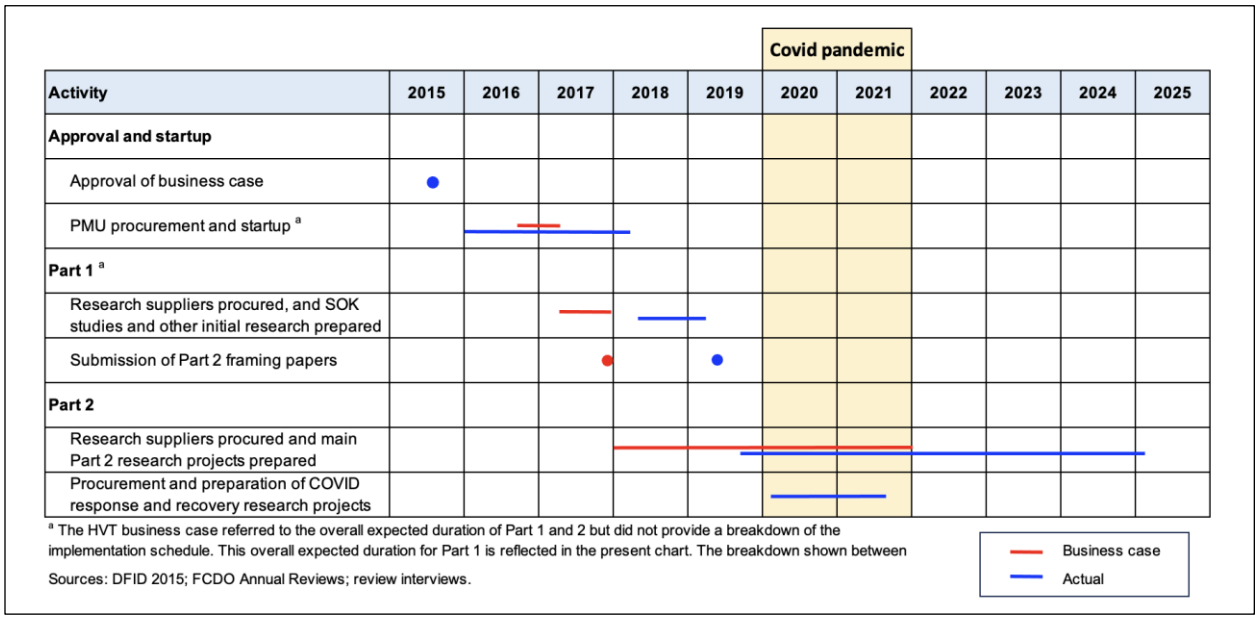
35. The programme was implemented in a number of stages. These are summarised below:

- Selection and mobilisation of the managing agent to operate the PMU
- Part 1:
  - Preparation of detailed implementation arrangements and activities
  - Strategic positioning studies: SOK studies to identify and prioritise research gaps in high-volume transport, and country scoping studies in selected countries to identify potential research needs
  - First batch of small technology innovation projects under the Transport-Technology Research and Innovation for International Development subprogramme (T-TRIID)
  - Submission and approval of the Part 2 Research Framing Paper
- Part 2:
  - Submission and approval of research uptake, capacity building and knowledge management strategy papers (IMC 2020c);
  - Main Part 2 research programme initiated through open calls
  - Covid-19 pandemic: much of the Part 2 research was delayed, but HVT temporarily repurposed some of its capacity to supporting research activities to help LMICs respond to and recover from the effects of the pandemic in the transport sector:
    - Covid-19 response and recovery research subprogramme of small research projects procured through open calls (using T-TRIID procurement model)
    - Collecting and disseminating research and data on how Covid-19 was affecting transport in LMICs, measures LMICs and other countries were using in the transport sector, and details of best practice approaches
  - Full implementation of main Part 2 programme resumed after Covid-19 restrictions were lifted
  - Second batch of T-TRIID projects
  - Research studies to support the global agenda on sustainable transport.

B. Implementation schedule

36. It took about nine years to implement HVT compared with five years indicated in the business case. This is shown in Figure 2.

Figure 2: Comparison of business case and actual implementation schedule



Source: DFID 2015; FCDO Annual Reviews; review interviews.

37. The main causes of delay were that (i) DFID procurement of the PMU managing agent[8] was completed about a year later than in the business case,[9] (ii) Part 1 procurement of research suppliers, preparation of research and formulation of Part 2 framing paper took about four months longer than in the business case; (iii) after the Part 2 framing papers were submitted by the PMU, there was a delay of about six months while DFID reviewed the proposals and decided whether to proceed to Part 2; (iv) the COVID-19 pandemic began less than six months after the start of Part 2, and over the following 18–24 months the imposition of physical distancing, travel and other restrictions in most countries led to delays in contracted research projects and deferral of other projects until restrictions were lifted. These delays were outside of the PMU's control.

38. A further cause of delay was that in both 2020 and 2023, the HVT budget was reduced as part of overall budgetary adjustments by the UK government.[10] The 2020 cut led to the PMU having to cancel a major open call for research in Asia after already receiving good quality proposals from bidders. It took three years before the PMU was in a position to revive the Asia open call.[11] In 2023, further budget custs meant the PMU had to reduce the scope of Part 2 research during the final two years of the programme.

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8 The managing agent contract was awarded to IMC Worldwide. In March 2022, IMC Worldwide was acquired by DT Global which took over as PMU managing agent.

9 DFID initially tried to procure an RPC to deliver the programme but received no bids that were technically or commercially suitable. Compared with having a PMU procure and manage large numbers of research suppliers, a capable RPC might have been more effective and efficient in leading and managing the programme and achieving uptake. DFID therefore reverted to procuring a PMU (DFID 2017). After issuing the tender notice in May 2016, a preferred bidder was identified in October 2016 but the contract was not awarded until October 2017 due to the time required for tender clarifications and providing Ministers with supporting information, followed by suspension of DFID decision-making due to purdah for the June 2017 general election (DFID 2018b).

10 In November 2020, the UK Government announced that aid spending would fall from 0.7% to 0.5% of gross national income as a temporary measure in response to the effects of the pandemic on public finances and the economy.

11 Due to the earlier cancellation, when a further Asia open call was issued in October 2023 it attracted less response from research suppliers.

39. When the PMU team was mobilised a year into the five-year implementation period, DFID revised the programme competion date from January 2021 to January 2023 to allow for the initial procurement delays (DFID 2018). Following the delays in completion of Part 1 and commencement of Part 2, and the delays in Part 2 research due to the Covid-19 pandemic, FCDO further revised the completion date to January 2025 (FCDO 2022).

40. Another issue that affected programme implementation was changes in key personnel responsible. Over the implementation period, there were four different DFID/FCDO programme responsible owners (PROs) for the programme and three different PMU team leaders (including a change of team leader only 3–4 months after startup).[12] There was also substantial turnover of other PMU staff, including project managers, technical leads and communications specialists. Given the extended duration of the programme, some level of staff turnover was be expected. There was significant turnover during the Covid-19 pandemic. The takeover of the PMU managing agent by another company (footnote 8) also led to some staff turnover.

41. Interviews with PMU staff and research suppliers indicated that the delays, the Covid-19 pandemic, budget cuts and frequent changes of key personnel meant that from soon after mobilisation, and over much of the implementation period, the PMU was under pressure from DFID/FCDO to proceed with the programme activities and deliver research outputs and publications. These various disruptions impeded implementation and created added uncertainties and discontinuities (e.g. planned procurements having to be postponed),

42. Interviews also provided some insights on how the expertise of the PMU changed over the course of programme implemenation. During Part 1 and the early stage of Part 2, the PMU had capable technical leads who played useful roles in shaping the research programme, and provided helpful advice and guidance to research suppliers. After that, technical review panel members provided quality assurance support for projects, and the technical leads were gradually replaced by research project managers whose role was to supervise delivery of the research projects.

C. Theory of change update

43. In 2021, FCDO made some minor changes to the ToC. While the original ToC continued to provide a suitable basis for guiding the programme, minor updates in format were made “to ensure the linkages between each stage [were] clear,” and some of the ToC assumptions were slightly updated (FCDO 2021). These were useful refinements but did not materially affect the research uptake delivery mechanism envisaged by the ToC. The updated ToC is in Appendix E.

D. Programme oversight, steering and technical advice structures

44. The HVT business case adopted some but not all of the coordination and decision-making structures referred to in the business case.

45. During Part 1, DFID and the PMU were part of a programme steering committee that met several times (DFID 2018b; 2019). This included inputs from independent technical experts. It

[12] By the time the contract for the PMU managing agent was awarded, the nominated team leader had only 3–4 months left before retirement. Some other nominated PMU team members were already engaged on other assignments so substitutes had to be identified.

seems that neither LMICs nor MDBs were represented on the committee.[13] After the start of the Covid-19 pandemic, the annual reviews make no further mention of a steering committee. In early 2020, shortly before the Covid-19 pandemic, the PMU prepared a Steering Committee Brief on the status of programme implementation (IMC 2020b), but it seems that during the pandemic this committee was discountinued and programme oversight and decision-making were expedited through bilateral programme management meetings between FCDO and the PMU without involving other stakeholders.

46. Similar to the previous DFID research programmes, HVT established a technical advisory panel comprised of independent experts. The experts were mainly from developed countries but included some experts from LMICs. The PMU drew upon panel members in evaluating tender submissions, conducting project quality assurance reviews, and obtaining other technical advice. The panel included leading experts in various fields of transport and seems to have provided useful technical advice over the course of the programme. In the case of some of the open call awards, it was harder to find independent expertise to cover the diversity of project ideas proposed by research suppliers. While most interviewed research suppliers valued the inputs of technical review panel members, some said panel members could not always offer useful advice as in some cases they lacked specialist knowledge of the topic in question.

47. Since LMICs, MDBs and other stakeholders had little or no role in programme management and research selection, at key points in implementation the PMU and research suppliers held various subregional workshops and other events to discuss the activities of the programme and obtain feedback from LMICs. These workshops helped to raise awareness about the HVT programme and its activities, and helped the PMU to confirm some of the priority issues for research in African and South Asian partner countries. However, in the absence of LMIC representation in the programme management and research steering arrangements, most of the partner government governments and other country insitutions had little direct involvement with the programme so it was more difficult to attract senior representatives and higher level engagement at the workshops.

E. Procurement model and plan

48. During Part 1, the PMU developed three options for procurement of research suppliers:

(i) **Open calls** for co-created research in a broad area, to be awarded to suppliers that can demonstrate innovation, a clear pathway to impact, value-for-money and involvement of partners from LMICs.

(ii) **Direct procurement** against a defined scope and TOR.

(iii) **Collaboration and partnerships** to leverage work already underway and capitalise on agreed cofunding arrangements allowing for quick wins.

49. To support a systematic approach to procurement, in compliance with UK government procurement rules, the PMU prepared a comprehensive procurement manual setting out the detailed procedures for use of the different procurement options depending on size of contract (IMC 2019; DT Global 2023).

[13] The 2019 DFID Annual Review mentioned three steering committee meetings during the year and the possibility of inviting ADB, World Bank, and the World Road Congress/PIARC to join the “programme steering committee” (DFID 2019).

50. The PMU's Part 2 Research Framing Paper developed the procurement plan for Part 2 drawing upon the findings of the SOKs and the other Part 1 activities. This is shown in Table 2.

Table 2: Summary of HVT procurement plan for Part 2 research

Procurement call	Number of procurements				Cost (£ million)	
	Theme 1: Long distance road and rail transport	Theme 2: Urban transport	Theme 3: Low carbon transport	Sub-total	Unit cost	Total cost
Open calls						
Climate	1	1		2	2.5	**5.0**
Policy and regulation	1	1	1	3	0.4	**1.2**
Technology and innovation	1	1	1	3	0.5	**1.5**
Decision Support	1			1	0.4	**0.4**
Subtotal	4	3	2	9		**8.1**
Defined/Direct calls						
Inclusion	1	1		2	0.3	**0.6**
Capacity building and research uptake						**2.0**
Disability document and World Road Congress						**0.2**
Multi-Donor Trust Fund						**0.6**
Research quality assurance and communications						**0.5**
Disability document and World Road Congress						
Subtotal	1	1		2		**3.9**
Total	**5**	**4**	**2**	**11**		**12.0**

WRC = World Road Congress.
Source: IMC 2019.

51. The procurement plan included a total of eleven calls, often with multiple awards per call. There were nine thematic open calls for a total of £8.1, each covering one of the three themes selected for Part 2. Two of these were for large projects on the cross-cutting theme of climate change in long distance road and rail transport, and urban transport, each for £2.5 million and expected to take 3–4 years. The other seven covered the cross-cutting themes of policy and regulation, technology and innovation, and decision support in long distance road and rail transport, urban transport and low carbon transport, at an average cost of £400,000 and expected duration of 18–24 months. The four defined/thematic direct calls included research projects on inclusion and disability, each for £300,000; a £2 million project on capacity building and uptake support; and £500,000 for programme quality assurance and communications.

F. Research programme selection

52. The previous DFID transport research programmes based their research strategy around addressing a selection of critical engineering and non-engineering issues affecting rural access in a selected group of LMICs. The LMICs and MDB financing partners were involved in proposing and selecting the research areas and research projects. This helped to ensure their support for and involvement in the research projects, which contributed to uptake and the likelihood of project-related capacity building being effective.

53. HVT adopted a different approach. Its broad scope included complex transport subsectors and cross-cutting dimensions that DFID had not previously supported through research

programmes. This made it harder to know which areas of HVT research could make the greatest contribution to LMICs, and more difficult to frame reliable TOR for recruiting research suppliers to conduct specific HVT research projects. The SOK studies in Part 1 helped to inform the programme of the range of subsector and thematic transport issues and research gaps in LMICs, but each SOK study identifed many more priorities for research than the HVT programme could hope to cover The procurement plan for part 2 research (Table 2) provided a form of guiding framework for the research programme but only a very loose one. In practice, most of the HVT procurement used open calls that provided bidders only fairly minimal guidance about the broad thematic area to be addressed, leaving it for bidders to propose the type of research project and the LMICs to be covered.[14]

54. This approach had some notable advantages and disadvantages. The HVT open calls attracted significant interest from researchers, technology developers, consultants and practitioners, and led to many good quality research projects and, in some cases, to research on new and innovative technologies and approaches to transport (Chapter III). Many of the larger open call projects were proposed by more experienced research suppliers who drew upon their relationships with LMIC authorities to identify research projects aligned with country priorities, and benefited from government interest and support. This led to well-chosen research projects that attracted favourable levels of LMIC update. In general, open calls allowed bidders flexibilty to suggest innovative research ideas, and to propose research in response to current challenges. Open calls can also simplify and speed up the process of procuring research suppliers by reducing or removing the need for conducting preparatory studies and preparing detailed TOR. The main disadvantage of open calls was that most of the research projects and research countries were selected by research suppliers without involvement of LMIC governments, other LMIC institutions, or MDBs. This generated a diverse scatter of different projects with few linkages between projects, and made LMIC uptake and capacity building more difficult.

G. Types and costs of research undertaken

55. The 99 HVT projects approved by April 2024 covered a wide range of different types of research.[15] The main categories of research projects and their costs are summarised in Table 3.

56. In Part 1, seven SOKs, five country scoping studies and a policy brief were prepared to support the strategic positioning of the programme at a cost of £1.28 million. The cost of the SOKs for Themes 1–3 ranged from £270,000 to £320,000. The SOK on Theme 4 was separated into a series of smaller SOKs on road safety, gender, and age and disability. While these studies were ongoing, a first batch of T-TRIID small-scale technology research projects (T-TRIID 1) were implemented, each costing between £25,000 and £50,000.

57. In Part 2, the main HVT research programme covered topics identified for open and defined/direct calls in the procurement plan. These included nine large projects each costing between £450,000 and £650,000. Most of the other studies cost between £100,000 and £200,000. The Covid-19 response and recovery projects initated early in Part 2 prepared small studies on the effects of the pandemic on people's mobility, and identify options for improved responses and recovery mechanisms. Each study cost less than £50,000. After the pandemic, a second batch of T-TRIID small-scale technology research projects (T-TRIID 2) was implemented. During Part 2, HVT also financed a number of research projects to support aspects of the global sustainable transport agenda, including research on mechanisms for improving transport data and tracking,

[14] To build up HVT's work in South Asia, some of the open calls limited bidders to proposing research in HVT partner countries in South Asia.

[15] The PMU awarded three further research projects after April 2024. These were not considered by the review due to lack of available reports and other data.

supporting improved nationally-determined contributions and climate finance. There were two larger contracts for £250,000 and five smaller contracts. A final category of Part 2 projects supported research uptake. The cost of these projects ranged from £15,000 and £90,000.

Table 3: Number of costs of HVT projects by research project category, April 2024

	HVT Programme [a]		
Research project category	**Projects**	**Cost (£)**	**Main focus of research projects**
Strategic positioning	13	1,281,730	SOK studies of the four broad HVT themes, country scoping studies, policy brief
T-TRIID 1	10	289,416	Small technology innovation projects
Part 2 research	30	6,681,429	The main research programme on the HVT themes and cross-cutting themes mainly awarded through open calls
COVID-19 response and recovery	21	504,975	Small research projects on the effect of Covid-19 on transport in LMIC, and the options for response and recovery
T-TRIID 2	9	344,396	Small technology innovation projects
Global sustainable transport agenda	7	821,438	Studies contributing to larger agendas of global-level research
Uptake support	6	305,556	Research dissemination, participation in global conferences, awareness raising among LMIC parliamentarians
Programme management	3	568,171	Quality assurance, T-TRIID management
Total	**99**	**10,800,111**	

T-TRIID = Transport-Technology Research and Innovation for International Development.
[a] The PMU awarded three further research projects after April 2024. These were not considered by the review due to lack of available reports and other data.
Source: PMU project database; Consultant.

58. There were also three projects that financed support for aspects of programme management and quality assurance rather than research. These included larger contracts of about £350,000 for quality assurance services and £190,000 for T-TRIID management.

59. Table 4 summarises the subsector focus of the 99 HVT research projects. Sectorwide research was the largest subsector, accounting for 39 projects and 39% of research spending. These included most of the projects supporting the global sustainable transport agenda, the SOKs on low carbon transport and inclusion, the country scoping studies, much of climate change research, and most of the uptake support. Urban transport and the road subsector were the other major HVT subsectors. There were 36 urban transport projects accounting for 29% of research spending, and 15 road projects for 18% of research spending. There were also six research projects on active mobility and paratransit together accounting for 7% of research spending.

Table 4: HVT project numbers and expenditures by transport subsector

Subsector	Number of projects	Cost of projects (£)	Share of total HVT research cost (%)	Average project cost (£)
Road	15	1,924,577	18	128,305
Rail	1	461,167	4	461,167
Road and rail	1	315,716	3	315,716
Urban transport	36	3,138,465	29	87,180
Active mobility & paratransit	6	767,734	7	109,676
Sectorwide	39	4,192,452	39	107,499
Total	**99**	**10,800,111**	**100**	**108,0921**

Source: PMU project database; Consultant.

60. In addition to their subsector focus, HVT projects included cross-cutting themes. Table 5 shows the main cross-cutting themes supported by the research projects. Reflecting the emphasis of the business case, the leading cross-cutting theme was climate change. It was examined by a third of research projects accounting for half of project expenditure. The other main cross-cutting theme was inclusion, including with respect to gender, disability, children and elderly, and other disadvantaged and vulnerable groups.

Table 5: HVT project numbers and expenditures by main cross-cutting theme

Main cross-cutting theme	Number of projects	Cost of projects (£)	Share of total HVT research cost (%)	Average project cost (£)
Climate change	30	5,439,004	50	181,300
Inclusion	34	2,590,418	24	76,189
Road safety	11	389,146	4	35,377
Decision support systems & data	18	1,636,009	15	90,889
All main HVT themes	6	745,535	7	124,256
Total	**99**	**10,800,111**	**100**	**109,292**

Source: PMU project database; Consultant.

H. Distribution of HVT research by subregion and partner country

61. As shown in Table 6, the geographical focus of the HVT research projects varied widely. About half of research expenditure and 60% of projects was for country-level research. Some 27 projects and 38% of research spending was for country-level research in several partner countries. This included projects on new and improved methods for use in multiple partner countries (e.g. Transitions project, City Retrofit for All project) and other projects that used research on multiple countries to develop generalised findings and proposals (e.g. some of the Covid-19 response and recovery studies). A further 32 projects, equivalent to only 12% of research expenditure, conducted country-level research on a single LMIC. The projects were often small, including many of the T-TRIID and Covid-19 response and recovery projects.

Table 6: HVT project numbers by geographical focus

Main cross-cutting theme	Number of projects	Cost of projects (£)	Share of total HVT research cost (%)	Average project cost (£)
Country	32	1,310,583	12	40,956
Multiple countries	27	4,285,394	38	158,718
Regional: Africa	13	980,652	9	191,838
Regional: Africa and Asia	13	1,687,579	16	191,838
Global	28	2,710,243	25	96,794
Total	**99**	**10,800,111**	**100**	**108,001**

Source: PMU project database; Consultant.

62. The remaining 50% of research expenditure was for global and regional projects. This was split roughly equally between the 28 global projects and 26 regional projects. Many of the global and regional projects prepared good practice guides, toolkits, guidelines and policy guides with the intention these might be useful for many LMICs (e.g. decision support systems, road safety guide, road design guidelines, guidelines on inclusion). Another significant group of global studies conducted research contributing to the global agenda on sustainable transport. These studies also complemented FCDO's leadership role in SuM4All and other global transport initiatives (para. 18). They included projects on transport indicators and data, next-generation transport sector nationally-determined contributions (NDCs), and climate finance. The regional projects also included the SOK papers, regional uptake support projects (e.g. HVT ambassadors, climate roundtables with African and Asian parliamentarians), and several larger projects to develop regionally-applicable solutions based on field-research in multiple partner countries (e.g. Empower 1 and 2). While some global and regional projects included substantial country-level research, others were based on literature reviews, desk studies and remote surveys.

63. Table 7 provides details of the distribution of research spending by HVT partner country, based on the PMU's record of project expenditures allocated by partner country. Total country-level spending amounted to £5.4 million equivalent to half the total HVT research expenditure. This included country-level projects, involvement in projects covering multiple countries, and county-level research within regional and global projects.[16]

64. Although HVT had 30 partner countries, in practice nine partner countries—Ethiopia, India, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda and Zambia—accounted for 85% of country-level research spending and 37% of total HVT research expenditure. Spending in these countries covered multiple projects, and the level of research spending ranged from about £267,000 in Nigeria and Zambia to about £973,000 in Ethiopia. Most of the other 21 partner countries had only limited involvement in the research programme. The average research spending on these countries was only £67,000.

[16] Global and regional project expenditures not allocated to countries were excluded.

Table 7: Distribution of country-level research spending by country and subregion

Partner country	Number of project involvements	Research cost (£)	Country share (%)
Africa			
Burundi	3	13,523	0.2
Cameroon	3	30,180	0.6
DRC	2	101,250	1.9
Egypt	1	1,397	0.0
Ethiopia	8	973,053	17.9
Gambia	1	909	0.0
Ghana	6	144,741	2.7
Kenya	12	218,436	4.0
Liberia	4	8,663	0.2
Madagascar	1	2,857	0.1
Malawi	4	156,176	2.9
Morocco	1	6,857	0.1
Mozambique	3	126,801	2.3
Nigeria	9	267,404	4.9
Rwanda	7	390,375	7.2
Senegal	1	6,857	0.1
Sierra Leone	7	374,647	6.9
South Africa	5	207,661	3.8
South Sudan	2	3,159	0.1
Tanzania	13	675,299	12.5
Uganda	14	634,498	11.7
Zambia	6	267,335	4.9
Zimbabwe	1	92,533	1.7
Subtotal	**114**	**4,704,614**	**86.8**
Asia			
Afghanistan	2	9,724	0.2
Bangladesh	9	136,415	2.5
India	10	370,832	6.8
Myanmar	1	1,397	0.0
Nepal	7	135,645	2.5
Pakistan	6	58,645	1.1
Sri Lanka	1	4,286	0.1
Subtotal	**36**	**716943**	**13.2**
TOTAL	**150**	**5,421,557**	**100.0**
Of which: Shaded countries	74	3,953,444	72.9
Other countries	76	1,468,113	27.1

Source: PMU; Consultant.

IV. RESEARCH ACTIVITIES

A. Introduction

65. This chapter examines the research activities financed by HVT and assesses the quality and innovation of the research produced, based on review and analysis of a representative sample of HVT research projects.

B. Sample of projects examined

66. The review of HVT research project quality and innovation and the assessment of research uptake in Chapter V examined a sample of 66 of the 99 HVT research projects. Only projects that had been completed or had already produced substantial outputs were included in the sample. Most projects met this requirement except for some awarded only a short time before the review was prepared. The few projects that funded programme management support (e.g. quality assurance) rather than research were also not included. Details of the sample of HVT research projects are provided in Appendix F

67. The 66 projects in the sample accounted for 67% of HVT projects and 84% of HVT research cost. The sample included two or more projects in from each research project category.[17] As the sample size is large relative to the total HVT rewsearch programme, and dovers each of the main research project categories, it may be considered broadly representative of the programme as a whole and its main parts. The sample coverage of each of the main research project categories is compared with the total HVT research programme in Table 8.

Table 8: Review sample compared with total number of HVT research projects, April 2024

	HVT Programme [a]		Review sample	
Research project category	**Projects**	**Cost (£)**	**Projects**	**Cost (£)**
Strategic positioning	13	1,281,730	9	1,102,185
T-TRIID 1	10	289,416	9	259,441
Part 2 research	30	6,681,429	23	6,391,180
COVID-19 response and recovery	21	504,975	11	242,863
T-TRIID 2	9	344,396	8	320,531
Global sustainable transport agenda	7	821,438	2	499,436
Uptake support	6	305,556	4	272,280
Programme management	3	568,171	–	–
	99	**10,800,111**	**66**	**9,087,916**

T-TRIID = Transport-Technology Research and Innovation for International Development.
[a] The PMU awarded three further research projects after April 2024. These were not considered by the review due to lack of available reports and other data.
Source: PMU project database; Consultant.

[17] The only under-represented category of projects was research to support aspects of the global sustainable transport agenda. When the review was prepared, many of these projects had only recently been awarded and had yet to produce significant outputs. While it was too early to assess the performance of such projects, some discussion of their potential is included in Chapters IV and V.

C. Types of research conducted

68. Before discussing the performance of the sample projects, it is useful to take stock of the range of different types of outputs they produced. These are presented in Table 9. The most numerous and costly types of research output were engineering research, literature reviews, best practice studies, toolkits engineering guidelines, prototype trials, guidelines and case studies. A series of large engineering research projects developed improved, climate-proofed design solutions and prepared updated overseas road notes, with a view to these being incorporated in national manuals for large scale uptake. The SOK literature reviews were large scale studies prepared by leading practitioners and academics. A variety of often larger projects developed policy briefs, toolkits, best practice studies and policy briefs intended for use by particular LMICs, groups of LMICs, or LMICs in general. There were many relatively small studies, particularly case studies to produce country-level evidence on transport issues requiring attention, and small-scale prototype trials of promising technologies. A series of smaller projects also financed improved approaches to HVT research dissemination, country visits to support uptake of major engineering research ouputs, and roundtables with African and Asian parliamentarians.

Table 9: Research outputs and costs of sample projects

Type of research output [a]	Number of projects	Cost of projects (£)	Average cost per project (£)
Literature review	5	1,241,524	248,305
Country scoping	5	110,566	22,113
Case study	16	690,656	44,216
Prototype trial	10	752,031	75,203
Engineering research	7	2,614,430	373,490
Guidelines	3	744,068	248,023
Toolkit	3	758,275	252,758
Policy brief	7	390,872	55,839
Best practice study	3	956,779	318,926
Global sustainable transport agenda	2	499,436	249,718
Research uptake support	5	329,280	65,856
	66	**9,087,916**	**137,696**

[a] For projects that produced more than one output, the principal or leading output is considered.
Source: PMU; Consultant.

D. Assessment of quality and innovation of sample projects

69. The quality and innovation of the 66 sample projects was assessed qualitatively on the basis of reviews of project reports and other materials produced, together with insights gained from interviewing project research suppliers, FCDO staff, PMU staff, LMIC officials, MDB officals and others. Factors considered included (i) project size, (ii) suitability of the research team, approach and methods to produce useful research outputs relevant for addressing gaps in high-volume transport provision in LMICs, (iii) the quality of reports and other research outputs produced, taking into account the extent, depth and reliability of research produced, and (iv) the inclusion of innovative aspects of research, such as new methods and technologies capable of addressing limitations in high-volume transport in LMICs, and use of promising new approaches and methods for conducting the transport research. Details of the main outputs and the assessed quality and innovation of each sample project are provided in Appendix G. In Table 10, the findings

of the project assessments are summarised by HVT project category in terms of the number, share and cost of projects with high, moderate and low rated quality and innovation.

70. The external review found that all sample projects were found to have produced research of high or moderate quality. This reflects several factors including:

- the approach to procurement of research was successful in attracting many leading transport research suppliers across the wide range of subjects covered by HVT;
- with the support of PMU project managers and experts from the technical advisory panel, the PMU carefully monitored the implementation of the research projects, holding regular progress meetings with many of the research suppliers (e.g. less experienced ones);
- the PMU also provided substantial support for report editing, which helped ensure that useful research prepared by some less experienced LMIC research suppliers was able to meet quality standards required for publication.

Table 10: Assessed quality and innovation of sample HVT research projects

Project category	Number of projects			Share of number of projects by category (%)			Share of cost of projects by category (%)		
	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low
Strategic positioning	3	6	-	33	67	0	61	39	0
T-TRIID 1	3	6	-	33	67	0	33	67	0
Part 2 research	21	2	-	91	9	0	89	11	0
Covid-19 response and recovery	8	3	-	73	27	0	82	18	0
T-TRIID 2	7	1	-	88	13	0	92	8	0
Global sustainable transport agenda	2	-	-	100	0	0	100	0	0
Uptake support	4	-	-	100	0	0	100	0	0
Total	**48**	**18**	**-**	**73**	**27**	**0**	**85**	**15**	**0**
Total = 66 projects									

Source: PMU; Consultant.

71. A total of 48 projects, equivalent to 73% of the review sample, were rated high for quality and innovation, and 18 were rated moderate. High-rated projects accounted for 85% of the total expenditure on sample projects. Among the HVT project categories, those implemented in Part 1 (strategic positioning studies and T-TRIID 1), and the Covid-19 response and recovery projects, had lower ratings for quality and innovation. Apart from Covid-19 projects, the project categories implemented in Part 2 (Part 2 research, Covid-19 response and recovery, T-TRIID 2, uptake support and support for the global sustainable transport agenda) were in most cases rated high for quality and innovation.

72. **Strategic positioning projects.** The SOK studies on urban transport, low carbon transport and inclusion were of high quality and played a key role in the strategic positioning of the programme. They provided relatively comprehensive reviews of the literature, issues, research gaps and priority areas for future research. While a variety of other literature reviews were already available in these areas, and practitioners were familiar with many of the issues discussed, it was useful to bring together and make sense of the array of available knowledge, and to use this to guide selection of the main HVT research activities. In the case of the SOK

study on road and rail, the coverage of roads was of a high standard and identified a wide range of relevant research needs (including on topics such as border crossing arrangements and corridor management that were not pursued in the research programme). The railways portion also provided a limited overview of aspects of the railway sector in Africa and South Asia and offered little evidence of the railway situation in particular LMICs or types of LMICs.

73. Short country scoping studies, supported by one-week country-visits, were used to identify possible research projects for Part 2 in five LMIC partner countries. These studies were of moderately good quality. The Bangladesh, Rwanda, Uganda and Zambia scoping studies, which were jointly financed by HVT and the UK's Energy and Economic Growth research programme (EEG), examined options for research on low-carbon transport. The study proposals were often high-level, with only limited consideration of how HVT research could be linked to government policies and plans. The Ghana scoping study, requested by FCDO Post in Accra, provided an input to a multi-partner initiative to improve transport along Ghana's north–south corridor.

74. **T-TRIID 1.** This was DFID's first use of technology competitions to provide seed money for proof-of-concept and prototype stage development of innovative ideas on improving transport in LMICs. It built on the model developed by the Transport Technology Research and Innovation Grant (T-TRIG) competition used by the UK Department of Transport (DfT), and involved close cooperation between the PMU, DfT and the Knowledge Transfer Network (DFID 2020).

75. Among the nine T-TRIID 1 projects in the review sample, three were rated high for quality and innovation. These covered Promoting Safety in Urban Transport, a Network Explorer Bus Network Analysis Tool, and a 'Kids' Court' road safety interventions to support enforcement of safe driving speeds. Each of these projects was innovative. The former two projects developed GPS-based software tools to improve the convenience and safety of public transport in LMICs, while the latter project adapted a community road safety model for use in African contexts (Amend 2019). Two of the six moderate-quality T-TRIID 1 projects covered adaptation of vehicle technologies to reduce carbon emissions. Both produced inconclusive results about the effectiveness of the technologies proposed. The other four projects were to develop software applications or platforms to improve transport planning, monitor driver drousiness, link commuters with last mile transport services, and develop a low-cost rural logistics network. T-TRIID 1 generally financed only a limited part of what would be needed to demonstrate proof-of-concept.

76. For a competition of this kind, providing small-scale seed financing for potentially innovative ideas, it is normal to expect a relatively high failure rate. It is therefore reasonable to conclude that, having produced three high quality, innovative proposals, T-TRIID 1 was successful in attracting promising research project opportunities and helped to confirm the merits of including such technology competitions in DFID transport research. The lessons from T-TRIID 1 then informed the approach to the later T-TRIID 2 subprogramme.

77. **Part 2 research**. The quality and innovation of projects in the main Part 2 research programme was consistently high, with 22 projects rated high and one rated moderate. This is significant as HVT expenditure on Part 2 research accounted for two-thirds of HVT total expenditure. Many of the projects were relatively large. These included research on updating ORN31 on pavement design and ORN21 on provision for disabilities, the Climate Resilient Sustainable Road Pavement Surfacings (CRISP) project, decision-support systes for resilient transport in LMICs, informal transport services, women's use of public transport, tools for addressing women's sexual harassment in public transport, transit-oriented development (TOD), and urban transport planning using mobile phone data. There were also a series of smaller high quality projects on walking and cycling in Africa, support for development of the updating of HDM,

low emission zone proposals in India, and a study on women's role as providers and passengers of electric two- and three-wheelers. Many of these involved extensive research in partner countries. The quality of work produced was generally suitable for use as an input in transport policy, planning and investment in partner countries. The one project that was rated moderate for quality and innovation concerned novel railway traction in Africa. This was a large study and produced relatively high quality research. The limitation was that the costly simulation studies might not have been necessary or relevant if a simple initial assessment had been prepared to compare railway traffic levels and operational characteristics in Africa with those needed for low carbon traction options, such as hydrogen-powered trains, to be feasible.

78. **Covid-19 response and recovery**. This subprogramme followed shortly after completion of the T-TRIID 1 projects, and used a similar small-scale, open call procurement modality. Many of the projects studied the effects of the pandemic on people's mobility, focusing in particular on vulnerable groups. Building upon the transport issues revealed by the Covid-19-related research, some of the researchers developed proposals for improving public transport in the post-pandemic period. The researchers were mainly academics and consultants from partner countries. Eight of the sample projects were of high quality and three of moderate quality. Projects rated moderate for quality and innovation were often carried out by research teams that had only limited experience. In one case, the HVT funding was not enough to complete proof-of-concept.

79. **T-TRIID 2.** There was a notable improvement in research quality and innovation from T-TRIID 1 to T-TRIID 2. Seven of the T-TRIID 2 projects in the review sample were of high quality and innovation and one was of moderate quality. This was partly because a wider pool of capable research suppliers were now aware of HVT and interested to take part in T-TRIID 2. It also reflected significant efforts by FCDO and the PMU to select projects that had strong partner country linkages and good prospects for achieving uptake. Many of the projects were to improve aspects of inclusive public transport, and active mobility and paratransit, in LMICs. Many of the researchers were more proactive than in T-TRIID 1 and developed close cooperation with relevant LMIC authorities, generally at city level. The studies and proposals were therefore better informed of local policies and plans, and often benefited from access to government decision-makers. An innovative project in Kampala developed a multi-faceted initiative to tackle the problem of vehicle emissions arising from poor vehicle maintenance.

80. **Global sustainable transport agenda.** The two large sample projects in this category financed development of a transport decarbonisation index (TDI) for use in LMICs and a study on improving LMIC access to climate finance for transport.[18] The projects were still ongoing at the time of the review but had already produced high quality outputs. They were prepared by international non-profit organisations that run their own programmes on low carbon transport and climate finance. Some other global-level studies were initiated toward the end of the HVT implementation period and commenced too recently to be included in the review sample.

81. **Uptake support**. All four uptake support projects were of high quality and some were innovative. Two projects procured services of a research supplier that arranges roundtables with LMIC parliamentarians on issues about climate change. Another produced an excellent guide to HVT research findings that made it easier for readers to access the findings of HVT research, and ran a well-designed challenge competition for young engineers to propose innovative ideas on how to make transport sustainable and low carbon.

[18] Unlike many of the other projects that addressed research topics selected by the research suppliers, the idea of conducting research to examine the possibility of developing a TDI originated from the PMU.

82. **Other factors associated with high and low quality**. Table 11 analyses the quality of sample projects by transport subsector, main cross-cutting theme, geographical focus, research supplier country and research contract value.

Table 11: Influence of transport subsector, cross-cutting theme, geographical focus and research supplier origin on quality and innovation of sample HVT research projects

	Number of projects			Share of number of projects by category (%)			Share of cost of projects by category (%)		
Project category	**High**	**Moderate**	**Low**	**High**	**Moderate**	**Low**	**High**	**Moderate**	**Low**
Transport subsector									
Road	8	2	-	80	20	-	97	3	-
Rail	-	1	-	-	100	-	-	100	-
Road and rail	-	1	-	-	100	-	-	100	-
Urban transport	24	5	-	83	17	-	97	3	-
Active mobility & paratransit	4	2	-	67	33	-	82	18	-
Sectorwide	12	7	-	63	37	-	86	14	-
Subtotal	**48**	**18**	**-**	**73**	**27**	**-**	**85**	**15**	**-**
Main cross-cutting theme									
Climate change	15	8	-	65	35	-	82	18	-
Inclusion	19	7	-	73	27	-	84	16	-
Road safety	6	2	-	75	25	-	82	18	-
Decision support systems & data	6	1	-	86	14	-	98	2	-
All main HVT themes	2	-	-	100	-	-	100	-	-
Subtotal	**48**	**18**	**-**	**73**	**27**	**-**	**85**	**15**	**-**
Geographical focus									
Country	14	12	-	53	47	-	74	26	-
Multiple countries	16	4	-	80	20	-	93	7	-
Regional	8	2	-	80	20	-	60	40	-
Global	10	-	-	100	-	-	100	-	-
Subtotal	**48**	**18**	**-**	**73**	**27**	**-**	**85**	**15**	**-**
Research supplier country									
Developed countries	30	8	-	79	21	-	85	15	-
African LMICs	8	7	-	53	47	-	85	15	-
Asian LMICs	10	3	-	77	23	-	85	15	-
Subtotal	**48**	**18**	**-**	**73**	**27**	**-**	**85**	**15**	**-**
Research contract value									
Up to £50,000	18	15	-	55	45	-	59	41	-
£50,000–100,000	10	-	-	100	-	-	100	-	-
£100,000–200,000	6	-	-	100	-	-	100	-	-
Over £200,000	14	3	-	82	18	-	85	15	-
Subtotal	**48**	**18**	**-**	**73**	**27**	**-**	**85**	**15**	**-**
Total = 66 projects									

Source: PMU; Consultant

83. This analysis supports the following additional observations about factors associated with high and low quality and innovation:

- Urban transport and road research projects were generally of high quality, with 97% of expenditure on such projects rated high for quality and innovation;
- Active mobility and sectorwide research was generally of high quality.
- Most of the research projects on HVT's main cross-cutting themes was of high quality;
- Country-focused projects was often of better quality than global and regional projects, and multi-country projects.
- Although LMIC research suppliers only accounted for a relatively small proportion of HVT research expenditure and often worked on smaller projects, research suppliers from developed countries, Africa and Asia all achieved a similar proportion of high quality projects (85%) and moderate quality projects (15%).
- All sample projects with a contract value between £50,000 and £200,000 were of high quality. Projects below £50,000 had a much lower quality rating, mainly because of the lower share of T-TRIID 1 projects rated high for quality and innovation.

V. RESEARCH UPTAKE, KNOWLEDGE MANAGEMENT AND CAPACITY BUILDING

A. Introduction

84. This chapter considers the extent that HVT research contributed to improved approaches being adopted to address high volume transport in LMICs. Such improvements encompass tangible effects of research contributing to improvements in high-volume transport in LMICs, HVT activities that supported LMIC capacity building, and HVT knowledge management and communications activities to support research dissemination and uptake.

B. Research uptake channels

85. Drawing upon evidence available from project reports and other outputs, and interviews with key stakeholders (para. 69), the uptake of sample projects was assessed qualitatively as of October 2024, shortly before HVT programme completion. Since the size of the research projects varied considerably,[19] the extent of research uptake was assessed relative to the size of the project. Indications of uptake were obtained from project reports, FCDO annual reviews, PMU logframe reports, and interviews with research suppliers, MDBs, LMIC officials and other stakeholders.

86. In practice, there can be a variety of channels for transport research to lead to tangible uptake in LMICs. Some examples of possible uptake channels for different types of HVT research outputs are illustrated in Table 12. For the types of applied research supported by HVT, it should generally be possible for research suppliers, guided by the PMU, to identify a realistic set of expected uptake channels before research projects begin, and to incorporate practical steps to bring about uptake over the course of project implementation.

Table 12: Illustration of uptake channels for different types of transport research output

Output type	Example	Example of possible research uptake channel
Literature review	• State of knowledge (SOK) studies • More narrowly-focused literature review studies	• The main uptake channel for SOK studies was through their influence on types of research undertaken in Part 2 • Literature reviews Influence policy and programmes at country-level • SOK study downloads
Country scoping	• Scoping of possible research projects in countries in Africa and South Asia	• Inclusion of projects proposed by scoping study in HVT research programme. • Identified research priorities implemented in partner countries
Case study	• Country-level case studies to gain insights on less researched topics e.g. women's sexual harassment, mobility needs of vulnerable and disadvantaged groups	• Awareness raised among citizens, transport authorities and service providers leading to implementation of new steps to address issues • Proposals/recommendations from case study implemented or refined through further research
Prototype trial	• Mobile phone apps for rideshare, network planning, safety tracking, addressing women's sexual harassment in public transport • Technologies for reducing emissions of buses and paratransit	• Prototype is effective and has been launched for wider use at country-level or attracted second-stage financing

[19] The smallest HVT research project cost less than £9,000, while the largest cost £650,000.

Output type	Example	Example of possible research uptake channel
Engineering research	• Preparation of national road manuals, Ethiopia • Field trials of alternative designs using locally available materials	• Findings incorporated in LMIC national engineering manuals and used as basis for design and implementation of road works • Downloads of manuals and other reference materials
Guidelines	• Detailed technical guidelines at country-level • Generic guidelines without specific country involvement	• Guidelines used by LMICs • Guidelines used by MDBs • Downloads
Toolkit	• Empower toolkit on inclusive transport	• Partner country authorities, operators and passengers use tools to improve public transport provision for disadvantaged and vulnerable groups • Tools used by partner country authorities to institutionalise inclusive approaches to public transport provision • Downloads
Policy brief	• Accessing climate finance for transport	• Policy proposals adopted by one or more partner country • Best practices incorporated within scope of transport projects in partner countries financed by MDBs • Downloads
Best practice study	• International best practices in transit-oriented development	
Study supporting global sustainable transport agenda	• Transport decarbonisation index, studies of LMIC transport data and indicators, climate finance study • Support for SuM4All working groups • Studies to support development of HDM-5	• Research influences regional and international transport agenda/initiatives and supports FCDO's leadership role • A supplier is contracted to implement the development of HDM-5, with prospects that, like previous versions, it will be used widely in the road sector in LMICs once available (similar to earlier versions of HDM)

HDM-5 = Highway Development and Management Model, Version 5, MDB = multilateral development bank, LMIC = low- and middle - income countries.
Source: Consultant

87. As explained in Chapter III, about half the HVT research expenditure was for projects focusing on country-level research on specific partner countries. For these projects, interviews with LMIC officials, LMIC co-reseachers and MDBs were used to corroborate country-level uptake reported by research suppliers. It was also possible to determine if anything continued after the research project, or if the activities ended when the HVT contract resources were fully utilised. In some cases, it was possible to obtain fairly detailed evidence of project uptake while in others a degree of judgement was needed, particularly if the research was still ongoing or only recently completed at the time of preparing the review.

88. The other half of the HVT research expenditure was for global and regional projects. In many cases these did not aim to develop transport solutions for specific LMIC partner countries. One subgroup of global and regional projects produced literature reviews, detailed technical studies, general guidelines, policy briefs, toolkits and best practice studies aimed at providing generalised advice to LMICs as a whole or to African or Asian LMICs. Another subgroup of global studies aimed to assist LMICs by contributing to global-level international collaboration on developing an improved global agenda for supporting sustainable, low-carbon transport in LMICs. Well-chosen UK-funded research of this kind had already played a valuable role in formulation of the SDG transport targets, and development of the SuM4All initiative and other global transport initiatives to improve transport in LMICs (para. 18).

89. In assessing the uptake of global and regional projects, interviews with FCDO and MDB officials, and other stakeholders in the global collaboration, were used to clarify the status of the

global work that HVT projects contributed to, the level of interest and support expressed by global-level stakeholders, and the possible paths and timeframes for uptake.

C. Assessment of uptake of sample projects

90. Details of the assessed uptake of the sample projects are provided in Appendix H. The number, share and cost of sample projects rated high, moderate or low for uptake is summarised in Table 13. A total of 15 sample projects (23%) were rated high for uptake, 20 projects were rated moderate (30%) and 31 were rated low (47%). Research expenditure was split roughly equally between projects rated rated high, moderate and low for uptake. The only HVT project categories that achieved relatively high levels of research uptake were the Part 2 main research projects and the T-TRIID 2 projects (roughly half of all sample projects and research expenditure rated high for uptake). The T-TRIID 1 projects and Covid-19 response and recovery projects had the lowest uptake, with more than three-quarters of projects and project expenditures on projects that achieved little or no uptake. Uptake improved considerably from T-TRIID 1 to T-TRIID 2.

Table 13: Assessed uptake from sample HVT research projects

	Number of projects			Share of number of projects by category (%)			Share of cost of projects by category (%)		
Project category	**High**	**Moderate**	**Low**	**High**	**Moderate**	**Low**	**High**	**Moderate**	**Low**
Strategic positioning	-	5	4	0	56	44	0	92	8
T-TRIID 1	-	2	7	0	11	89	0	11	89
Part 2 research	10	6	7	43	26	30	48	22	30
Covid-19 response and recovery	-	2	9	0	18	82	0	24	76
T-TRIID 2	5	2	1	50	38	13	55	37	8
Global sustainable transport agenda	-	1	1	0	50	50	0	50	50
Uptake support	-	2	2	0	50	50	0	61	39
Total	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Total = 66 projects									

Source: PMU; Consultant.

91. In a large research programme, it may be expected that some projects will not attract uptake. Some may not produce proposals that offer much improvement. Others may be difficult to implement—for example, if wider policy issues and impediments first need to be addressed or if they are unable to attract funding for further stages of research and development. Small-scale technology competitions, such as the T-TRIID subprogramme, provide a number of researchers with seed money to prepare proof-of-concept studies in the expectation that only a small number of projects will proceed to implementation or attract second-stage funding.

92. It is useful to consider several programme-level factors that influenced the uptake of research projects:

- While the ToC assumed significant interest from LMIC governments, MDBs and other potential beneficiaries to adopt HVT research outputs (para. 28), the HVT implementation arrangements did not involve LMIC governments, MDBs and other key stakeholders in steering the programme or selecting the research (para. 54).

- Even when research was of high quality and innovative, prospects for country-level uptake in LMICs generally depended upon the research suppliers having built a close working relationship with partner country institutions involved, and adapted the proposals arising from research to fit country context, policies and plans.
- Many projects were awarded in open calls that relied on research suppliers to select the research topics and the countries for country-level research (Table 2). In some cases, well-informed research suppliers identified projects that were integral to country-level policies and plans in LMICs.[20] This often led to uptake. In other cases, projects covered topics that interested the researcher but had little connection to country-level policies and plans. Uptake of such projects was low.
- HVT procurement documents required bidders to incorporate steps to achieve research uptake within their tender submissions but, in practice, many projects concentrated mainly on conducting research without identifying a realistic uptake channel.
- HVT generally left it to research suppliers to arrange country visits but those without prior country experience and contacts often struggled to gain access to decision-makers. HVT did not, on behalf of FCDO, inform partner country authorities about the projects or ask them to extend their cooperation and support to the research supplier.

93. In assessing the underlying uptake performance of the programme, it is useful to distinguish the performance of research projects conducted after Part 1 and excluding the Covid-19 response and recover projects. The SOK studies and scoping studies were intended as inputs to the design of Part 2 research programme and were not inteded to directly lead to improved transport in LMICs. T- TRIID 1 was a pilot phase to explore the use of small-scale transport technology competitions to identify innovative project ideas, while the Covid-19 studies focused mainly on understanding the effects of the pandemic on mobility rather than producing new approaches at country-level. When such projects are excluded, this leaves a subgroup of 37 sample projects for the Part 2 main research programme, T-TRIID 2, uptake support, and support for the global sustainable transport agenda. Projects in this subgroup accounted for £7.48 million of research expenditure, equivalent to 69% of total HVT research expenditure. For this subgroup, 41% of projects equivalent to 44% of subgroup research expenditure were rated high uptake, and 30% of projects equivalent to 25% of subgroup expenditure were rated moderate uptake. While leaving room for improvement in future, these are satisfactory levels of rated uptake, particularly for a first programme in a complex, new field of research.

94. It should be be underscored that, while not all projects attracted high levels of research uptake, some individual projects, such as ORN31 and HDM, are expected to attract very high uptake that will lead to enormous cost savings and benefits for LMICs. In some cases, the costs and benefits arising from a single HVT project may be many times higher than the cost of the entire HVT research programme. Examples of such projects are provided in the follow sections.

95. **Strategic positioning projects.** The four SOK studies in the review sample are assessed to have made a moderate contribution to country-level uptake. Their main purpose was to take stock of the available literature on HVT's main thematic and cross-cutting areas of focus, and identify priority research gaps to address through the Part 2 research. This contributed to country-level uptake by influencing the types of research gaps that were eventually addressed by research projects. As many of the Part 2 research projects originated from research suppliers procured through open calls, the SOKs had less influence on the choice and research projects.

[20] For example, the updating of national road design manuals and the preparation of city-level urban transport plans.

96. Short country scoping studies were expected to contribute to country-level uptake by identifying promising country-level research opportunities to include in the HVT research programme. The four scoping studies on low-carbon transport (para. 73) had little buy-in from the government authorities responsible for transport. The Bangladesh, Rwanda and Zambia studies were high-level and gave only limited consideration to linking HVT research proposals to government policies and plans. The Uganda scoping study was better informed of country context. Its proposals for research on improving urban public transport and addressing vehicle emissions in Kampala may have contributed to Uganda being included in multi-country projects on urban public transport in Part 2 (e.g. Empower, From Pop-Up to Permanent); and possibly to selection of a T-TRIID 2 project on reducing vehicle emissions in Kampala (Wanyama Autosafety Initiatives). While the scoping study on Ghana's north–south transport corridor originated from a country-level request, the study was too short to contribute significantly to the multi-partner corridor initiative and did not influence the composition of Part 2 research.

97. **T-TRIID 1.** Two of the nine T-TRIID 1 sample projects were rated moderate for uptake. A project on Promoting Safety in Urban Transport used innovative mobile phone apps to track the safety of public transport on minibuses. It was led by an experienced Kenya-based technology provider with a track record of supporting sustainable development projects, and is in the process of raising second-stage funding. The Kids' Court project successfully trialled a community-based approach to vehicle speed limit enforcement that changed driving behaviour and raised community awareness about road safety. The research supplier has continued to support kid's courts through its country offices and partnerships in multiple African LMICs.

98. The other seven T-TRIID 1 projects had low uptake. In some cases, technology prototype trials were inconclusive and no further stage funding was available. In other cases, including several projects to develop transport services applications, the T-TRIID 1 support only covered a small part of the project development process, and there were no indications of further research funding being available to complete project development.

99. This was FCDO's first use of small-scale technology competitions, and was implemented early in Part 1 before the HVT programme was widely known among research suppliers. Although uptake was quite low, the moderate uptake projects demonstrated the potential of such competitions and justified the inclusion of a second T-TRIID open call on Part 2.

100. **Covid-19 response and recovery**. Two of the eleven small-scale Covid-19 projects achieved moderate country-level uptake. One project worked closely with Delhi authorities to develop guidance proposals and a toolkit on gender equitable public transport in the city; and provided substantial capacity development support, leading to improved prospects of uptake in the city bus system. Another project developed training modules on reform of urban transport systems in India. These were incorporated in the National Urban Learning Platform which is widely used for training sector officials, professionals and academics.

101. The other nine Covid-19 projects had low uptake. Many produced useful country-level case studies on the effects of the pandemic on people's mobility, but most had no involvement or support from government authorities. Other projects produced best practice studies—for example on motorcycle taxi safety, equitable public transport, and activity mobility—but did so without involvement of partner countries. In such cases, the research generally ended when HVT project budget was fully utilised.

102. The PMU produced a high-quality publication summarising the findings of the HVT Covid-19 response and recover projects (HVT 2021). This could be valuable resource for LMICs in the event of further pandemics in future.

103. **T-TRIID 2.** As discussed in Chapter IV, the quality and innovation of T-TRIID projects improved signficiantly from T-TRIID 1 to T-TRIID 2. This was also true of uptake. Five of the eight T-TRIID 2 sample projects were rated high for research uptake and two were rated moderate. Each of the high uptake projects involved LMIC-based researchers working closely with country transport authorities to develop improved approaches through research. Four projects were to develop safer and more inclusive public transport in African and Asian partner country cities. They attracted substantial uptake in government and city plans to impove public transport. The emissions testing project in Uganda has grown in scale and ambition and attracted further funding from multiple sources. The two T-TRIID 2 projects with moderate uptake produced high quality research to develop an urban transport planning tool, and a gendered approach to addressing adaptation capacity to hot weather conditions in India. World Bank staff used the planning tool to provide a high-level overview of traffic conditions as part of preparation of a transport project in Bangladesh. The hot weather conditions project was prepared working closely with authorities in India and, once completed, could have potential for high uptake. The one T-TRIID 2 project with low uptake was to prepare road design guidelines for three-wheelers. The research was academic in nature and there was no involvement of country or city authorities.

Figure 3: Human success story on HVT small-scale support for transport technology

Developing novel solutions and innovations by seed-funding transport technology innovation projects

Through its Transport-Technology Research and Innovation for International Development (T-TRIID) subprogramme, the High Volume Transport (HVT) programme provided small-scale seed money grants of up to £50,000 for proof-of-concept and prototype-stage development of innovative ideas to improve transport in LMICs and make it more sustainable and low-carbon. Open calls were used to invite researchers to propose innovative transport technology projects. The approach drew upon the model used by the UK Department of Transport (DfT) for its Transport Technology Research and Innovation Grant (T-TRIG) competition, and involved close cooperation between the HVT, DfT and the UK Knowledge Transfer Network (DFID 2020). About 6% of HVT research expenditure was on T-TRIID projects.

Several T-TRIID projects developed novel approaches for tackling hitherto intractable problems of traffic safety and vehicle emissions, and attracted significant buy-in from the government and other stakeholders. Each of the lead researchers was already familiar with the traffic safety and vehicle emissions situation in the project country. Each project adapted an innovative approach taken from developed countries to be used in a developing country context, and worked closely with the government and other relevant country-level institutions to build an evidence base to convince policy-makers of the need for change and formulate practical interventions to tackle the main issues.

Improving vehicle roadworthiness to reduce vehicle-related air pollution and CO2 emissions, and improve vehicle safety. One of most neglected factors contributing to vehicle-related air pollution, CO2 emissions and vehicle safety problems is the quality of vehicle maintenance. In developed countries, governments require owners to have their vehicles tested periodically for roadworthiness and emissions by qualified mechanics at an accredited garage. Vehicles that fail the tests have to be fixed before their vehicle licence can be renewed. Many developing countries do not have a vehicle inspection system or their system is flawed, and actual emissions can be multiple times higher than manufacturers' estimates for well-maintained vehicles. In such countries, one of the main ways to alleviate health problems due to air pollution and unsafe vehicle condition, and mitigate CO2 emissions, is to train vehicle mechanics and establish an effective vehicle inspection system.

A Ugandan researcher, with a background in vehicle mechanics and information technology, developed an innovative grass-roots programme to tackle vehicle emissions and safety in Kampala. A family member had experienced serious respiratory problems when they lived near a busy road but recovered when they moved to another house farther from main roads. This convinced the researcher that the problems had been caused by tailpipe emissions and motivated him to establish Wanyama Autosafety Initiatives to build the evidence base needed to convince policy-makers about the issue and the need for intervention.

HVT seed-funding was used to finance testing of emissions and vehicle safety for an initial sample of 50 vehicles. In most cases, emissions were found to be much higher than manufacturers' estimates (up to five times more). The main cause was poor maintenance. In Kampala most vehicles were maintained by informal sector mechanics who generally had no formal training. Most of the spare parts they used were of inferior quality or counterfeit. These issues were exacerbated by the high average age of the national vehicle fleet and wide array of different vehicle types in use. Some 80% of vehicles were aged, used second-hand vehicles imported from overseas.

The project showed the present situation can be mitigated by implementing a combination of measures to improve maintenance. These include additional testing of vehicles to arrive at a comprehensive, statistically robust overall fleet assessment; formalisation of informal garages through regulation and licensing; accredited training of mechanics: improved regulation of vehicle imports and spare parts quality; and periodic mandatory inspections of vehicle roadworthiness. As consumption of fuel is one of the main vehicle operating costs, such measures could potentially lead to a reduction in vehicle operating costs, and would therefore be attractive to vehicle owners.

The research team is working with the transport ministry and stakeholders to implement these measures to bring about a major reduction in tailpipe emissions and improve vehicle safety. The evidence produced by the HVT project also helped the researcher to attract additional sources of financing for its vehicle maintenance initiatives.

P**olicy and regulation for motorcycle taxi safety**. While working on a project funded by the UK National Institute of Health Research (NIHR) to develop a "safe systems" approach to road safety in Nepal, a researcher from the University of the West of England witnessed the proliferation of motorcycle taxis in Kathmandu after ride hailing apps were introduced in 2017. About 1.5 million motorcycles were in use the Kathmandu Valley, including 190,000 motorcycle taxis. The legislation and regulations on transport services had been prepared long before the advent of motorcycle taxis and provided no protection against unsafe driver practices or unroadworthy motorcycles.

The T-TRIID project was used to conduct surveys, data analysis and stakeholder dialogue to better understand the nature and operation of motorcycle taxi services in Kathmandu, document the associated safety and personal security risks, and identify changes needed in policy and regulation to improve safety for riders and passengers. Assessment of road accident data found that motorcycle accidents were underreported and motorcycle taxi accidents were not separately identified. As result of the working closely with motorcycle taxi operators, the project led to Nepal's largest motorcycle taxi operator introducing measures to improve accessibility for visually impaired passengers, and created a list of prohibited motorbike and scooter types. It also banned vehicles with exposed silencers. Building upon on the proposals prepared by the HVT project, the transport ministry is now preparing regulations on motorcycle taxi operations and use of helmets.

Kids' Courts to improve road safety near schools. Amend is an international road safety NGO that operates in 15 African countries. One of its researchers came across a promising community-based road safety scheme used in the UK to address the problem of unsafe driving at schools. Motorists caught exceeding the speed limit were given the choice of either accepting a fine and licence points deduction or attending a "Kids' Court" to be cross-examined by a panel of schoolchildren about why they were speeding and whether they were aware they could have hit a child: https://www.bbc.com/news/uk-england-birmingham-37623024. Most drivers chose Kids' Court. By shaming drivers in front of the school children, and requiring them to produce a written pledge to change their driving behaviour, the intervention sought to raise driver awareness and knowledge about road safety risks, and lead to improved driver behaviour.

In 2018, when HVT invited submissions for a first phase of the T-TRIID subprogramme, Amend had been operating Kids' Courts at five schools in Maputo, Mozambique for two years, working closely with the police. Kids' Courts interventions included conducting an initial baseline survey of children's road safety knowledge, providing road safety education in the schools, training child "judges" and convening Kids' Courts to consider the cases of 94 offending drivers. There was anecdotal evidence that Kids' Courts led to safer driver behaviour but a more rigorous evidence-based evaluation was needed to confirm scheme effectiveness and justify wider usage in Mozambique and other African countries.

Comparing children's road safety knowledge against the baseline, the evaluation found that road safety education provided by the project had been effective in improving children's knowledge and this knowledge was further strengthened when children participated as "judges." Surveys of offending drivers who had attended Kids' Court found nearly all had a positive experience, nearly all thought Kids' Courts have potential to improve driver behaviour, and most agreed a lower speed limit should be applied near schools. These findings were reinforced by surveys of teachers, parents and the police that confirmed the effectiveness of the scheme and supported expanded use of Kids' Courts at other schools in Mozambique and elsewhere in Africa. As a result of the evaluation Amend was able to attract funding to expand Kids Courts in Mozambique and introduce them in other African countries including, Tanzania and Ghana.

Sources: Amend 2019; DFID 2020; Flower et al. 2024; Wanyama 2024a; 2024b.

104. **Part 2 research**. This was the largest research project category, accounting for 62% of total HVT research expenditure. As discussed in Chapter IV, nearly all the Part 2 research projects produced high quality research. Most also attracted satisfactory levels of uptake. Ten were rated high for uptake, with six moderate uptake projects and seven low uptake projects. Many of the high uptake projects were large projects conducted by experienced research suppliers to address a major research gap. In all cases of high uptake, there was significant involvement of country partner authorities in the research and this contributed to eventual uptake.

105. Examples of high-uptake Part 2 reseach projects include:

- **Updating of ORN31.** Drawing upon high quality engineering research and pavement trials, the updated ORN31 guidelines on pavement design in tropical countries incorporated 25 years of advances in climate mitigation and adaption technologies since the previous ORN31 update (FCDO 2021). The updated guidelines have attracted high levels of uptake. Similar to experience under the ReCAP, AFCAP1 and SEACAP (Duncan 2020), the improved designs have already been incorporated in national road design manuals and guidelines in multiple LMICs, including Ethiopia, Kenya, Nigeria, Mozambique and Bangladesh. This can be expected to result in enormous savings in life cycle costs for road infrastructure in LMICs as ORN31 is expected to eventually influence over £20 billion of road construction financing each year (FCDO 2021).
- **CRISP.** This engineering research project successfully prepared improved, climate resilient road pavement designs using locally available materials. Ethiopia's national road authority was closely involved in the research and was selected for constructability trials. Given the advantages of the resilient pavement options developed, and Ethiopia's past uptake of ORN31 and other UK-funded road engineering research, prospects for uptake are good. Through further promotion and dialogue with African road institutions, there would also be potential to attract uptake in other African countries. This could lead to very large benefits for LMICs. For example, assuming there are 350,000 km of bitumen surfaced roads in Sub-Saharan Africa, and only 10% of these would utilise more reilient pavement designs produced by research, Hine estimated annual savings in road provision costs of £93 million (Hine 2019).
- **Updating HDM.** Several HVT financed-studies by multiple research suppliers were part of the World Bank-led multi-stakeholder global initiative to update HDM, restore its integrity and accuracy, and incorporate climate change, road safety and other aspects. The initiative has taken a long time but all preparatory studies have now been completed or are underway, and expressions of interest were called in March 2024 with the intention of appointing a contractor to implement the HDM upgrading work in 2025. Once HDM-5 becomes available for use, it will be widely used for economic analysis of road development and maintenance in LMICs, with high uptake expected from LMICs, MDBs, and transport professionals and consultants working on the road subsector in LMICs. HDM is currently used to appraise about $20 billion of road investments each year (FCDO 2023). By restoring modelling integrity and accuracy, and incorporating estimation of the effects of climate change, traffic accidents, and other factors, HDM-5 will significantly improve the completeness, quality, accuracy and reliability of economic appraisal. This is likely to have enormous economic benefits for LMICs through selection of better investments offering higher economic benefits, and deferral or revision of proposals that are not feasible and sustainable.

- **Empower 1 and 2**. These projects studied practical tools for tackling the probem of sexual harassment of women using public transport in seven African cities. This led to development of the SHE CAN tool to help authorities, operators and passengers establish evidence-based interventions to tackle the problem. In Nigeria, HVT researchers assisted the Lagos Metropolitan Area Transport Authority (LAMATA) to trial and then mainstream the SHE CAN tool for addressing women's sexual harassment in bus transport in Lagos, Nigeria. Train-the-trainer approaches were used to support mainstreaming. As a result of the project, LAMATA incorporated the SHE CAN principles in its decision-making and reform plans, and adopted improved passenger station designs that will improve the convenience of public transport and mitigate women's sexual harassment and other personal safety risks. LAMATA's BRT and commuter rail services carry between 1.5–2.0 million passengers each day, so the improvements introduced by HVT research are having large scale effects on reducing women's exposure to sexual harassment in public transport. There was also uptake of the SHE CAN tool in Addis Ababa and Kampala, and in Sierra Leone. Several other African countries have also expressed interest.
- **TOD in East African cities.** A large HVT research study, by the Institute for Transportation Policy and Development (ITDP), identified a series of pragmatic options for progressively developing more sustainable and inclusive public transport by incorporating TOD principles in urban planning and urban transport provision. There had been numerous previous studies on the development of idealised TOD and bus rapid transit (BRT) schemes but these were difficult to implement in the absence of suitable urban corridors. The HVT study focused on identifying practical interventions that countries and cities can use to progressively retrofit TOD and BRT features in urban plans and urban public transport. This attracted interest from East African city transport authorities. With the support of other development partners, Tanzanian authorities have been using the study in developing local BRT area plans for Dar Es Salaam. Addis Ababa authorities have been using it in BRT planning and improving inter-agency coordination.
- **Women's Personal Safety, Participation, and Employment Linkage in Urban Public Transport,** This study was prepared by an experienced Ethiopian research supplier who contributed to other HVT research studies in Ethiopia. It examined the experiences and needs of women using public transport in Mekelle, the capital city of Ethiopia's Tigray region, and the extent of women's participation in planning, decision making and job creation in urban public transport. The researchers worked closely with city authorities to identify the problems faced by women and people with disabilities using public transport in the city, and disseminated the findings widely through national television and other media. The project included awareness raising and capacity building support for city authorities and other stakeholders. Subsequently, the city authorities adopted the disability-inclusive designs produced by the research and is using them to retrofit disability-inclusive improvements in the city's roads and public transport facilities.

Figure 4: Human success story on women's sexual harassment in public transport

An evidence-based approach to protecting against sexual harassment if women using public transport

One of the main ways to reduce greenhouse gas (GHG) emissions and air pollution from transport is to shift traffic away from high-emission transport modes. In cities, this entails shifting from private vehicles to public transport. People's willingness to do so depends on the adequacy of available public transport services, taking into account such factors as convenience, reliability, comfort, safety and cost.

It has long been known that women experience problems of sexual harassment and personal safety threats using public transport in low- and middle-income countries (LMICs) but there was no reliable evidence base to inform policy-makers and practitioners about the extent of the problem and the likely solutions. Recent research by the UK's High-Volume Transport (HVT) programme, built an evidence base for several African cities and developed the SHE CAN tool to help transport authorities, passengers and other stakeholders to develop effective strategies, interventions and tracking mechanisms to protect women against sexual harassment.

Much of the research focused on Lagos in Nigeria. With a population of over 20 million, Lagos is Africa's largest and fastest-growing city. Yet until quite recently it had no formalised public transport system. Transport was left to private and informal sector operators, with minimal regulation. Service quality was poor and fares were high. On average, transport costs absorbed about 40% of the incomes of Lagos residents. Overemphasis on motorisation and road construction led to severe traffic congestion and excessive travel times for passengers.

Things began to change for the better in 2002. With support from World Bank, the Lagos Assembly established the Lagos Metropolitan Area Transport Authority (LAMATA), a semi-autonomous agency responsible for coordinating transport policies, programs and actions of all public agencies at the different tiers of state government. In 2007, it was granted further powers to run franchises and transport operations and in 2008 it opened the first of a series of low-cost bus rapid transit (BRT) lines and commuter rail services. Since then, it has gradually integrated the multimodal public transport system and upgraded BRT service quality. External financiers include World Bank, African Development Bank and Agence Francaise de Developpement (AFD).

HVT research on women's sexual harassment was conducted by a UK-based transport consulting firm, with LAMATA as research partner in Nigeria, and supported by a consortium of nongovernment organisations (NGOs). LAMATA's high level of engagement and leadership have been key factors contributing to the success of project. An initial literature review examined the state of knowledge, identified critical gaps and compiled details of the range of sexual harassment problems (e.g. verbal, leering, touching, groping, pushing and intimidation, stalking) and the types of intervention measures that were effective in developed countries.

A survey of 3,000 LAMATA passengers found that 70% of women had witnessed sexual harassment in public transport and 45% had experienced it personally. There were significant risk of women being sexually harassed while waiting for a bus or walking home after alighting from a bus. By disseminating these findings widely in the national media, LAMATA attracted popular support to proceed further with measures to tackle sexual harassment.

The main output of the HVT research was the SHE CAN online tool that helps decision-makers—including local authorities, policymakers, enforcement agencies, transport providers and NGOs—to understand the nature of the sexual harassment problem. A menu of best practice intervention options is provided for addressing various kinds of sexual harassment problems in different settings (e.g. legal frameworks, surveillance and policing, infrastructure, campaigns, vehicle design and management). Recommended interventions are tailored to the organisation involved.

After adopting the SHE CAN tool, LAMATA has led a series of interventions to begin tackling sexual harassment. It created the "Speak Up" campaign using print media and social media videos to raise awareness that gender-based violence is a criminal offence, with helpline numbers and contact information provided (partnering with Lagos State Domestic and Sexual Violence Response Team). It has been developing a "joined-up" approach to enforcement of gender-based violence laws with the Ministry of Justice's gender-based violence department. Through a further HVT research project on Inclusive Interchanges, LAMATA developed a design brief for inclusive interchanges that included application of the SHE CAN principles to interchange design and layout. The brief was then used to refine the design of the Ojota Bus Terminal to improve convenience and mitigate personal security and other risks. It be used in a similar way in the planned development of 13 city transport hubs. Bus operating companies have reviewed designs for new bus terminals and depots to ensure they are safe for women and vulnerable groups. LAMATA has also raised concerns about sexual harassment with bus operating companies that it regulates.

LAMATA has also taken steps to mainstream and institutionalise the SHE CAN principles. These are now integrated into ISO Management Systems and SHE CAN champions have been appointed in every unit and department of LAMATA. A sexual harassment question is now included in LAMATA's quarterly customer satisfaction surveys to document and inform management. Sexual harassment is now a topic in LAMATA's staff inception training programme. Drivers and staff have received training on being responsive to sexual harassment,

It is too early to tell how much these efforts will reduce women's sexual harassment in public transport and whether more women will choose to shift from using private vehicles to public transport. However, prospects look good. LAMATA is committed to gender-inclusion, has recruited many women to senior positions, and regular updates the evidence base through surveys and other instruments. It has proved highly effective at managing public transport investment projects and implementing reforms when necessary, and has attracted both political support and external advice and financing from World Bank and other development partners.

Sources: Amiegbebhor and Popoola 2021; Empower Consortium 2022; FCDO 2023; 2024; Gil and Msulwa 2018; Harman and McDonough 2021; Ogbara and Sonoiki 2024; Otunola et al. 2019; Vectos 2021a; 2023; 2024; World Bank 2010.

106. Among the Part 2 projects with moderate uptake, some produced high quality research studies but lacked a country-focus or involvement from partner countries. These included the update of ORN21 to enhance the mobility of people with disabilities; a well-informed study of walking and cycling in Africa; and development of a prototype tool on decision-support systems for resilient strategic transport networks in LMICs. There was no immediate uptake of these studies but, due to their high quality, some might eventually attract uptake. The ORN21 project produced excellent guidelines that could be incorporate in LMIC manuals and methods. Given the high standing of ORNs, and the interest generated by the HVT special session on disability-inclusive transport at the 2019 World Road Congress, there are prospects that eventually elements of this research will be used by LMICs.[21]

107. The Part 2 projects with low rated uptake included relatively large projects on human trafficking on long distance corridors in East Africa, novel railway traction, informal transport in African cities, and inclusive and climate resilient-transport planning; together with small and medium-sized projects to prepare a policy guide on climate-resilient transport in Africa and South Asia, and preparation of road safety initiatives an updated road safety policy guide. Much of the research was good quality but most projects were carried out without involvement of LMIC authorities and in most cases without including work at country-level. The informal transport project examined the situation in six African cities but its focus was principally on research for purposes of awareness-raising, and less attention was given to facilitating uptake.

108. **Global sustainable transport agenda**. The two sample projects in this category were rated moderate and low for uptake. The study on Improving Access to Climate Finance for Transport in LMICs made a useful contribution within a larger programme of research on climate finance for LMICs developed by the World Resources Institute (WRI). However, it is difficult to attribute more than moderate uptake to the HVT study as it was one of numerous studies

[21] A Kenyan member of the ORN21 research team later became a senator and, drawing on ORN21, sponsored five Bill proposals that promote inclusivity, including the Persons with Disabilities Bill and amendments to transport laws aimed at reducing road fatalities.

contributing to ongoing international dialogue on climate finance. The TDI project, prepared by the Partnership on Low Carbon Transport (SLoCaT), examined formulation of a suitable TDI and the availability of reliable sources of country-level data for measurement of the TDI. Much of the work was technical in nature, with little involvement of LMICs. While an index of this kind would be a useful tool, its potential and attractiveness to LMICs may depend on first working with LMICs to strengthen transport data. After the current TDI project, further stages of development, trialling and capacity development would be needed if a feasible index is to be developed and attract necessary interest and support from LMICs. There could be opportunities for future FCDO transport research programmes to support further phases of work on global studies and intiatives financed by HVT. However, FCDO should first carefully assess prospects, time frames and feasibility.

109. **Uptake support**. Based on indications of uptake by programme completion, two of the four uptake support projects were rated moderate for uptake and two were rated low. Projects by Engineers Without Borders prepared an excellent guide to HVT research findings and implemented an innovate low carbon transport challenge for young engineers. However, both projects were commissioned late in programme implementation and it will be difficult to retain user interest once HVT has been closed. The two roundtables organised by Climate Parliament were not intended to bring about country-level uptake of HVT research. Their role was to raise awareness about transport and climate change among a group of 20 African and Asian members of parliament with a view to making a small contribution to engaging LMICs on climate change, and influencing agendas on climate change over the longer term (Climate Parliament 2023; 2024).

110. **Other factors associated with uptake**. Table 14 identifies additional factors associated with uptake of HVT research when considered by transport subsector, cross-cutting theme, geographical focus, research supplier country and research contract value:

Table 14: Influence of transport subsector, cross-cutting theme, geographical focus and research supplier origin on research uptake from sample HVT research projects

Project category	Number of projects			Share of number of projects by category (%)			Share of cost of projects by category (%)		
	High	Moderate	Low	High	Moderate	Low	High	Moderate	Low
Transport subsector									
Road	6	1	3	60	10	30	95	1	4
Rail	-	-	1	-	-	100	-	-	100
Road and rail	0	1	-	-	100	0	0	100	0
Urban transport	8	8	13	28	28	45	45	31	24
Active mobility & paratransit	1	2	3	17	33	50	15	61	24
Sectorwide	-	8	11	-	42	58	-	50	50
Subtotal	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Main cross-cutting theme									
Climate change	3	9	11	13	39	48	21	47	32
Inclusion	6	7	13	23	27	50	44	17	39
Road safety	1	2	5	13	38	50	16	27	57
Decision support systems & data	4	-	3	57	-	43	91	-	-
All main HVT themes	-	2	-	-	100	-	-	100	55
Subtotal	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Geographical focus									
Country	6	7	13	23	27	50	38	30	32
Multiple countries	4	4	12	20	20	60	40	26	35
Regional	1	6	3	10	60	30	3	60	37
Global	4	3	3	40	30	30	62	23	15
Subtotal	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Research supplier country									
Developed countries	11	10	17	29	26	45	40	27	33
African LMICs	3	5	7	20	33	47	27	59	14
Asian LMICs	1	5	7	8	38	54	9	56	35
Subtotal	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Research contract value									
Up to £50,000	3	7	23	9s	21	70	14	24	62
£50,000–100,000	4	5	1	40	50	10	40	25	34
£100,000–200,000	2	2	2	33	33	33	33	56	11
Over £200,000	6	6	5	35	35	29	39	32	29
Subtotal	**15**	**20**	**31**	**23**	**30**	**47**	**36**	**33**	**31**
Total = 66 projects									

Source: PMU; Consultant.

111. This analysis supports the following additional observations about factors associated with high and low research uptake:

- Research on roads had the highest rated uptake among the transport subsectors. Some 60% of road projects equivalent to 95% of road project expenditure was assessed high for uptake. Some 28% of projects and 45% of spending on urban transport achieved high uptake. Active mobility and paratransit projects and sectorwide projects had the lowest uptake.
- Among the cross-cutting themes, projects on decision-support systems and data, and inclusion, had the highest research uptake. Uptake of research on road safety and climate change was significantly lower.
- In terms of geographical focus, the global-level research had relatively high assessed uptake. This was mainly due to the two large, high-uptake research projects on ORN31 and HDM. Country- and multi-country- projects also achieved substantial uptake. The uptake of regional research projects was lower.
- About 40% of spending on research suppliers from developed countries produced high levels of uptake, compared with 27%% for research suppliers from Africa and 9% for research suppliers from Asia, although nearly 60% of expenditure on African and Asia research suppliers achieved a moderate level of uptake. About a third of spending on developed country and Asian research suppliers resulted in little uptake, compared with 14% of spending on African research suppliers.
- Over a third of projects costing £50,000–100,000, £100,000–200,000 and over £200,000 were assessed high for uptake. Most other projects in these categories were assessed moderate for uptake. Uptake of projects costing less than £50,000 was much lower (mainly T-TRIID 1 and Covid-19 projects).

D. Research project with further uptake potential

112. Among the high-quality HVT research projects some projects may have potential for increased uptake and scalability if provided further financing support by FCDO. A list of such projects is provided in Appendix I.

E. Alignment between research uptake and the theory of change

113. As discussed in the preceding sections, the review has presented evidence of substantial overall uptake of HVT research. It also found that certain types of research had relatively low uptake, often for common reasons, such as lack of partner country involvement. In the following section, the uptake channels for transport research envisaged in the ToC are compared with the actual channels associated with uptake of HVT research projects. Suggestions are provided on how to better align ToC uptake channels with practice in future. The related topic of FCDO logframe indicators and targets is also discussed.

1. Research uptake channels in the ToC and in practice

114. The ToC envisaged that uptake of HVT research would contribute to increased access to transport services, more efficient and affordable trade routes and safer, lower carbon transport in LMICs (Figure 1). This would be achieved partly by HVT research strengthening the evidence base on the most strategic, cost effective, safe and low-carbon types of transport investments and services; and partly by embedding HVT research in LMIC transport policies, manuals and documents. The main risk identified was that the programme would have limited influence on policy and decision-making by LMIC governments, multilaterals and other investors. This would

be mitigated by working closely with each of these parties and developing a research uptake strategy.

115. The ToC was clear that HVT research should lead to tangible improvements in transport in LMICs, but did not clearly define the channels through which uptake would take place. As a result, some questions about uptake channels were not entirely resolved:

- What would cause LMIC governments, MDB financiers and other stakeholders to use improved approaches developed by HVT at country-level?
- Was it necessary for research projects to work closely with LMIC authorities and MDBs to integrate their work into county-level transport policies, plans and investment activities?
- If academic articles about HVT research were published in peer-reviewed journals would this lead to country-level uptake in LMICs?
- What would be the mechanism for global-level research studies to lead to improved transport in LMICs?

116. **Country-level research uptake**. The evidence presented in this chapter indicates that to produce high quality research with likelihood of uptake at country-level, HVT research projects generally needed work closely with LMIC authorities and align the research to fit with country-level policies, plans and programmes. When research was undertaken in this way, and produced useful findings, the LMIC authorities could expedite necessary consultation and approval processes to facilitate uptake of improvements developed by the research within country-level policies, plans, investment programmes, and national standards and technical manuals. Project examples included the updating of ORN 31, the CRISP project, the Empower project and the support for disability-inclusive street design in Mekelle, Ethiopia. On the other hand, HVT projects that lacked LMIC involvement sometimes produced high quality research but none attracted high uptake at county-level. Project examples included the research on novel railway traction technologies, the study of the social inclusion and human trafficking on high volume transport corridors, and the policy guide on climate change resilient transport: for low-income countries in Africa and South Asia.

117. If this type of uptake channel had been recognised more explicitly in the ToC, and reflected more fully in the programme implementation arrangements, it seems likely that HVT would have sought to involve LMICs more directly in the programme, notably by including them on a research steering committee and in programme oversight arrangements.

118. If LMIC involvement had been prioritised, some modification of approach would have been needed when procuring research suppliers using open calls. It should be acknowledged that use of open calls played a valuable role in enabling HVT to quickly gain experience across the breadth of the HVT main themes and cross-cutting themes, and was also useful for attracting research suppliers with innovative ideas. However, many of the open calls provided little guidance on the types of research to be undertaken, leaving it to research suppliers to select the research topic and study countries. As discussed in Chapter III, this generated a scatter of different projects that often lacked involvement from LMIC authorities (para. 54). If the problems of lack of LMIC involvement are to be avoided in future, open calls should be part of a well-defined overall research programme, and open call documentation should provide research suppliers with more guidance on what to examine and which partner countries to focus on, preferably on the basis of

the programme having worked closely with partner countries to define subprogrammes and country involvements that align with their priorities and research needs.

119. Another factor that hampered country focus was that so many partner countries were included in the programme. This might potentially have led to many partner countries benefitting significantly from HVT research but, in the absence of mechanisms for involving countries in programme oversight and research selection, many countries received only minimal research support while the majority of country-level research spending was on only nine partner countries. A more effective approach used by some other FCDO research programmes might be to select a core group of, say, 10–12 partner countries, on the basis that they offer good opportunities for uptake of improved approaches developed by research and have expressed strong interest to be included in the research programme. During programme implementation, if other countries met these requirements, they could be added to the core group.

120. **Research uptake through MDBs.** Previous UK-financed transport research programmes demonstrated the potential for achieving high uptake by embedding research in large MDB-financed transport investment programmes in LMICs. The HVT business case referred to Asian Development Bank (ADB) and World Bank having expressed interest in linking the HVT research to their large financing programmes road and railway programmes in LMICs, with appropriate components of HVT research to be designed into the respective transport programmes. In practice, although FCDO, PMU staff and research suppliers regularly met with MDB officials to discuss topics of mutual interest, MDBs were not involved in programme oversight or research selection, and HVT did not develop a systematic approach to identifying research that could be linked to MDB financing pipelines at country-level. The review found no examples of HVT research projects having directly contributed to MDB transport financing programmes.

121. It would be useful to target MDBs more explicitly as a research uptake channel. Aside from financing provided by China, they are the main source of external financing of transport in LMICs in Africa and Asia, and many LMICs depend on MDBs to finance their major transport investment programmes. In most LMICs, the government and MDBs maintain a regular high-level sector dialogue on transport that can provide an entry-point for uptake of improved approaches developed by research.

122. It should be possible for FCDO transport research programmes to collaborate more systematically with MDBs at country-level. MDBs publish their country financing pipelines and country strategies online and it is fairly easy to identify responsible MDB task managers. The FCDO programme managers should regularly identify potential synergies between HVT and MDB pipeline projects, and build dialogue with MDB task managers on possible collaboration. Prospects for linking research to MDB projects will generally be higher if collaboration begins at the pre-concept stage of the proposed MDB project or early in concept development.

123. **Uptake of global-level research**. The uptake channel for global-level research is more difficult to define. Research projects can help to shape aspects of global agendas on sustainable, low-carbon transport and make them more effective (e.g. incorporation of transport targets in the SDGs). It can also lead to development and adoption of improved tools for use in all LMICs (e.g. HDM). The experience of global projects supported by HVT suggests that they often involve relatively complex arrangements for coordination and implementation. The extended time frames involved make it harder to attribute eventual uptake to the efforts of any one stakeholder.

124. **Uptake arising from publications in peer-reviewed journals**. A further uptake channel that was pursued during programme implementation was publication of articles in peer reviewed

journals. In some sectors and fields of research, publication of research findings in a peer-reviewed journal is a leading channel for research uptake (e.g. medical research). However, it is not an effective channel for uptake of research on transport in LMICs. None of the research suppliers interviewed by the review made reference to a HVT journal article of this kind having led to uptake by practitioners. The impression given was that few LMIC transport sector decision-makers and practitioners keep up-to-date on academic literature.

125. Among the research suppliers interviewed were a number of professors from leading UK universities and editors of reputable academic journals. None of these senior academics supported the idea that publication in peer-reviewed journals leads to transport improvements in LMICs, except possibly over the very long term. Publication could lead to uptake of ideas in other academic research but some other form of uptake channel would still be needed to reach transport decision-makers and practitioners in LMICs.[22]

2. Logframe

126. Details of the FCDO logframe are provided in Appendix J. In Part 1 and the initial stage of Part 2, tracking of logframe indicators was limited to the output level. In 2021, when an initial group of HVT research projects had been completed or were nearing completion, FCDO added logframe targets at the impact and outcome levels (FCDO 2021).

127. The choice of logframe indicators reflected the linkages between inputs, outputs, outcomes and impacts envisaged in the ToC. The seven output indicators covered the number of research projects procured, publications produced, publication downloads, partner events and meetings attended, and knowledge management and communications activities undertaken. Ambitious annual targets were set for the numbers of publications and events attended. By 2024, the mid-level logframe targets (cumulative) included 33 papers published in peer-reviewed journals, 95 other publications, 21 policy documents published, 400 participants in HVT knowledge dissemination activities, 2,500 communications activities, 530 policy makers and practitioners attending capacity building activities, and two engagements with FCDO Post in partner countries (FCDO 2024).

128. The five outcome indicators covered citations of peer-reviewed publications, citations in national manuals and guidelines, co-funding mobilised and VfM savings, and the number of stakeholders/policy makers considering using HVT evidence in national specifications and standards for road design. The ambitious outcome-level targets for citations reinforced the output-level emphasis on producing publications. By 2024, the mid-level targets included 300 citations in peer-reviewed publications, as well as 13 citations in national manuals and guidelines, and 29 stakeholders/policymakers considering using HVT evidence in national road design specifications and standards.

129. The three impact indicators tracked use of HVT evidence to inform policy decisions and practice, in city-wide transport policies and manuals, and in introducing changes to address gender and inclusion in public transport and services. By 2024, the mid-level logframe targets aimed for six cases of policy-makers using HVT evidence to inform policy decisions and practice, three sets of city policy documents on urban and low carbon transport informed by HVT research, and five changes in public transport infrastructure and services improving the mobility of women and vulnerable groups attributable to HVT (ibid.).

[22] Some doubts were also expressed about the standing and academic rigour of the main journal HVT used for publication of articles in peer-reviewed journals.

130. In general, the PMU met or exceeded the HVT logframe targets over the implementation period, and the programme was rated highly in FCDO annual reviews. However, the effect of the logframe indicators and targets was to overemphasise production of publications and participation in events. There were no indicators tracking how research suppliers were working with LMIC authorities to arrive at proposals capable of attracting uptake, nor of MDB pipeline projects using HVT research, and there was no indicator reflecting the uptake channels for global-level projects. There was also no tracking and targeting of the involvement of LMIC research suppliers and researchers in HVT research projects.

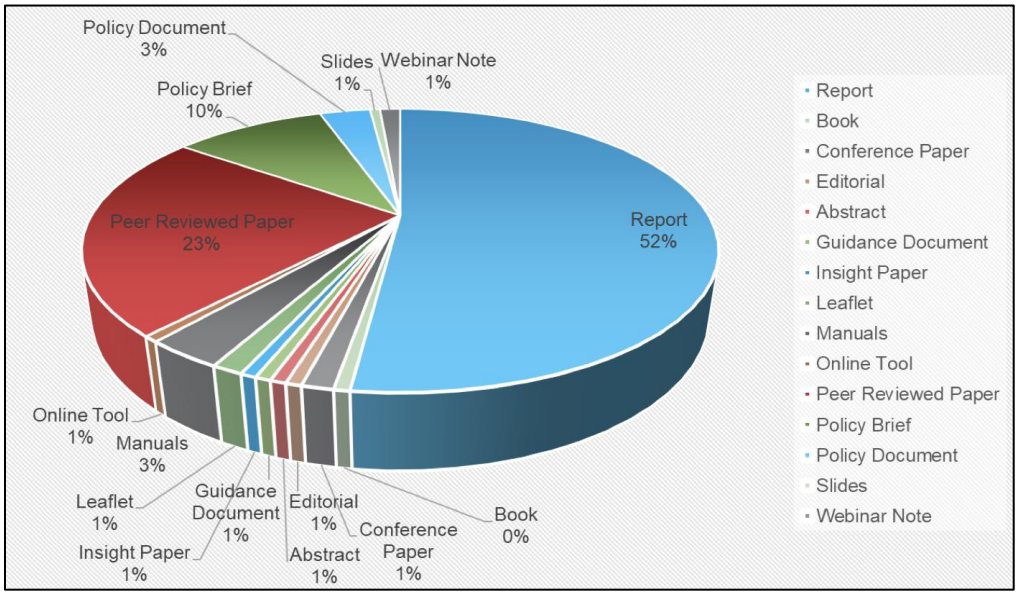
131. Given doubts about the linkage between journal papers and uptake by LMICs, FCDO would need to revisit the logframe indicator of VfM based on the average cost per journal paper produced and average cost per citation.

F. Knowledge management

1. Publications

132. In view of the logframe targets for publications, the PMU put considerable effort into having research suppliers produce further publications in addition to the project reports, and provided editing support and quality assurance. A recent uptake support study examined 150 publications produced by a sample of 40 HVT research projects. About half the publications were project reports, a quarter were peer-reviewed journal articles, and 13% were policy briefs and policy documents (Engineers Without Borders 2024a). This is shown in Figure 5.

Figure 5: Analysis of publications produced by 40 HVT projects



Engineers Without Borders. 2024a.

133. One notable publication was the HVT special issue of the peer-reviewed journal, Sustainability, published in 2020. This contained eleven articles by leading academics and transport sector practitioners presenting the findings of SOK studies and other research in Part 1 (Burrow et al. (eds.) 2020).

134. Interviews with PMU staff indicated that many of the publication drafts prepared by research suppliers—particularly those from LMICs—were poorly prepared and required considerable inputs from PMU staff in order to reach a publishable standard. In the case of LMIC research suppliers, such PMU inputs were a form of capacity building and less-experienced LMIC research suppliers expressed strong appreciation for this help.

2. Participation in conferences and international transport events

135. FCDO and the PMU used participation in major international transport conferences to promote HVT, disseminate research findings, and hold meetings with attending representatives of LMICs, MDBs and other stakeholders. These included major international conferences covering transport in LMICs; the transport forums of World Bank, ADB and African Development Bank (AfDB); and the International Transport Forum (ITF). This also helped FCDO to further its role in providing leadership and contributing to international collaboration on development of the global agenda for sustainable, low-carbon transport.

136. Leading examples of HVT contributions to international transport conferences include:

- **World Road Congress, 2019**. In partnership with DfT, HVT organised a special session on disability-inclusive transport that won the World Road Association award for best session of the congress.
- **Africa Transport Research Conference, 2020.** Hosted one-day workshop on HVT attended by 200 African transport academics and practitioners.
- **COP 26, 2021.** The PMU co-ordinated the development of the programme of side events hosted by UK's CCG Programme on 3–5 November 2021, and speakers representing HVT projects were included in a series of transport side events. HVT also contributed to the SuM4All paper on electric vehicles and co-chaired the working group.
- **UNEP Africa Regional Forum, 2022**. HVT was a key partner in the Regional Africa forum on Inclusive and Active Mobility in a Changing Climate. HVT presented the findings of seven research projects.
- **ITF Summit, 2023**. HVT partnered with the International Road Federation and SuM4ALL to host an official side-event. Speakers from FCDO and HVT presented HVT research findings and took part in panel discussions on high-volume transport.

137. Towards the end of the implementation period, the PMU recruited two "Southern Ambassadors"—one from Africa and one from Asia—with a view to increasing the visibility of HVT and engagement with HVT research through participation in international events. The two ambassadors are respected regional experts in transport who are able to engage with LMIC decision-makers. At the time of preparing the review it was too early to reliably assess whether this form of engagement is effective as a means of raising research programme uptake.

3. Website downloads and peer networks

138. Details of the cumulative number of downloads of HVT publications were provided by the PMU. Only limited data was available as the HVT website uses only basic download tracking tools (Google Analytics), and the PMU relies on third-parties to provide data on downloads from other sites. There was a total of 104,000 downloads of HVT publications from all sites. Some 89% of these were journal papers.

139. There were 15,892 cumulative publication downloads from the HVT website. A breakdown of the types of documents downloaded from the HVT website is shown in Table 15. The leading download types were research reports (64%), manuals (17%) and editorials (13%).

Table 15: Downloads from HVT website by document type, 2019–2024

Type of document	Number of downloads
Research report	10,118
Manual	2,743
Editorial	2,057
Guidance document	477
Book	170
Leaflet	165
Webinar note	67
Presentation slides	31
Call for action	64
Total	**15,892**

Source: PMU.

140. The ten most-downloaded publications from the HVT website are shown in Table 16. Together they accounted for nearly half of all HVT website downloads. ORN31 had the most downloads. This was consistent with the high levels of uptake and interest expressed by LMICs in incorporating the ORN31 update in national manuals and guidelines. The next highest number of downloads was for the editorial article in the HVT special issue of Sustainability.

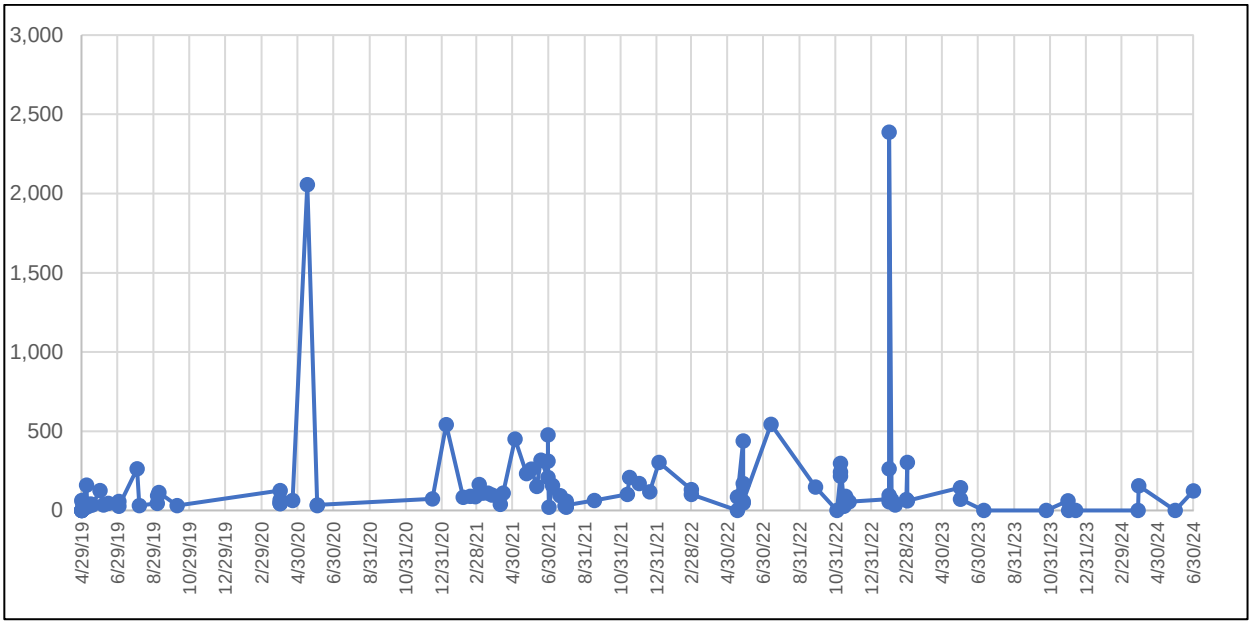
Table 16: The ten most-downloaded publications from the HVT website, 2019–2024

Publication	Type of document	Number of downloads
ORN31: A Guide to the Structural Design of Surfaced Roads in Tropical and Sub-tropical Regions	Manual	2,387
SOK Editorial: Advancing Applied Research in High Volume Transport in Low-Income Countries in Africa and South Asia	Editorial	2,057
Inclusive TOD in Eastern Africa: A Guide to Local Development Planning	Research report	543
Gaining Or Losing Ground: Ensuring That Post-covid-19 Transportation Serves the Needs of Women in Low-income Sub-Saharan African Cities	Research report	541
Moving Ahead: Urban Mobility Reforms for Post-Covid Resilience in India	Guidance document	477
Moving towards gender equitable public transport operations in a post COVID-19 world	Research report	451
Transit-oriented development: Case studies report	Research report	439
COVID-19 impact on transport and mobility in Africa - A review of policy and practice in seven African countries	Research report	317
Transitions: Informal Transport Compendium Report	Research report	311
STATE OF KNOWLEDGE REPORT - Adaptation for Transport Resilience to Climate Change for Lower Income Countries in Africa and South Asia	Research report	304
	Subtotal	**7,827**
	Share of total HVT website downloads	**49%**

ORN = Overseas Road Note, SOK = state of knowledge, TOD = transit-oriented development
Source: PMU.

141. HVT website downloads at two-monthly intervals are shown in Figure 6. Two publications attracted particularly high peaks bi-monthly monthly downloads, peaking in April 2020 and February 2023. These were the editorial article in the HVT special issue of Sustainability and the ORN 31 update (para. 140). Publication downloads tended to peak soon after publication and then diminish rapidly. This highlights the issue that after the initial peak in downloads has subsided, it becomes challenging to retain wider interest in the research produced.

Figure 6: Trends in HVT website downloads by date launched, 2019–2024



[a] Total number of downloads of each publication by date launched on HVT website from April 2019 to June 2024.
Source: PMU.

142. The PMU arranged many webinars and online events to disseminate research and develop online peer network to support collaboration among HVT researchers. Such approaches were especially useful when restrictions were in place during the Covid-19 pandemic. Interviews with research suppliers and PMU staff suggest that, after the pandemic, people's level of engagement in these online events decreased which reduced their quality and usefulness.

143. Interviews with research suppliers indicated that many did not find the online peer network useful and most did not use it much. The wide scatter of projects and lack of well-defined research subprogrammes made it difficult to develop synergies between project research teams. The underlying solution to this issue is more likely to be found in improving programme design and coherence than in upgrading online applications.

G. Capacity building activities

144. Most of the HVT support for capacity building in partner countries was provided as part of the research projects implemented in Part 2. This included building the capacity of LMIC research suppliers by engaging them in HVT research, including LMIC researchers within teams led by developed country research suppliers, and holding short training workshops during country visits.

145. The distribution of HVT research projects by country of research supplier is summarised in Table 17. Overall, only modest progress was made in use of LMIC research suppliers on HVT

projects. Some 83% of HVT research spending was on research suppliers from developed countries. In some cases, these research suppliers included LMIC research suppliers or individual researchers in their project teams but in other cases LMIC researchers had little or no involvement. Only 11% of HVT research spending was on research suppliers from Africa and 6% on research suppliers from Asia. Reasons include the limited numbers and capacities of LMIC research suppliers, lack of awareness of HVT, inexperience in preparing tender submissions and limited use of joint ventures between developed country and LMIC research suppliers. It is notable South African suppliers were an exception, accounting for about half of the expenditure on African research suppliers. While the role of South African research suppliers was encouraging, this also highlighted the need to develop improved strategies for building research supplier capacity in other African partner countries.

Table 17: Distribution of HVT projects and expenditure by research supplier country

Research supplier country	Number of projects	Cost of projects (£)	Share of HVT total research cost (%)
Developed country	65	9,011,089	83
Africa	19	1,192,138	11
Asia	15	596,885	6
Total	99	10,800,111	100

Source: PMU.

146. Table 18 provides details of the ten leading HVT research suppliers by cost and number of projects undertaken. Six were UK consulting firms or universities and two were international non-profit organisations based in developed countries. The one LMIC research supplier in this group was GoMetro, a South African consulting firm that carried out a large urban transport project to trial using mobile phone data as a tool for urban transport planning and modelling.

Table 18: Ten leading HVT research suppliers by cost and number of projects

Research supplier	Cost (£)	Number of projects	Average cost per project (£)
University of Birmingham	1,306,117 [a]	4	282,529
Vectos	1,164,120	4	291,030
TRL	1,072,634 [a]	5	249,825
ITDP	799,985	2	399,992
SLoCaT	735,773	4	183,943
University of York	651,514	2	325,757
Cardno	565,621	2	282,810
University of Southampton	525,324	2	262,662
GoMetro	495,000	1	495,000
Hodos	358,955	2	179,478
Total	**7,675,531**	**28**	**274,126**
Share of total HVT research cost	*71%*	*28%*	

[a] Assuming the contract amount for quality assurance services was divided equally between the two research suppliers, TRL and University of Birmingham.
ITDP = Institute for Transport Development, SLoCaT = Partnership for Sustainable Low Carbon Transport.
Source: PMU; Consultant.

147. Although HVT spending on LMIC research suppliers was much lower than on developed country suppliers, there were a number of notable cases of LMIC research suppliers producing high quality research that attracted uptake. In some cases, LMIC research suppliers that performed well were recruited again for larger projects. Table 19 provides details of the HVT projects carried out by five high performing LMIC research suppliers.

Table 19: Examples of high-performing LMIC research suppliers

LMIC research supplier	Country	HVT research projects undertaken
Alert Engineering	Ethiopia	• Strategic positioning studies: contributions to several SOKs • Part 2 research: associated firm in the team led by TRL on preparing ORN31. • Part 2 research: women's personal safety, participation, and employment in urban public transport • Part 2 research: contributions to electric vehicle scoping study, Ethiopia; Empower 2, and disability inclusive transport work by Mekelle University
Mekelle University	Ethiopia	• T-TRIID 2: Safety and Mobility Challenges of Persons with Disability in Mekelle City: Towards Inclusive Urban Transport
Sonal Shah/ Urban Catalysts	India	• Strategic positioning studies: team member for urban transport: SOK study • Covid-19: project on poor women's mobility • T-TTRID 2: safe and secure public transport in Delhi • Part 2 research: women's role in electric two- and three-wheelers
Alex Rugumba	Uganda	• Strategic positioning studies: Uganda country scoping • Strategic positioning studies: Zambia country scoping • HVT technical advisory panel member
Wanyama Autosafety Initiatives	Uganda	• T-TRIID 2: local initiative to tackle high vehicle emissions due to poor vehicle maintenance standards and practices

ORN = Overseas Road Note, T-TRIID = Transport-Technology Research and Innovation for International Development.
Source: PMU.

148. Many of the projects that included country-level research conducted a training workshop for partner country stakeholders. A range of online training and webinars were also provided. As discussed in Chapter IV, some of the projects also developed online training modules and tools that are being used by LMICs.

VI. EVALUATION OF PERFORMANCE, CONCLUSIONS AND LESSONS

A. Introduction

149. Drawing upon the evidence presented in the preceding parts of the review, this chapter evaluates the performance of the HVT, and presents the conclusions of the review and lessons for consideration in formulation of future FCDO transport programmes.

150. The evaluation is based on the DAC evaluation criteria of relevance, effectiveness, efficiency and sustainability,[23] and the ten RQs in the TOR (Appendix A). Relevance refers to the extent to which the intervention objectives and design respond to beneficiaries', global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change. Effectiveness concerns the extent to which the intervention achieved, or is expected to achieve, its objectives, and its results, including any differential results across groups. Efficiency examines the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way. Sustainability refers to the extent to which the net benefits of the intervention continue, or are likely to continue (OECD 2019). The evaluation ratings for each criterion use a standard four-point scoring scale distinguishing excellent, satisfactory, less than satisfactory, and unsatisfactory performance.

151. As indicated in Chapter I, when a transport research programme is evaluated at completion, some of the research projects may not have had enough time for outcomes and impacts to be observable. The evidence gathered from interviews with HVT research suppliers suggests this risk is fairly low. Generally, if no uptake was attracted by project completion, the project ended, the research team demobilized, and there were no other means of continuing the research. Exceptions might be possible if the research supplier had strong country linkages and was able to maintain dialogue after completion, leading eventually to some form of uptake; or if another financier later provided further funding for the research project.

B. Evaluation of performance

1. Relevance

RQ 1: To what extent was the design of the programme appropriate and relevant given the political, economic, and social context in the various countries of implementation, respective government's policy framework and the external development partners' development assistance strategies?

152. The HVT programme is rated **relevant**. It was highly relevant for the UK to finance research on high-volume transport in LMICs. Many aspects of high-volume transport needed to be improved if LMICs were to attain the SDG transport targets, and initial studies identified major gaps in research and knowledge. Through HVT, FCDO was able to expand its transport research portfolio to align better with major transport needs and challenges of LMICs and support efforts to develop sustainable, and low-carbon transport. Most of the HVT research projects covered research topics that were relevant or highly relevant for improving transport in LMICs. It was

[23] Relevance refers to the extent to which the intervention objectives and design respond to beneficiaries', global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change. Effectiveness concerns the extent to which the intervention achieved, or is expected to achieve, its objectives, and its results, including any differential results across groups. Efficiency concerns the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way. Sustainability refers to the extent to which the net benefits of the intervention continue, or are likely to continue (OECD 2019).

commendable that during the Covid-19 pandemic, HVT quickly introduced a research subprogramme on Covid-19 response and recovery.

153. While many aspects of programme design and implementation arrangements were highly relevant, the rating for relevance also takes into account aspects that were less relevant and could have been done differently to better support research selection, research programme coherence, country involvement, and research uptake (as explained in Chapters II–V). Although the programme was intended to work closely with LMICs and MDBs, mechanisms were not established to systematically involve them in programme oversight and research selection. This made it difficult to align research with partner country priorities and MDB country financing pipelines. The extensive use of open calls, often with broad scope and only brief TOR, meant that many of the research ideas and research countries were chosen by research suppliers without much input from HVT partner countries. This reduced their prospects of uptake.

2. Effectiveness

RQ 3: How effectively has HVT programme research contributed to improved developing improved policy and planning frameworks, technical solutions, stakeholders' engagement, capacity building; and how has it ensured research uptake?

154. The HVT programme is rated **effective**. A large amount of useful research was produced and satisfactory levels of research uptake were achieved. Based on analysis of the review sample of HVT projects, some 85% of research expenditures produced research outputs of high quality and innovation, and the remainder of research spending produced outputs of moderately good quality. Some 36% of research expenditure was on projects that achieved high uptake, and 33% on projects with moderate uptake. This is a satisfactory level of uptake, particularly for a first programme in a complex, new field of research.

155. Since most of the initial studies (e.g. SOK studies) were to develop the positioning of the programme, and the T-TRIID 1 and Covid-19 response and recovery subprogrammes were experimental, it is useful to consider the level of uptake achieved by the HVT projects procured after these initial subprogrammes. This subgroup of projects comprised the Part 2 main research programme, T-TRIID 2, uptake support and global sustainable transport research; and accounted for 69% of total HVT research expenditure. Some 41% of sample projects in this subgroup equivalent to 44% of subgroup expenditure were rated high for uptake, and 30% of projects equivalent to 25% of research expenditure were rated moderate uptake.

156. Several aspects of programme design hampered effectiveness. While the ToC provided a useful model of much of the transport research process, it did not provide well-defined research uptake channels. This led to an overemphasis on producing side-publications and journal papers, even though there is little evidence such papers influence country-level uptake of transport research in LMICs. Partly because of the use of open calls, there was an underemphasis on ensuring research suppliers work closely with partner countries, leading to some "orphan" projects that lacked involvement or support from LMIC institutions.

RQ 4: To what extent is the HVT programme contributing to innovation and transformative change to bring about more accessible, affordable and climate friendly transport in the LMICs?

157. LMICs face many challenges to make transport more accessible, affordable and climate-friendly and have considerable needs to adapt promising technologies and methods for use at

country-level, The HVT programme financed a wide variety of research to assist LMICs with these challenges. Much of the research was innovative. Innovations ranged from climate-resilient road designs and construction materials; enhancement of HDM; development of applications and tools to improve the convenience and safety of public transport and paratransit; testing prototypes to convert buses and paratransit vehicles to clean fuel; an initiative to tackle vehicle emissions through improved vehicle testing in Kampala; use of mobile phone data for urban transport planning, development of pragmatic models for applying BRT and TOD concepts in crowded East African cities; and an innovative community-based model for encouraging safe driving near schools.

158. The assessment of project quality and innovation in Chapter IV and the assessment of research uptake in Chapter V found that while some projects developed innovative new approaches that attracted uptake, others produced inconclusive results or lacked sufficient involvement of LMIC institutions to attract uptake. Among the large and mid-sized projects, uptake of innovative proposals was higher. In cases of low uptake, lack of country-level involvement was a common factor.

159. HVT was relatively successful in managing the risks inherent in conducting research on new and improved technologies. Through T-TRIID, it provided seed funding for proof-of-concept studies and protype trialling of new transport technology projects. The cost of unsuccessful projects was small, and some projects produced innovative ideas with scalability potential. Performance also improved significantly from T-TRIID 1 to T-TRIID 2, as more experienced research suppliers came to know about HVT, and the PMU gave more attention to country-level uptake channels when awarding research contracts.

RQ 5: What has been achieved by HVT research on inclusive, safer, and more responsible transport?

160. Inclusive, safer and more responsible transport in LMICs was one of the four main themes of HVT research. The Part 1 SOK studies on this theme played an important role in raising awareness about the range of issues involved. The Part 2 research drew upon leading researchers to develop improved approaches. Leading achievements included development and implementation of the SHE CAN tool for addressing sexual harassment in African cities, a series of studies on gender-inclusive public transport in India, updated guidelines on disability-inclusive transport (ORN21), and implementation of disability-inclusive and gender-inclusive public transport designs in Ethiopia.

RQ 6: How has the programme addressed gender equality and social inclusion issues in the transport sector?

161. Gender equality and social inclusion were examined by many of the HVT research studies. A series of Covid-19 response and recovery projects prepared case studies on the mobility issues faced by women and disadvantaged and vulnerable groups. Building upon issues and research gaps identified in the SOK studies on inclusion, HVT researchers developed the SHE CAN tool which provided a practical framework for tackling women's sexual harassment in public transport in African cities, and attracted substantial uptake. Studies of gender-inclusive public transport in India have attracted the interest of several city governments. A large research project also examined options for integrating paratransit and active mobility with public transport systems in African cities.

3. Efficiency

RQ 7: Considering the activities, costs and time frames of the HVT programme, was programme implementation adequately organised and operationalised to achieve the intended results?

162. The HVT programme is rated **efficient**. Programme activities were generally implemented in line with expected quality standards, time frames and costs. Implementation took longer than planned due to startup delays and exogenous factors. It took DFID longer than originally planned to procure a managing agent for the PMU. This was partly because it tried unsuccessfully to procure an RPC as this might have offered a more effective and efficient way of delivering the research programme. The main delays during implementation were due to factors beyond the control of the HVT, notably the Covid-19 pandemic and the two reductions in programme budget due to government-wide budget cuts.

163. The high quality and innovation of the HVT research, and fairly impressive levels of research uptake, confirm that the approach to programme implementation achieved good results. Results could have been further improved if mechanisms were in place to involve partner countries in research selection and programme oversight, and to systematically link research projects to MDB country-level financing pipelines. Programme coherence and synergies between research projects would have been stronger if open calls had been used more selectively. Programme management could also have been simplified if the programme had initially concentrated on a group of 10–12 core countries instead of including a much larger number of countries, many of which had little involvement in HVT research.

RQ 8: How well is the HVT programme providing Value for Money (VfM)?

164. The main mechanism for achieving VfM was through award of research contracts through competitive tendering. Nearly all research was procured in this way. The PMU prepared a comprehensive procurement manual that was used to guide procurement processes and ensure VfM. The strong response rate from bidders, high quality of work produced and low project failure rate are indications of the VfM achieved by the programme.

165. Based on uptake assessed at programme completion, the benefits arising from uptake of HVT research are expected to be many times greater than the cost of the research programme. For example, the uptake of HVT research on ORN31 and HDM is expected to lead to billions of pounds of cost savings and additional economic benefits (para. 105).

4. Sustainability

RQ 9: Is the intervention leading to other changes, including “scalable” or other projects gaining traction” solutions, and supporting and enabling southern leadership in transport research and innovation activities?

166. The HVT programme is rated **sustainable**. Building upon the experience of previous UK-funded transport research programmes, HVT developed a broad overarching agenda for research on high-volume-transport and financed a successful first programme of research addressing parts of this agenda. Since much of the agenda remains to be addressed, and HVT developed effective approaches to delivering a wide range of high-quality research, there is good potential for conducting further FCDO research programmes on high-volume-transport in future.

167. HVT research produced a number of examples of scalable projects. The updated ORN31 and CRISP projects, and the developoment of HDM-5 were highly scalable. The former two projects already attracted uptake in national road design manuals and guidelines of a number of African countries. HDM research helped toward the development of HDM-5 which, once completed, will be widely used for the appraisal and management of roads in LMICs. The SHE CAN tool achieved scalability initially by attracting widespread uptake and mainstreaming at LAMATA in Lagos, and then through uptake in a number of other African cities. Another large HVT study developed practical steps for countries and cities to progressively retrofit TOD and BRT features into urban plans and urban public transport. Two East African cities used this in developing their BRT plans.

168. Some aspects of programme design were less sustainable and should be strengthened for future use. The research uptake channels in the ToC need to be better defined and reflected in the logframe. Partner countries and MDBs need to be involved in research selection and programme oversight, and open calls should be used more selectively and fitted within a well-defined overall research programme.

169. HVT made limited progress with LMIC capacity building. The main capacity building mechanism was through recruitment of LMIC researchers to conduct HVT research projects. This accounted for 17% of research expenditure.[24] A more systematic approach to capacity building needs be developed, together with associated logframe targets to drive performance.

5. Overall evaluation finding

170. Based on the evaluated relevance, effectiveness, efficiency and sustainability, the overall performance of the HVT programme is rated **successful**. Through HVT, FCDO successfully realigned and broadened its transport research to address the wide-ranging research needs for developing sustainable, low-carbon transport in LMICs. The programme produced a variety of high-quality applied research and achieved satisfactory levels of uptake and sustainability. The benefits of the research to LMICs far exceeded the programme costs.

RQ 10: Has the intervention caused significant policy achievements affecting the lives of the intended beneficiaries?

171. By programme completion, HVT had already contributed to significant policy achievements leading to improved and more-inclusive transport in Africa and Asia, with prospects of further policy-level uptake of HVT research in future.

C. Conclusions

172. The conclusions of this review are that HVT applied research programme made a large-scale contribution to applied transport research in LMICs, much of the research achieved uptake in LMICs, and several projects produced highly scalable projects expected to deliver cost savings and economic benefits in LMICs many times higher than the cost of the HVT programme.

173. After previously concentrating its transport research on rural access, FCDO successfully expanded its focus to encompass all the main land transport modes and each of the main cross-cutting themes. Through initial strategic positioning studies in Part 1, HVT identified large needs

[24] Many developed country research suppliers also included LMIC researchers in their teams although their inputs were often quite limited.

for research on high-volume transport. The research conducted in Part 2 was generally high quality and achieved satisfactory uptake.

174. The main weakness of HVT was that some research projects lacked LMIC involvement and support. This reduced their relevance and prospects for uptake. This can be addressed in future by defining the uptake channels in the ToC more clearly, involving partner countries and MDBs in research selection and oversight, developing an overarching research programme to guide programme activities, and using open calls selectively and with more guidance on choice of topic and partner country.

175. There was also an overemphasis on producing journal articles and other side-publications from research projects. In contrast with some other sectors, such as health or economic research, there is little evidence that publication of such papers leads to uptake by practitioners in LMICs.

176. There is a good case for FCDO to support further research on high-volume transport in LMICs. Improvement of high-volume transport will be essential if the SDG transport targets are to be met in LMICs, HVT uncovered major gaps in knowledge that will require considerable further research, and FCDO is one of the only development partners that finances transport research. Based on the experience of the expected benefits of further research are likely to greatly exceed the cost of research.

D. Lessons

177. Based on the findings of the review, several lessons are identified for consideration when designing future FCDO transport research programmes:

- **LMICs have enormous needs for transport research**. HVT identified a wide range of transport research needs across the main themes and cross-cutting themes of high-volume transport. Similar to previous DFID research programmes on rural access, the performance of HVT projects showed that good research on high-volume transport can attract high uptake, and deliver large cost savings and economic benefits in LMICs. Considerable additional research will be needed to help LMICs develop sustainable, low-carbon transport systems and attain the SDG targets for transport.
- **The SOK studies prepared by HVT will remain valid for some years.** A new research programme on high-volume transport can proceed to commencement of research without an initial phase of SOK studies.
- **FCDO should refine the uptake channels in its ToC for transport research programmes in LMICs**. Each of the main uptake channels should be clearly defined in the ToC so that a realistic approach to uptake will be followed throughout the programme and in the logframe. These should include uptake by LMIC institutions, uptake in MDB financing pipelines, and uptake within global transport agendas and initiatives. When requesting tenders for research, bidders should be required to identify realistic uptake channels and practical steps to address barriers to uptake. While publication of journal articles can be useful for programme promotion and as a tool for disseminating research to other researchers, it should be downplayed as an uptake channel in the ToC, and targets for production of journal articles and other side-publications should be refined accordingly.
- **Scope to streamline programme management.** A PMU administered by a managing agent was successfully used to deliver HVT. This entailed a large number of procurements

and considerable contract administration. Other DFID programmes suggest that if a suitable RPC could be identified, it could potentially provide strong technical leadership for the programme and directly take responsibility for delivery of much of the research programme (Mott MacDonald 2015). This could improve programme coherence and efficiency (e.g. not necessary to procure a separate research supplier for each project) and enhance synergies between research activities. A reputable non-commercial or philanthropic transport research organisation with experience in LMICs might be well suited to this role. Drawing upon its transport knowledge, experience and expertise, it would be well-placed to guide the overall strategic direction of the research programme and develop a systematic approach to research uptake. An RPC might also have access to complementary sources of research funding that could be used to expand the reach of the research programme and might potentially offer a permanent home for FCDO-financed research beyond the life of individual FCDO transport research programmes. Should it not be possible to procure a RPC, the work of a PMU could be simplified by reducing the number of research contacts and increasing average contract size, and by establishing a well-defined overarching research programme rather than leaving much of the programme to be shaped by the research proposals of open call research suppliers.

- **Implementation arrangements to support close involvement of LMICs, MDBs and other key stakeholders.** HVT projects that attracted involvement and support from partner country institutions often achieved high uptake. Those that lacked such involvement seldom attracted uptake. This can be improved upon in future by involving LMICs, MDBs and other relevant stakeholders in research selection and programme oversight. Arrangements for research selection and programme oversight should be agreed with partner countries, MDBs and other stakeholders before programme startup. Another idea might be to decentralise some or all of the PMU functions to two or three subregional offices (e.g. East and West Africa, Southern Africa, South Asia). These could serve as hubs for country-level engagement, on-the-ground mentoring and quality assurance of LMIC research suppliers, training and dissemination activities.
- **Linking research to MDB financing pipelines.** FCDO maintains strong cooperation with MDBs that finance transport in Africa and Asia. Previous UK-financed transport research showed that when research was integrated with MDB-financed transport investment programmes, it could achieve large scale uptake. MDBs are receptive to using FCDO research in this way, particularly at the pre-concept stage when there is more flexibility to incorporate research findings in project design. Research programmes should systematically monitor MDB advance transport financing pipelines, and liaise with MDB task managers, with a view to identifying proposed projects at pre-concept stage that could be made more sustainable, inclusive and low-carbon through research.
- **Selection of partner countries.** A group of 30 LMICs were eligible for support under HVT. This was double the number of countries supported by the previous transport research programme, ReCAP. In practice, country-level support was concentrated among a group of nine countries. In the absence of country involvement in research selection, it was difficult to engage the other countries. Programme coherence could be improved and country-level engagement deepened if the number of partner countries was initially limited to a core group of, say, 10–12 core countries, based on their expressed interest in making use of FCDO transport research. During programme implementation, other countries could be added to the core group if they have identified significant research needs and expressed interest and commitment to be included as a partner country.
- **Capacity building.** HVT made useful contributions by procuring LMIC research suppliers and individual LMIC researchers to conduct research, and also conducted project-level

training workshops, as well as online trainings and peer networking. In future, FCDO should track expenditure on LMIC research suppliers and individual researchers in the logframe, and adopt suitably ambitious annual targets. This could be supported by changes in tender provisions (e.g. developed country research suppliers to form joint ventures with LMIC research suppliers, applying an LMIC preference factor). Drawing on the approaches to capacity building used by some other development partners such as Germany's Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), another option might be the recruit a small group of talented young LMIC researchers to be members of the programme management team.

- **Transport technology innovation competitions**. Through the T-TRIID subprogramme, HVT demonstrated that small-scale seed financing of transport technology research can play a useful role in introducing innovative transport technologies in LMICs. Support of this kind should be included in FCDO's next transport resaerch programme.
- **Support for global level research initiatives on transport in LMICs.** Under HVT this included studies to support the global agenda for sustainable, low-carbon transport, and studies contributing to the World Bank-led multistakeholder initiative to develop HDM-5. FCDO's involvement in this work helped it to continue to shape agendas for sustainable, low-carbon transport in LMICs and influence associate international initiatives. There will be continuing needs for such global research in future and FCDO should continue to be selective about which global projects it supports.

178. At transport subsector and thematic level, the review also identified broad directions for research that FCDO may consider when formulating further research on high-volume transport:

- **Low-carbon transport.** HVT research financed a range of initial studies on low-carbon transport and produced guidelines, best practices and other guidance for LMICs. Given the need for LMICs to shift to low-carbon forms of transport, and the role of climate finance in supporting this shift, further research should work more closely with individual LMICs, groups of LMICs, and MDBs to develop improved low-carbon transport policies and programmes capable of attracting uptake. As long-distance freight is a major contributor to transport emissions, freight and freight logistics should be included as a focus for research.
- **Climate resilience and adaptation.** HVT confirmed that LMICs have enormous and urgent needs for research on climate adaptation and resilience of transport infrastructure, and that high quality research on climate adaptation can produce very large benefits. Most of the HVT work focused on high-volume roads. There are also comparable needs for climate adaptation research in other aspects of transport including railways, ports, and mass transit.
- **Roads.** UK-funded road engineering research is well-established and has achieved high uptake through HVT and previous transport research programmes, leading to enormous benefits for LMICs. A number of other ORNs will need to be updated in future and have potential to attract high uptake. A list of existing ORNs is provided in Appendix K. The HVT research confirmed that LMICs have large further needs for research on climate-proofing of road assets. There is also potential for non-engineering research on issues affecting the convenience, competitiveness and safety of long-distance road transport services. The most recent FCDO rural access research programme (ReCAP) showed that LMICs also continue to have large needs for research on rural access.
- **Railways**. HVT research was largely confined to a study of novel traction technology. Since railway transport has significantly lower emissions than road transport, research is

needed on how to shift traffic from road to rail by making railways services more attractive and competitive for customers, and addressing critical impediments (e.g. last mile connections, multimodal freight hubs, border crossing arrangements). Modelling of future African railway freight flows could support continental initiatives to address critical bottlenecks affecting long-distance railway transport in Africa. Research is also needed to support efforts to climate-proof LMIC railway infrastructure and facilities.

- **Urban transport systems.** HVT research on BRT and TOD attracted some uptake in East Africa and showed the potential for research on urban transport systems to deliver large scale benefits in LMIC cities. Studies on paratransit and active mobility raised awareness of their importance as means of transport for large numbers of LMIC urban residents, and identified issues of lack of supporting infrastructure and facilities, and lack of integration with formal pubic transport systems. LMIC cities have large needs for further research to support improved policies and programmes on urban transport.
- **Decision-support, policy-support, and technology and innovation.** These were important cross-cutting research themes of HVT. Small-scale transport technology competitions also provided a low-cost way of attracting potentially innovative projects. Based on HVT experience, for such projects to achieve uptake, the research supplier generally needs to work closely with relevant LMIC authorities and other stakeholders.
- **Inclusive urban transport services**. While research on this cross-cutting theme produced notable uptake (e.g. SHE CAN tool), much of the HVT research was to build an improved evidence basis and raise awareness about issues of access and inclusion, especially for women and disadvantaged and vulnerable groups. Future research should work closely with LMIC city authorities and other key stakeholders to help bring about the types of changes needed in policy and practice.
- **Road safety.** Building upon the UK's longstanding support for road safety in LMICs, HVT-financed preparation of high-quality international guidelines on road safety, and conducted useful studies on adapting urban streets to improve safety for paratransit and active mobility. To achieve potential levels of uptake, future research should work more closely with partner country national road authorities and road safety agencies, and with city authorities responsible for urban road safety.
- **Private sector participation in transport investment in LMICs.** As LMIC needs for transport investment significantly exceed the financing capacity of LMIC governments and development partners, research is needed on how to mobilise private finance at scale to support inclusive, sustainable transport infrastructure and services.
- **Transport climate finance for LMICs.** LMICs lack the capacity to finance all the investments they need for climate mitigation and adaptation, and therefore need to access concessional climate finance. Further global-level research is needed to identify and address the obstacles faced by LMICs seeking transport climate finance. Country-level research is also needed to help LMICs develop effective models for attracting climate finance for investment in sustainable transport.

Appendix A

TERMS OF REFERENCE

A. Review Objective

1. Purpose

The review will assess the extent to which HVT is achieving its intended objectives and identify areas for improvement. It will document key data related to the programme performance and help inform future programming to maximise the effect of applied transport research in Africa and Asia. The external reviewer will be expected to comply with the OECD Development Assistance Committee (DAC) evaluation criteria, as well as undertake a form of contribution analysis to review the evidence generated through of several years of implementation of the programme.

2. Objectives

(i) In light of the results achieved so far, assess the relevance of the pathways of change and assumptions, as described in the theory of change of HVT, looking at outcome level but also exploring unintended outcomes, positive and negative
(ii) Develop a narrative of the results accrued under this programme, identify, and better understand why some aspects may not have worked as intended and where success has led to positive change
(iii) Identify lessons learned and good practices experienced by stakeholders and partners

B. Review questions

The following questions should be considered as part of the review.

Relevance

1. To what extent was the design of the programme appropriate and relevant given the political, economic, and social context in the various countries of implementation, respective government's policy framework and the external development partners' development assistance strategies?

Effectiveness

2. Is the HVT programme achieving its objectives? How is it delivering against its theory of change, logframe outputs/outcomes? Are the key performance indicators (KPIs) the most relevant?

3. How effectively has HVT programme research contributed to improved developing improved policy and planning frameworks, technical solutions, stakeholders' engagement, capacity building; and how has it ensured research uptake?

4. To what extent is the HVT programme contributing to innovation and transformative change to bring about more accessible, affordable and climate friendly transport in the LMICs?

5. What has been achieved by HVT research on inclusive, safer, and more responsible transport?

6. How has the programme addressed gender equality and social inclusion issues in the transport sector?

Efficiency

7. Considering the activities, costs and time frames of the HVT programme, was programme implementation adequately organised and operationalised to achieve the intended results?

8. How well is the HVT programme providing Value for Money (VfM)?

Impact and sustainability

9. Is the intervention leading to other changes, including “scalable” or other projects gaining traction” solutions, and supporting and enabling southern leadership in transport research and innovation activities?

10. Has the intervention caused significant policy achievements affecting the lives of the intended beneficiaries?

C. Scope of work

Deliverables and key activities

1. In-person kick-off meeting
2. Inception report and workplan
3. Consultations and workshops and with a cohort of stakeholders and suppliers
4. Draft and final review report
5. Presentation and PPT summarising final report to HVT team and FCDO

Please note that the consultant is expected to collaborate with a transport expert, separately subcontracted by HVT, who will support, and guide work where needed.

Task 1 - Agree scope, objectives and outputs of the review. The consultant will work with the HVT team to confirm and agree objectives, scope and a workplan for the consultancy, and will confirm in the form of minutes from the meeting in week one.

Task 2 - Briefing. Full briefing for the consultant and identification of key review questions (RQs) and HVT expectations for the review. Task 1 and task 2 are due to be completed on the day of meeting with the HVT team (online). The consultant will provide a brief inception report indicating the proposed approach, methodology and the sample of projects selected for review.

Task 3 - Programme Review. HVT will share key documents on plans and activities completed, in addition to the information contained in the link above in section 1, and key staff members will join a progress discussion. Relevant documents will include business case, work plan, FCDO annual review, logframe, theory of change (ToC), mapping of log frame and ToC linkages and key publications. The published reports of HVT research activities are available at https://transportlinks.com/publications. The review should include data from interviews (minimum 20 partners), surveys, and other consultation approaches.

Task 4 - Ad-hoc follow up discussions. It will be useful to allow for possible ad-hoc discussions to be mutually agreed between the consultant and the HVT management team, with attendees

and timing to be agreed. Such discussions can assist in clarifying and confirming ideas emerging from the review and drawing attention to aspects to consider in future programming of research activities**.**

Task 5 - Human success story addressing climate change and transport. The consultant will identify a human success story of this kind from among the research activities undertaken by HVT and use this as the basis for preparing a contribution case study of HVT's output results leading to outcomes and impact results at sector level in terms of climate adaptation and/or mitigation (specific topic to be agreed). Contribution analysis to be used to capture outcome changes. Key results and recommendations arising to be included in the final report.

Task 6 - Final report. The final report will be drafted for review by the HVT team and FCDO. It will include the ToC and logframe analysis and its validation, denoting the value of the programme to the sector (including comparison to other, similar programmes), and will centre around answering the review questions (RQs). It should also address the recommendations in the report of the ToC logframe mapping done by the HVT team. This final report should also highlight learnings, risks and actionable recommendations for development of future programming, including priorities, with a focus on maximising HVT's outcomes and impacts. It must include (but not be limited to) the following findings:

- Stakeholder consultation
- HVT value for money analysis
- Gender Equality and Social Inclusion recommendations for future programming.

The consultant will allow for at least one round of comments, consolidated by HVT, as this includes FCDO feedback before approval and the end of the assignment.

D. Methodology

As indicated in the objectives, review questions should follow the OECD DAC evaluation criteria relevance, effectiveness, efficiency, impact and sustainability. While we would seek to highlight areas which have worked well, been effective and delivered impact, we are also interested in better understanding what has not worked well and the reasons why, or what could have been improved.

The review methodology is expected to use a mix of qualitative and quantitative methods, to be outlined in the proposal, and be fully defined and approved as part of the inception report. The review should involve interviews with HVT stakeholders, funders, technical parties and governmental stakeholders. It is encouraged to include in your proposal the following elements:

    - Tentative workplan
    - Desk review of key programme documents, including datasets to perform a review of existing programmatic evidence, including logframe and KPI review
    - Development of tools: surveys, interviews
    - Approach for workshop design and facilitation methodology
    - Coordination of stakeholder outreach plan for the review
    - Stakeholder consultation:
  - Including key sector actors' interviews per category of stakeholder. Selection criteria will need to be developed to ensure that individuals/organisations chosen for in-depth interviews are representative;

- HVT annual survey (with input from the consultant);
- Participatory research action to unpack outcome generation and reflect on evidence based HVT programming and uptake and shared ownership with partners;
- Any other methods, including with AI supportive technology.

    - Documentation of stories of transformational change and successes emerging within the scope of the programme (undertaking a contribution analysis).
    - Mapping of other programmes and comparison with HVT, highlighting the additionality of its scope to the sector.
    - If possible, apply a counterfactual method to analyse the sphere of influence of the HVT programme (e.g. compare state of play in countries where HVT had little to no intervention, in assisted countries identify if HVT research influenced transport or other projects that were subsequently approved or are under preparation, including projects financed by multilateral development banks and other development partners).

Appendix B

BIBLIOGRAPHY

ALERT Engineering. 2022. *Women's Personal Safety, Participation and Employment Linkage in Urban Public Transport.* Final report. HVT039. HVT. London.

Amend. 2019. *Kids' Court road safety interventions: their impact on knowledge, attitudes and practices in Maputo, Mozambique*. HVT. London.

Amend. 2021. *Infrastructure Toolkit for Non-Motorised User Safety in African Cities*. HVT. London.

Amiegbebhor, D., and B. Popoola. 2021. Initiating Smart Public Transportation in Lagos: Setting the Tone for African Cities. Journal of Construction Project Management and Innovation, 11(1): 22-30, 2021.

Araya, A.A., A. Legesse and G.G. Feleke. 2022. *Women's safety and security in public transport in Mekelle, Tigray*. Paper presented at 2nd International Traffic Safety Conference, Doha, 2022. HVT. London.

Asian Development Bank (ADB). 2010. *Sustainable Transport Initiative Operational Plan*. ADB. Manila.

Barber, C., K. van der Weijde and E. O'Connor. 2021. *Issues related to distribution of the COVID-19 Vaccine in Sub-Saharan Africa: An Insight*. HVT. London.

Bakker, S., G. Haq, K. Peet, S. Gota, N. Nedimorec, A. Yiu, G. Jennings and J. Rogers. 2019. *Low-Carbon Quick Wins: Integrating Short-Term Sustainable Transport Options in Climate Policy in Low-Income Countries*. Sustainability 2019, 11, 4369.

Bichou, K. 2014. *High volume transport: rapid assessment of research gaps in port operations and technical aspects*. DFID Evidence on Demand. HVT. London.

Burrow, M., G. Ghataora, B. Thompson and B. Obika (eds.). 2020. *Sustainable High Volume Road and Rail Transport in Low Income Countries*. Sustainability. Special Issue.

Cardno. 2020a. *ReCAP Final Report. ReCAP*: London.

Cardno Emerging Markets. 2020b. *Literature Review: An Investigation into the Impact on Social Inclusion of HVT Corridors and Potential Solutions to Identifying and Preventing Human Trafficking.* HVT035. HVT. London.

Cardno. 2021. *An Investigation into the Impact on Social Inclusion of HVT Corridors and Potential Solutions to Identifying and Preventing Human Trafficking*. Fieldwork Report. HVT. London.

Cardno IT Transport. 2019. *HVT Theme 1: Long distance strategic road and rail transport - Part 1.* Final report. HVT. London.

Climate Parliament. 2023. *Virtual Parliamentary Roundtable on Sustainable Transport.* Climate Parliament. London.

Climate Parliament. 2024a. *Virtual Parliamentary Roundtable on Sustainable Transport*. Climate Parliament. London.

Climate Parliament. 2024b. *Legislators Working Worldwide to Combat Climate Change*. Climate Parliament. London.

Cook, C, T. Duncan, S. Jitsuchon, A, Sharma, and W. Guobao. 2005. *Assessing the Impact of Transport and Energy Infrastructure on Poverty Reduction*. ADB. Manila. https://www.adb.org/sites/default/files/publication/27956/assessing-transport-energy.pdf

Connor, P. and F. Schmid. 2014. *Rapid Desk Based Study: Research Gaps in Rail Engineering and Technical Aspects of High Volume Transport in Low Income Countries*. DFID Evidence on Demand. HVT. London.

Dalkmann, H., B. Obika and L. Geronimo. 2020. *A Call for Collective Action for International Transport Stakeholders to Respond to the Covid-19 Pandemic*. HVT. London.

Dalkmann, H. 2020. *From A Call for Action to an Action Agenda: Response to COVID-19 by the International Transport Community*. HVT. London.

Dalkmann, H. and J. Turner. 2020. *COVID-19 Urban Transport Response: Opportunities for Policy-Making in Africa.* HVT. London.

Water Fuel Engineering. 2019. *Low Carbon Hyderabad Bus Fleets*. HVT. London.

Development Tracker. 2024. *Research on Growth and High Volume Transport in Low Income Countries.* UK Foreign, Commonwealth and Development Office (FCDO). Retrieved from https://devtracker.fcdo.gov.uk/programme/GB-1-203844/documents

DFID. 2014a. *Rural Roads and Transport Services Research Business Case: Applied Research on Rural roads and Transport Services through Community Access Programmes in Africa and Asia (AFCAP2 and AsCAP)*. Growth Research Team. DFID. London.

DFID. 2014b. *Project Completion Report: Africa Community Access Partnership*. DFID. London.

DFID. 2016. *Applied Research in High Volume Transport (HVT): Business Case and Summary Sheet*. DFID. London.

DFID. 2016b. *Research Uptake: A guide for DFID-funded research programmes*. DFID. London.

DFID. 2017. *Annual Review* of HVT Programme. July 2017

DFID. 2018a. *Applied Research in High Volume Transport: Business Case and Summary*. Retrieved from https://iati.fcdo.gov.uk/iati_documents/8954993.odt

DFID. 2018b. *Annual Review* of HVT Programme. July 2018. DFID. London.

DFID. 2019. *Annual Review* of HVT Programme. July 2019. DFID. London.

DFID. 2020. *Annual Review* of HVT Programme. June 2020. DFID. London.

Dietrich, R. 2020. *Country scoping of research priorities on low carbon transport in Bangladesh*. HVT. London.

Dietrich, R. 2020. *Country scoping of research priorities on low carbon transport in Pakistan.* HVT. London.

Dietrich, R. 2023. *Ghana Transport Scoping Study: Final Scoping Report*. HVT061. HVT: London. HVT061. HVT. London.

DT Global. 2022a. *An Investigation into the Impact on Social Inclusion of High Volume Transport Corridors and Potential Solutions to Identifying and Preventing Human Trafficking*. Final report. HVT035. HVT. London.

DT Global. 2022b. *Human Trafficking Training Manual for Vehicle Operators: Manual for Trainers.* Final report. HVT. London.

DT Global. 2023. *Applied Research Programme in HVT: Procurement Procedures Manual. V5.* HVT. London.

Duncan, T. 2021. *Independent Review of Improved Rural Roads and Transport Services for Communities in Low-Income Countries Programme (ReCAP)*. HVT. London.

Echo Mobile. 2019. *Monitoring Devices and Information Transmission to Commuters: Promoting Safety in Urban Transport.* Final Report. HVT. London.

Empower Consortium. 2022. *Tackling Sexual Harassment in sub-Saharan African Transport: Changing Attitudes, Meeting Needs*. HVT. London.

Engineers Without Borders (EwB). 2024a. *Bringing Sustainable Mobility to Life: Context Review*. HVT. London.

EwB. 2024b. *Reshaping Transport Design Challenge 2024*. Monitoring and Evaluation Report on Key Insights September 2024. HVT. London.

FCDO. 2021. *Annual Review of HVT Programme*. June 2021. DFID. London.

FCDO. 2022. *Annual Review of HVT Programme*. July 2022. DFID. London.

FCDO. 2023. *Annual Review of HVT Programme.* July 2023. DFID. London.

FCDO. 2024. *Annual Review of HVT Programme.* July 2024. DFID. London.

Flower, J., S. Poudel, P. Lama, S. Joshi and J. Mytton. 2024. *Safer motorcycle taxis as part of Nepal's public transport system. Final report*. HVT. London.

Frye, A. 2019. *Disability Inclusive Public Transport: Practical steps to making public transport disability inclusive.* HVT. London.

Gil, G. and R. Msulwa. 2015. *LAMATA (Nigeria): A Beacon of Light for Lagos Transport System.* at the Centre for Infrastructure Development, The University of Manchester.

Gleeson, M. A. 2020. *Legislative and Regulatory Risk Management for Mass Transportation Providers in Low-income Countries to Mitigate the Financial Effect of COVID-19. Final Report.* HVT. London.

Global Alliance of NGOs for Road Safety. 2021. *COVID-19 impact on transport and mobility in Africa: a review of policy and practice in seven African countries*. HVT021. HVT. London.

GoMetro. 2021. *Africa Urban Mobility Observatory: Role of Informal Paratransit Report. Big Data to Enable Inclusive, Low-Carbon Mobility*. HVT042. HVT. London.

GoMetro. 2022. *Africa Urban Mobility Observatory: HVT Africa Urban Mobility Observatory: Policy and Planning Insights Report: Big Data to Enable Inclusive, Low Carbon Mobility.* HVT. London.

GoMetro. 2023a. *Africa Urban Mobility Observatory: Action Plan – Blantyre: Big Data to Enable Inclusive, Low-Carbon Mobility*. HVT042. HVT. London.

GoMetro. 2023b. *Africa Urban Mobility Observatory: Action Plan – Kigali: Big Data to Enable Inclusive, Low-Carbon Mobility*. HVT042. HVT. London.

Greenham, S., Workman, R., Ferranti, E., McPherson, K., Quinn, A., Street, R., Dora, J., Fisher, R., Mills, S., Packham, K., Baxter, W., Roberts, C. 2022. *Climate-Resilient Transport: A policy guide for low-income countries in Africa and South Asia.* Prepared by the University of Birmingham and TRL, UK. February 2022.

Greenham, S., Workman, R., Ferranti, E., McPherson, K., Quinn, A., Street, R., Dora, J., Fisher, R., Mills, S., Packham, K., Baxter, W., Roberts, C. 2022. *Are transport networks in low-income countries prepared for climate change? Barriers to preparing for climate change in Africa and South Asia*. Mitigation and Adaptation Strategies for Global Change, Springer, vol. 28(8), pages 1-22, December.

Haq, G. 2020. *Low Carbon Transport Quick Win: Opportunities for Climate and Clean Air Action in Urban Road Transport in Low Income Countries in Africa and Asia*. HVT. London.

Haq, G., C. Muhoza, G. Njoroge, D. Mwamba, W. Y. Arby, A. Ngabirano. 2021. *Inclusive Climate-Resilient Transport in Africa: Assessment of the needs of transport stakeholders including disadvantaged groups*. HVT. London.

Haq, G., S. Cinderby, R. Opiyo, A. Ngabirano, Y.A. Wasike, D. Mwamba, H. Cambridge and C. Muhoza. 2022. *Using Creative Participatory Approaches for Inclusive Climate Resilient Transport in Africa. Guidelines for Practitioners*. HVT. London.

Harman and McDonough. 2021. *Learning from Lagos*. Think Global Health. 18 November 2021. Retrieved from https://eprints.lse.ac.uk/103047/

Heggie, I. 1995. *Management and Financing of Roads: An Agenda for Reform*. World Bank Technical Paper Number 275, Africa Technical Series. World Bank. Washington DC.

Hine, J. 2019. *DFID's Contribution to Transport Research and Knowledge*. HVT. London.

Hine, J. 2020. *Transport and Employment in International Development*. HVT. London.

HVT. 2021. *Covid-19 Response & Recovery Research: An Evidence Base for a Resilient Future*. December 2021

ICAI. 2018. *DFID's transport and urban infrastructure investments: a performance review. ICAI. London*.

IMC. 2019. *Project Management Unit (PMU) for Applied Research in High Volume Transport (HVT): Part 2 Research Framing Paper*. HVT. London.

IMC. 2020a. *Research Uptake Strategy: Phase 2 – Conducting Research Plan for 2020/21.* Powerpoint presentation. HVT. London.

IMC. 2020b. *Steering Committee Brief*. January 2020. HVT. London.

IMC. 2020c. *Research Uptake Plan*. January 2020. HVT. London.

Ikeoha Foundation, 2021. *A survey of innovative road transport solutions in Nigeria in response to the COVID-19 pandemic*. Final report. HVT. London.

Integrated Transport Planning (ITP). 2019. *Transit Explorer: a bus network analysis tool.* HVT. London.

ITP. 2021. Best *practice on designing for equitable public transport networks through accessibility modelling in emerging covid-19 cities.* HVT. London.

ITP. 2022. *Enhancing the mobility of people with disabilities. Part 2: Guidelines for Practitioners*. February 2022. Update of ORN21. HVT. London.

Intrepid Minds. 2019. *Hubz Project. Final report*. HVT. London

Islamic University of Technology. 2024. *Road Design Guideline considering Three-Wheeler Slow-Moving Vehicles (Tri-SMV) for Urban and Rural Roads of Bangladesh*. HVT. London.

Institute for Transportation and Development Policy (ITDP). 2019. *State of Knowledge Report on Theme 2: Urban Transport*. HVT. London.

ITDP. 2021. *Baseline Report: High Volume Transport: City Retrofit for All*. HVT. London.

ITDP. 2021. *Transit-Oriented Development Case Studies Report: An Assessment of Six Settlements and Interventions in East Africa and India*. HVT. London.

ITDP. 2022. *Inclusive TOD in Eastern Africa: A Guide to Local Development Planning.* HVT. London.

ITDP. 2023. *High Volume Transport: City Retrofit for All.* Final Report and Capacity Building Strategy. HVT. London.

Jennings, G. 2020. *An exploration of policy knowledge-seeking on high-volume, low-carbon transport: findings from expert interviews in selected African and South-Asian countries*. Transportation Research Interdisciplinary Perspectives 5 (2020) 100117.

Jennings, G. 2020. *Gaining or Losing Ground: Ensuring that post-Covid-19 Transportation Serves the Needs of Women in Low-Income Sub-Saharan African Cities*. HVT. London.

Jennings, G. and E. Arogundade. 2021. *Women were out on the back-end: Covid-19 Mobility constraints and their lessons and implications for gender-equity in Sub-Saharan Africa*. Paper presented at Virtual Southern African Transport Conference 5–7 July 2021. HVT. London.

Jobanputra, R. 2021. *Fast-tracking public transport priority: Investigating the potential of Tactical Transit Lanes in mitigating the impact of COVID-19 in cities in Sub-Saharan Africa*. Final report. HVT. London.

Jobanputra, R. and G. Jennings. 2021. *Learning from Covid-19 Tactical Urbanism: Challenges and Opportunities for 'Infrastructure-Lite' in Sub-Saharan African Cities*. Paper presented at Virtual Southern African Transport Conference 5–7 July 2021. HVT. London.

Joshi, R. 2021. *Post-COVID-19 Mobility: Key levers to reform urban transport systems. Final report.* HVT. London.

Khalil, A. 2019*. Final Report on Smart Eye for Driver (SED) under the programme Transport-Technology Research Innovation for International Development (T-TRIID): A solution to the millions of car crashes that occur due to sleepiness and distraction of drivers*. HVT. London.

Lane-Visser, T and M. Vanderschuren. 2023. *SHE CAN: a tool to empower decision makers to address sexual harassment in public transport in Sub-Saharan Africa*. 41st Southern African Transport Conference, 10-13 July 2023. ISBN: 978-0-6397-8659-9.

MDB Working Group on Sustainable Transport. 2015. *Progress Report (2014–2015) of the MDB Working Group on Sustainable Transport.* Retrieved from https://www.adb.org/documents/progress-report-2014-2015-mdb-working-group-sustainable-transport

Mott MacDonald. 2015. *Mid-Term Evaluation of DFID's Health Research Programme Consortia: Synthesis Report*.

Nepal Communitere. 2019. *Feasibility study on the modification of pedal driven rickshaw to electrically assisted rickshaw to improve the health and earning capacity of the rickshaw drivers in Kathmandu.* HVT. London.

Nepal Institute for Urban and Regional Studies. 2021. *Evaluating the Economic Impact and Infection Control Measures of COVID-19 in the Public Transport Sector in Nepal.* Final Report: HVT. London.

Nepal Institute for Urban and Regional Studies. 2021. *COVID-19 Impact on Public Transport and Safe Revival: Practices and Innovations: A policy brief on reducing the epidemiological risks and economic losses in the public transportation sector in Nepal*. HVT. London.

Ogbara, M. and O. Sonoiki. 2024. *Case Study: The Lagos Metropolitan Area Transport Authority's Deployment of the SHE CAN Tool*. Retrieved from https://shecan-tool.info/repository/case-study:-lamata

Organisation for Economic Cooperation and Development. 2019. *Evaluation Criteria: Adapted Definitions and Principles for Use.* Development Co-Operation Directorate, Development Assistance Committee. OECD. Paris.

Otunola, B., S. Kriticos and O. Harman. 2019. *The BRT and the danfo: a case study of Lagos' transport reforms from 1999-2019*. IGC Cities that Work Case Study. International Growth Centre, London, UK.

Peter Davidson Consultancy. 2019. *Transport-Technology Research Innovation for International Development (T-TRIID).* Research Project Final Report. HVT. London.

Petrarulo, L. 2020. *Reviewing Nationally Determined Contributions: Opportunities for more Ambitious Transport Actions in Africa and Asia*. HVT. London.

Porter, G., M. Kett, M. Gorman and S. Jones. 2019. *State of the Knowledge Study on Age, Disability and High Volume Transport in Developing Countries*. HVT. London.

Proxad. 2019. *Project Balega. Final report*. HVT. London.

Rahman, M.S. 2021. *Impact of COVID-19 on the mobility of physically challenged people and older people. Final report*. HVT. London.

ReCAP PMU and Scriptoria. 2021. *Life of the Research for Community Access Partnership (ReCAP), Programme Report 2014-2020*. ReCAP. London.

Rogers, J. 2019. *Capacity building needs assessment and strategy to promote low carbon development in high volume transport for selected low-income and lower-middle income priority countries in Africa and South Asia. Part 1: State of Knowledge study to formulate the Applied Research Programme and implementation strategies*. HVT. London.

Rugamba, A. 2020. *Country scoping of research priorities on low carbon transport in Zambia.* HVT. London.

Rugamba, A. 2020. *Country scoping of research priorities on low carbon transport in Uganda.* HVT. London.

Rutul, J., S. Shah, P. Deshpande. N. Prasanth and M.J. Vishnu. 2021. *Moving Ahead: Urban Mobility Reforms for Post-Covid-19-Resilience-in-India*. HVT. London.

Shah, S. 2021. *Moving towards gender equitable public transport operations in a post COVID-19 world.* Final Report. HVT. London.

Shah, S. 2024a. *User guide: Best practice on designing for equitable public transport networks through accessibility modelling*. HVT. London.

Shah, S. 2024b*. Safer Streets, Safer Cities in Bihar: Street design guidance to mainstream women's mobility and access*. HVT. London.

Shah, S. 2024c*. Safe and Secure Public Transport in Delhi: Use of technology to address the issue of buses skipping stops.* HVT. London.

Partnership on Sustainable Low Carbon Transport (SLoCaT). 2019. *Capacity Building Needs Assessment and Strategy to Promote Low Carbon Development in High Volume Transport for Selected Low-Income and Lower-Middle income Priority Countries in Africa and South Asia.* HVT. London.

SLoCaT. 2019. *Theme 3: Low Carbon Transport. Part 1 - State of Knowledge study to Formulate the Applied Research Programme and Implementation Strategies*. HVT. London.

SLoCaT. 2023. *High Volume Transport: City Retrofit for All: Final Report and Capacity Building Strategy*. HVT. London

SLoCaT. 2024a. Sustainable Development Goals: Targets for Transport. SLoCaT. Retrieved from https://slocat.net/transport-targets-sustainable-development-goals/

2024b. *Towards the Development of a Surface Transport Decarbonisation Index for Low- and Middle-Income Countries in South Asia and Sub-Saharan Africa. State of Knowledge Report.* HVT. London.

Stockholm Environment Institute and University of York. 2021. *Inclusive Climate-Resilient Transport in Africa: Assessment of the needs of transport stakeholders including disadvantaged groups.* HVT. London.

Stockholm Environment Institute and University of York. 2022. *Using Creative Participatory Approaches for Inclusive Climate Resilient Transport in Africa.* HVT. London.

Sustainable Mobility for All (SuM4All). 2019. *Global Roadmap of Action: Toward Sustainable Mobility.* SuM4All. Washington DC.

SuM4All. 2022a. *E-mobility in Low-Income Countries in Africa: Finance, Governance, and Equity.* GRA in Action Series. SuM4All. Washington DC.

SuM4All. 2022b. *Electromobility and Renewable Electricity: Developing Infrastructure for Synergies.* GRA in Action Series. SuM4All. Washington DC.

Swansea University. 2021a. *Accelerating COVID-19 related 'best practice' in the urban motorcycle taxi sector in Sub-Saharan Africa. Country report: Uganda*. HVT. London.

Swansea University. 2021b. *Accelerating COVID-19 related 'best practice' in the urban motorcycle taxi sector in Sub-Saharan Africa. Country report: Liberia*. HVT. London.

Swansea University. 2021c. *Accelerating COVID-19 related 'best practice' in the urban motorcycle taxi sector in Sub-Saharan Africa. Country report: Uganda.* HVT. London.

Swansea University. 2021d. *Accelerating COVID-19 related 'best practice' in the urban motorcycle taxi sector in Sub-Saharan Africa. Country report: Ghana*. HVT. London.

Thompson, B and B. Obika. 2020. *Advancing Applied Research in High Volume Transport in Low-Income Countries in Africa and South Asia*. Sustainability 2020, 12, 4088.

Transport for Cairo. 2024. *Capacity Building in Sustainable Urban Mobility for Low Income Countries "Research on Demand and Success Factors for Future Supply"*. Final Report. HVT: London.

TRL. 1993. *Overseas Road Note 31: A Guide to the Structural Design of Bitumen-Surfaced Roads in Tropical and Sub-Tropical Countries*. DFID. London.

TRL. 2014. *High Volume Transport: Rapid assessment of research gaps in road engineering and technical aspects.* DFID Evidence on Demand. HVT. London.

TRL. 2021a: *Improving transport planning to mitigate against the potential impact of pandemics in LICs.* Final report. HVT. London.

TRL. 2021b: *Making Transport in Low-Income Countries Resilient to Pandemics: A Planning Guide.* HVT. London.

TRL. 2022. *Road Note 31: A Guide to the Structural Design of Surfaced Roads in Tropical and Sub-tropical Regions: Integrating Climate Resilience into Road Networks.* HVT. London.

TRL. 2023. Road Note 31: *Dissemination of the Structural Design of Surfaced Roads in Tropical and Sub-tropical Regions.* HVT. London.

TRL. 2024. *Overseas Road Notes—The Series.* TRL. Retrieved from https://www.trl.co.uk/projects/overseas-road-notes---the-series

Turner, J. 2020. *Country scoping of research priorities on low carbon transport in Nepal*. HVT. London.

United Nations. 2011. *Global Plan for the Decade of Action for Road Safety 2011–2020*. United Nations. New York.

University of Birmingham. 2021a. *State of Knowledge Report: Adaptation for Transport Resilience to Climate Change (AfTR-CC) for LICs in Africa and South Asia*. HVT047. HVT. London.

University of Birmingham. 2021b. *Traffic Volume Report. Novel traction systems for sustainable railway futures in LICs.* HVT. London.

University of Birmingham. 2021c.*Simulation Report - Novel traction systems for sustainable railway futures in LICs.* HVT. London.

University of Birmingham. 2023. *Novel traction systems for sustainable railway futures in LICs.* Final report. HVT. London.

University of Birmingham. 2023. *Climate Resilient Sustainable Road Pavement Surfacings. Trials Constructability Report.* HVT. London.

University of Birmingham. 2023. *Climate Resilient Sustainable Road Surfacings*. Final Report. HVT. London.

University of Leeds. 2021. *Links between Transport Air Quality and COVID-19 Spread in Bangladesh: Summary of Findings*. HVT. London.

University of Southampton. 2019. *Road Safety in Low-Income Countries.* Final Report. HVT. London.

University of Southampton. 2023. *Sustainability and Risk Analysis Tool: User Guide. Decision Support Systems for Resilient Strategic Transport Networks in Low Income Countries.* HVT. London.

University of Southampton. 2023. *Decision support systems for resilient strategic transport networks in low-income countries.* Final summary report. HVT. London.

Uteng, T. P. 2019. *State of the Knowledge Study on gender and transport in developing economies.* HVT. London.

Van Gijn J and Xochitl B. 2009. *Project Completion Review of the Southeast Asia Community Access Programme (SEACAP)*. Narrative Report. DFID. London.

Vanderschuren, M., H. Allen, P. Krause and T. Lane-Vissera. 2023. *Lessons learnt through gender-based travel data collection and related sexual harassment in Sub-Saharan Africa*. Social Sciences & Humanities Open 7 (2023) 100442.

Vectos. 2021. EMPOWER – *Practical Tools for Decision Makers and Citizens to Tackle Sexual Harassment in African Urban Transport*. HVT. London.

Vectos. 2021. *TRANSITIONS - Informal Transport Compendium Report: A literature review to establish the 'state of knowledge' and appraisal of gaps requiring further research.* HVT. London.

Vectos. 2023. *Informal Public Transport Routemap & city comparative analysis. Supporting transitions towards low carbon, affordable and safe urban mobility working with the Informal Public Transport (IPT) sector*. HVT. London.

Vectos. 2024. *Inclusive Interchanges. LAMATA Pilot Deployment Strategy. Final*. HVT. London.

Wadud, Z., S.M. Rahman and A. Enam. 2022. *Face mask mandates and risk compensation: an analysis of mobility data during the COVID-19 pandemic in Bangladesh.* BMJ Global Health.

Walk21 Foundation. 2021. *'Our walking is our asset': Exploring the way in which walking is valued in pedestrian practice and policy in African cities.* HVT. London.

Walk21 Foundation. 2021. *Investing in walking in African cities: moving beyond policy.* HVT. London

Wanyama, M. 2024a. Africa's *Automobile Maintenance Structure: A Policy Brief Highlighting the Safety and Emission Risks of Automobile Maintenance in Kampala*. HVT. London.

Wanyama, M. 2024b. *Autosafety Uganda: Tackling Road Transport Emissions and Crashes from the Source*. HVT. London.

World Bank. 2008. *Safe, Clean, and Affordable: Transport for Development.* Transport Strategy Statement. World Bank. Washington DC.

World Bank. 2010. *Lagos Urban Transport Project 2.* Project Appraisal Document. World Bank. Washington DC.

World Bank. 2020. *ieConnect for Impact: Understanding and Optimizing the Benefits of Transport Investments.* Retrieved from https://www.worldbank.org/en/results/2020/11/12/ieconnect-for-impact

Wheat, P., A.D. Stead, H. Huang and A. Smith. 2019. *Lowering Transport Costs and Prices by Competition: Regulatory and Institutional Reforms in Low Income Countries*. Sustainability 2019, 11, 5940.

Yanocha, D., J. Mason and J. Hagen. 2021. *Using data and technology to integrate mobility modes in low-income cities*. Transport Reviews, 41:3, 262-284.

Appendix C

PRINCIPAL PERSONS CONSULTED

Name	Organisation	Position
Ms. Elizabeth Jones	FCDO	Senior Transport Adviser
Ms. Anne Joslin	FCDO	Infrastructure Adviser
Mr. Alfie Alsop	FCDO	Infrastructure Adviser
Mr. Stephen Coyle	FCDO	Programme Manager
Mr. Neil Ebenezer	PMU	HVT Team Leader
Mr. Bernard Obika	PMU	Former HVT Team Leader
Ms. Louise Cattro	PMU	Former HVT Programme Manager
Ms. Niki Sayer	PMU	Former HVT Procurement Specialist
Mr. Holger Dalkmann	PMU	Technical Lead
Mr. Gary Haq	University of Leeds	Technical Lead
Ms. Nuria Biosca	PMU	HVT Research Manager
Ms. Mihaela Vocila	PMU	HVT Research Manager
Mr. Samual Fookes	PMU	HVT Research Manager (T-TRIID)
Ms. Helen Platt	PMU	HVT communications Specialist
Ms. Sara Seghayer	PMU	HVT Programme Manager and Financial Specialist
Ms. Limou Dembele	PMU	HVT Monitoring and Evaluation Specialist
Mr. Joseph Haule	Independent	HVT Ambassador
Mr. Wenxin Qiao	World Bank	Senior Transport Specialist
Mr. Jamie Leather	Asian Development Bank	Chief, Transport Sector Group
Mr. Ramon Munoz-Raskin	World Bank	Programme Leader for Infrastructure and Sustainable Development
Ms. Gina Porter	University of York	Professor
Mr. Alex Rugamba	Independent	Transport engineer
Mr. Richard Dietrich	Independent	Infrastructure specialist
Ms. Maruxa Cardama	SLoCaT	Secretary General
Mr. Nikola Medimorec	SLoCaT	Researcher
Ms. Borana Resulaj	SLoCaT	Finance and Grants Manager
Mr. Jacob Mason	ITDP	Senior Director, Global Program
Mr. Benjamin Welle	World Resources Institute	Director, Integrated Transport & Innovation
Ms. Lucy Pearson	Climate Parliament	Executive Director
Mr. Paul Curtis	SLR (formerly Vectos)	Director, Research and Development

Name	Organisation	Position
Mr. Tim Durant	SLR (formerly Vectos)	Associated Director
Mr. Tom Bishop	Amend	Programme Director
Mr. Sam Clark	Transaid	Head of Programmes
Mr. Mark Dimond	Integrated Transport Planning	Research Associate
Mr. Tom Fleming	Integrated Transport Planning	Research Associate
Mr. Jim Walker	Walk 21	Director
Mr. Clive Roberts	University of Durham	Professor
Mr. Xia Wadud	University of Leeds	Professor
Mr. Shafiq-Ur Rahman	University of Dhaka, Bangladesh	Professor
Ms. Oluwaseun Sonoiki	Lagos Metropolitan Area Transport Authority (LAMATA), Nigeria	Legal counsel
Mr. Keshav Panthi	University of Texas	Researcher
Mr. Cyprian Moses	Hudumaplus, Tanzania	Director
Ms. Gail Jennings	Independent	Researcher
Mr. Krijn Peters	University of Swansea	Professor
Ms. Sonal Shah	Urban Catalysts, India	Executive Director
Mr. Rutul Joshi	CEPT, India	Head of PhD Programme
Mr. Simon Blainey	University of Southampton	Professor
Mr. Justin Coetzee	GoMetro, South Africa	Chief Executive Officer
Mr. Michael Wanyama	Wanyama Autosafety Initiative, Uganda	Team Leader
Mr. Kevin Prescott	Hodos Media	Director
Mr. Andrew Otto	TRL	Practice Lead, International Pavement Engineering Team
Mr. Kevin McPherson	TRL	Principal Consultant
Mr. Alemgena A. Araya	Alert Engineering, Ethiopia	Managing Director
Mr. Andrew Quinn	University of Birmingham	Professor
Mr. Dmtsu Gebremariam Hagos	Mekelle University, Ethiopia	Lecturer
Ms. Shalina Sinha	CEPT University, India	Senior Associate Professor
Mr. Surya Sugathan	CEPT University, India	Transport Planner
Mr. Jonathan Flower	Senior Research Fellow	University of the West of England

Appendix D

PREVIOUS UK-FUNDED RESEARCH ON TRANSPORT IN DEVELOPING COUNTRIES[1]

A. Introduction

1. The UK has been financing applied research on transport in LMICs for many years. Prior to the 1990s, research was undertaken through direct subvention funding of the Overseas Unit of the Transport Research Laboratory (TRL), which built up a respected body of applied research publications including Overseas Road Notes (ORNs) that developed specifications and design manuals for road construction and maintenance in tropical climates (Hine 2019). Among the most influential of these notes was Overseas Road Note 31 (ORN31): A Guide to the Structural Design of Bitumen-Surfaced Roads in Tropical and Sub-Tropical Countries (TRL 1993).

2. The former Department for International Development (DFID) introduced competitive bidding for its research programmes in 1990. Transport research was included within a large, competitively awarded Engineering Knowledge and Research Programme covering multiple infrastructure sectors. By opening research to competition, DFID gained access to additional research suppliers. TRL became an executive agency in 1992 and was privatised in 1996. Since then, it has continued to be one of the leading suppliers of UK-funded transport research in LMICs (Hine 2019).

B. Previous UK-funded transport research in developing countries

1. Scope of previous programmes

3. Most of DFID's previous transport research was on rural access. This reflected the importance of improving local roads to provide poor rural communities with access to social and other services, agricultural markets, employment and other economic opportunities (DFID 2014a; ICAI 2018). Between 2004 and 2020, DFID financed three large stand-alone programmes of applied research on rural access.

4. The Southeast Asia Community Access Programme (SEACAP), 2004–2009, undertook research in Cambodia, Lao PDR and Viet Nam linked to rural road investment projects being financed by multilateral development banks (MDBs). This focused mainly on developing engineering and materials solutions for rural road surfacing and paving, slope stabilisation and maintenance (DFID 2014a). SEACAP research developed improved engineering solutions to improving road quality and longevity and reduce construction costs. It also demonstrated that high research uptake can be achieved if research produces improved technical solutions to critical issues, and research work is closely coordinated with the formulation of rural access investment projects by major financiers. One of the main mechanisms for doing so was by helping countries incorporate research findings in national manuals, specifications and guidelines, thereby institutionalising the improved approaches for countrywide use (Van Gijn and Benjamin 2009).

5. In 2005, DFID approved support for the Global Transport Knowledge Partnership (gTKP) to coordinate and strengthen transport knowledge dissemination. This reflected DFID's awareness that high quality transport research only creates value when it is disseminated to

[1] This appendix draws upon a study of DFID's Contribution to Transport Research and Knowledge (Hine 2019) and the external review of the Improved Rural Roads and Transport Services for Communities in Low-Income Countries Programme (ReCAP) (Duncan 2021).

potential users leading to take-up at country level. gTKP initially concentrated on dissemination of rural road engineering research, before later including research on transport services and other types of transport (DFID 2014a; Hine 2019).

6. In 2008, DFID approved a second programme of research on rural access, this time focusing on LMICs in Africa. The Africa Community Access Programme, Phase 1 (AFCAP1) assisted a core group of six African countries. The research was engineering-focused, covering similar topics to those of SEACAP (e.g. improved approaches to road surfacing) and importance was again attached to incorporation in national manuals, specificaitons and guidelines. At that time, many African countries lacked design norms and standards for rural roads, and few took local materials and conditions into account. Among the core group of countries, Ethiopia, was implementing one of Africa's largest national rural road programmes and, with AFCAP1 support, it developed a suite of design manuals, specifications and standard bidding documents for use by the national programme.[2]

7. AFCAP1 provided clear evidence that research can play a valuable role in reducing the costs of rural access and improving road quality and safety, and that LMICs in Africa and Asia could benefit from such research. DFID's project completion report also identified several challenges for the sustainability of research, notably (i) the issue of loss of knowledge due to lack of knowledge repositories and turnover of staff among donors, governments and other partners; (ii) the risk that much of the momentum established by AFCAP1 would be lost and long-term road monitoring projects would not be completed unless follow-up support was provided; (iii) the need to update infrastructure specifications to protect against climate vulnerability; and (iv) the need to build capacity of partner countries to conduct their own transport research programmes. DFID also acknowledged that more research was needed on non-infrastructure aspects that influence transport service outcomes for rural transport users (DFID 2014b).

8. In 2014, DFID approved a third research programme on rural access, the Rural Roads and Transport Services for Communities in Low-Income Countries Programme (ReCAP). This financed research for twelve African LMICs, through the Africa Community Access Programme, Phase 2 (AFCAP2) and, for the first time, five LMICs in Asia, through the Asia Community Access Programme (AsCAP). In Africa, the partner countries included the six core countries from AFCAP1 and six other countries that had expressed interest. The partner countries in Asia had not previously received support under DFID rural access research programmes.[3] To support implementation, DFID recruited a consulting firm to operate a PMU to manage and coordinate the programme implementation activities, procure research suppliers through competitive tendering, and provide quality assurance. High-level oversight of the programme was provided by an executive committee and the steering committees for AFCAP2 and AsCAP, and included representatives of the partner countries, MDBs, and regional transport and transport research organisations (ReCAP PMU and Scriptoria 2021).

9. ReCAP financed two streams of research activities. The first stream included engineering research on rural access provision and preservation (similar to SEACAP and AFCAP1) and research on transport services, road safety and transport regulation. Nearly half of ReCAP research expenditure was on road engineering research to support national manuals, guidelines and specifications, including development of climate resilient designs. There was substantial uptake in partner countries. The second stream of research activities covered the cross-cutting

[2] At programme completion, AFCAP1 was rated "A+" by DFID. It also won the prestigious British Expertise prize for Outstanding International Collaboration (DFID 2014b).

[3] DFID had been assisting rural access in Nepal through its bilateral country assistance programme.

issues of capacity building, knowledge management, gender and inclusion. This included research on rural transport services, motorcycle taxis and three-wheelers, first mile improvements, socio-economic impacts, and gender dimensions of rural transport. This non-engineering research helped to build a new evidence base in under-researched fields of rural access, and to raise LMIC awareness about critical issues (e.g. women's public transport needs, motorcycle safety). However, a longer period of engagement would have been needed to achieve uptake of this research. In many LMICs, the rural transport regulator lacked capacity and the rural transport regulations were ineffective and needed to be updated. The external review of ReCAP found that the non-engineering research had established a useful foundation of knowledge that could eventually lead to greater LIMC uptake and embedding if supported by research and capacity building over a longer period (Duncan 2021).

179. In 2015, DFID approved ieConnect for Impact to finance an impact evaluation programme of World Bank transport investment projects. Evaluations are carried out of selected projects to incorporate evidence from impact evaluation in project and policy decisions. These include projects under preparation, approved and completed projects (World Bank 2020). ieConnect has shown that high quality analytical studies prepared during project preparation can be used to improve expected impact.

2. Uptake, stakeholder engagement and coordination

180. The experience of previous DFID transport research programmes was generally that some form of LMIC buy-in and ownership needed to be established before or during a project if there were to be prospects of uptake at country-level. SEACAP and AFCAP1 did this by working closely with partner countries and involving them in steering the research (Van Gijn and Xochitl 2009; DFID 2014b). SEACAP had only three country partners while AFCAP1 had six. Partner countries were generally selected on the basis of their expressed interest in using UK-funded research to strengthen national policies, practices and plans for rural access development. As the number of partner countries was relatively small, it was possible to work more intensely with countries, build trust and ownership, gain access to decision-makers and senior technical staff, and build synergies across HVT research in different partner countries. Some of the research projects achieved uptake at scale by contributing to the design of large national investment programmes.

181. Under ReCAP, approved the year before HVT, DFID began to modify this country-focus. The ReCAP business case did not refer to selection of a specific set of partner countries for the programme and in practice there were a total of 17 partner countries and, for the first time, HVT included countries from both Africa and Asia in a single DFID transport research programme. The larger number of countries offered the possibility of achieving uptake of improved approaches in more LMICs but reduced the amount of programme effort and resources available per country.

182. Several of the implementation arrangements contributed to research quality, uptake and strategic coherence of SEACAP, AFCAP1 and ReCAP:

(i) an executive committee, comprising representatives of DFID, the research steering committee(s), MDBs and the PMU, to be responsible for programme-level decision-making and oversight; and providing a channel to connect research with MDB investment financing in LMICs;

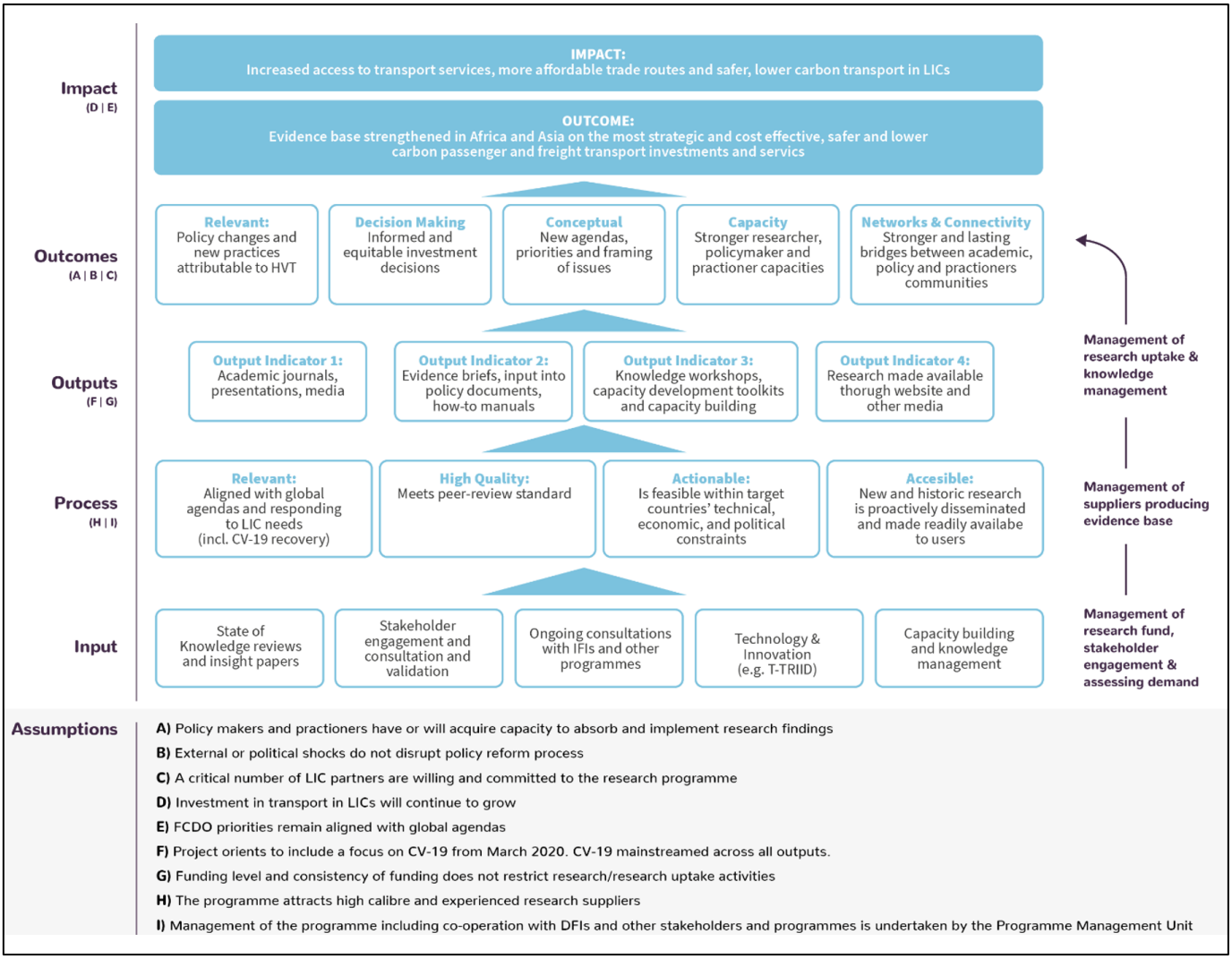
(ii) a research steering committee, comprising LMIC representatives mainly drawn from government transport agencies and LMIC transport research organisations, to oversee and establish ownership over the selection of research projects, affording

LMICs opportunities to propose research aligned with national priorities and plans and establish LMIC buy-in and ownership of the HVT research; and

(iii) a technical advisory panel, consisting of respected technical experts on transport, to support quality assurance and provide advice on addressing technical issues on an as-needed basis.

Appendix E

UPDATED HVT THEORY OF CHANGE, 2021



Source: FCDO 2021.

Appendix F

SAMPLE OF HVT PROJECTS REVIEWED

No.	Research category	Research supplier	Project name	Cost (£)	Transport subsector	Cross-cutting theme	Output type	Geographical focus
1	Strategic positioning	Cardno	SoK Paper - Theme 1: Long distance road and rail	315,716	Road and rail	Climate change	Literature review	Sub-Saharan Africa, South Asia
2	Strategic positioning	ITDP	SoK Paper - Theme 2: Urban transport	315,651	Urban transport	Climate change	Literature review	Sub-Saharan Africa, South Asia
3	Strategic positioning	SLoCaT	SoK Paper - Theme 3: Low carbon transport	268,055	Sectorwide	Climate change	Literature review	Sub-Saharan Africa, South Asia
4	Strategic positioning	Gina Porter, Tanu Priya Uteng, Univ. of Southampton	SoK Paper - Theme 4: Inclusion	92,197	Sectorwide	Inclusion	Literature review	Sub-Saharan Africa, South Asia
5	T-TRIID 1	Water Fuel Engineering	T-TRIID Project - Low Carbon Hyderabad Bus Fleets	30,000	Urban transport	Climate change	Prototype trial	India
6	T-TRIID 1	Nepal Commutiere	T-TRIID Project -Modification of Pedal Driven Rickshaw to Electric	28,403	Active mobility & paratransit	Climate change	Prototype trial	Nepal
7	T-TRIID 1	Proxad Ltd	T-TRIID Project - Project Balega	30,000	Urban transport	Inclusion	Prototype trial	South Africa
8	T-TRIID 1	My Smart Remote Ltd	T-TRIID Project - Smart Eye for Driver	30,000	Road	Road safety	Prototype trial	Pakistan
9	T-TRIID 1	Intrepid Minds	T-TRIID Project - Hubz	25,250	Road	Inclusion	Prototype trial	South Africa
10	T-TRIID 1	Peter Davidson Consultancy	T-TRIID Project - Feasibility of developing a transport scheme business case tool	30,000	Sectorwide	Decision support systems & data	Prototype trial	South Africa
11	T-TRIID 1	Echo Mobile	T-TRIID Project - Promoting Safety in Urban Transport	28,500	Urban transport	Road safety	Prototype trial	Kenya
12	T-TRIID 1	Integrated Transport Planning	T-TRIID Project - Network Explorer: a bus network analysis tool	29,878	Urban transport	Decision support systems & data	Prototype trial	South Africa
13	T-TRIID 1	Amend	T-TRIID Project - Impact of 'Kids' Court' speed enforcement interventions on vehicle speeds	27,411	Urban transport	Road safety	Case study	Mozambique
14	Part 2 Research	Hodos Media	Business Case for HDM-4	259,005	Road	Decision support systems & data	Engineering research	Global
15	Strategic positioning	Richard Dietrich	Bangladesh Scoping Study & Management of Transport Scoping Studies	14,662	Sectorwide	Climate change	Country scoping	Bangladesh
16	Strategic positioning	Richard Dietrich	Pakistan Scoping Study & Management of Transport Scoping Studies	14,662	Sectorwide	Climate change	Country scoping	Pakistan
17	Strategic positioning	Alex Rugamba	Uganda Scoping Study & Management of Transport Scoping Studies	18,122	Sectorwide	Climate change	Country scoping	Uganda
18	Strategic positioning	Alex Rugamba	Zambia Scoping Study & Management of Transport Scoping Studies	18,122	Sectorwide	Climate change	Country scoping	Zambia
19	Part 2 Research	Road Safety Foundation	Update of Road Safety Policy Guide	9,455	Road	Road safety	Policy brief	Global
20	Part 2 Research	Amend	Road Safety Initiatives	106,820	Urban transport	Road safety	Toolkit	Tanzania, Malawi

21	Part 2 Research	Integrated Transport Planning	Update of Overseas Road Note (ORN) 21	103,207	Sectorwide	Inclusion	Guidelines	Global
22	Uptake support	Climate Parliament	Roundtable meetings with African and Asian Parliamentarians	83,925	Sectorwide	Climate change	Research uptake support	Sub-Saharan Africa, South Asia
23	COVID-19 response	Hudumaplus Co. Ltd	What are the Impacts of and Responses to COVID-19 19 in addressing mobility of people with disabilities in Tanzania? Case Study Dar Es Salaam, Kagera and Zanzibar Regions	23,820	Urban transport	Inclusion	Case study	Tanzania, Rwanda, Burundi
24	COVID-19 response	Dr. M. Shafiq-Ur Rahman	Impacts of Covid-19 on mobility of physically challenged people and older people	19,970	Urban transport	Inclusion	Case study	Kenya, Cameroon, Nigeria
25	COVID-19 response	University of Leeds	Modelling the links between transport, air quality and COVID-19 spread using naturalistic data from Dhaka, Bangladesh	49,970	Urban transport	Decision support systems & data	Case study	Bangladesh
26	COVID-19 response	Rahul Jobanputra	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	Urban transport	Inclusion	Policy brief	Kenya, Uganda
27	COVID-19 response	Dr Rutul Joshi	Post-COVID-19 Mobility: An opportunity to reform urban transport systems	30,000	Urban transport	Inclusion	Policy brief	India, Bangladesh, Sri Lanka, Kenya, Tanzania, Zambia, Uganda
28	COVID-19 response	Sonal Shah	Moving towards gender equitable public transport operations in a post-COVID-19 world	28,998	Urban transport	Inclusion	Case study	India Bangladesh, Afghanistan, Pakistan, Nepal
29	COVID-19 response	Gail Jennings	Gaining or losing ground? Ensuring that 'post-Covid-19' transportation serves the needs of low-income women in African cities	9,825	Urban transport	Inclusion	Case study	Uganda, Nigeria, Kenya
30	COVID-19 response	Swansea University	Accelerating Covid-19 related 'best practice' in the urban motorcycle taxi sector in sub-Saharan Africa	21,000	Active mobility & paratransit	Inclusion	Case study	Sierra Leone, Liberia, Ghana, Uganda, Kenya, Tanzania
31	COVID-19 response	Hudumaplus Co. Ltd	How Exposed have transport workforces been to COVID-19 -19 and what solutions are available to reduce risk and exposure? Case Study Dar Es Salaam Region	10,000	Urban transport	Inclusion	Case study	Tanzania, Rwanda, Burundi
32	COVID-19 response	Integrated Transport Planning	Best practice on designing for equitable public transport networks through accessibility modelling in emerging COVID-19 cities	9,780	Urban transport	Inclusion	Best practice study	Kenya, Tanzania, Uganda, Ghana, Liberia, Sierra Leone
33	COVID-19 response	Rahul Jobanputra (see Gail Jennings above)	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	Urban transport	Inclusion	Case study	Kenya, Uganda
34	Part 2 research	Cardno	An Investigation into the Impact on Social Inclusion of HVT Corridors, and Solutions to Identifying and Preventing Human Trafficking	249,905	Sectorwide	Inclusion	Literature review	Tanzania, Uganda
35	Part 2 research	Walk 21	The Impact of COVID-19 pandemic on climate change mitigation: Walking and Cycling Policy and Practice in Africa	87,000	Active mobility & paratransit	Climate change	Policy brief	Sub-Saharan Africa

36	Part 2 research	University of Birmingham	Climate resilient sustainable road pavement surfacings	499,813	Road	Climate change	Engineering research	Ethiopia, Sierra Leone
37	Part 2 research	University of Birmingham	Novel traction systems for sustainable railway futures in LICs	461,167	Rail	Climate change	Engineering research	Sub-Saharan Africa
38	Part 2 research	Alert Engineering	Women's Personal Safety, Participation, and Employment Linkage in Urban Public Transport	228,804	Urban transport	Inclusion	Case study	Ethiopia
39	Part 2 research	Vectos	Empower – Practical tools for decision makers and citizens to tackle sexual harassment in African urban transport	477,035	Urban transport	Inclusion	Toolkit	Nigeria, Rwanda, Uganda
40	Part 2 research	GoMetro	Africa Urban Mobility Observatory	495,000	Urban transport	Climate change	Prototype trial	Tanzania, Ethiopia, DRC, Rwanda, Malawi
41	Part 2 research	University of Southampton	Decision Support Systems for Resilient Strategic Transport Networks in Low Income Countries	495,350	Sectorwide	Climate change	Engineering research	Uganda, Zambia, Kenya, Tanzania
42	Part 2 research	Vectos	Transitions - Transitioning the policy debate, stakeholder relations and informal transport services for a low carbon future	462,665	Urban transport	Inclusion	Best practice study	Ghana, Sierra Leone, Mozambique, South Africa, Zimbabwe
43	Part 2 research	ITDP	City Retrofit for All: Examining Inclusive Infill Transit-Oriented Development Strategies in East Africa's Rapidly Growing Urban Areas	484,334	Urban transport	Climate change	Best practice study	Tanzania, Ethiopia
44	Part 2 research	University of York	Inclusive climate resilient transport planning in low income countries in Africa	471,725	Sectorwide	Climate change	Guidelines	Ethiopia, Rwanda, Uganda, Zambia
45	Part 2 research	University of Birmingham	Climate Change Resilient Transport: A Policy Guide for Low-Income Countries in Africa and South Asia	169,137	Sectorwide	Climate change	Guidelines	Sub-Saharan Africa, South Asia
46	Part 2 research	TRL	Update of Road Note 31	649,150	Road	Decision support systems & data	Engineering research	Global, including workshops in Bangladesh and Mozambique
47	Part 2 research	Hodos Media	HDM-4 Support with World Bank	99,950	Road	Decision support systems & data	Engineering research	Global
48	Strategic positioning	Richard Dietrich, Augustus Ababio-Donkor, Prof. Charles Adams, Theun Elzinga	HVT Transport Scoping Study - Ghana corridor	45,000	Sectorwide	Inclusion	Country scoping	Ghana
49	T-TRIID 2	Integrated Transport Planning	Computer Vision for Public Transport	25,000	Road	Road safety	Prototype trial	Sierra Leone
50	T-TRIID 2	Vectos	Inclusive Interchanges	50,000	Urban transport	Inclusion	Case study	Nigeria
51	T-TRIID 2	The University of the West of England	Policy and regulation development for motorcycle taxi safety in Nepal	44,423	Active mobility & paratransit	Inclusion	Policy brief	Nepal
52	T-TRIID 2	Sonal Shah	Safe and Secure Public Transport in Delhi	51,600	Urban transport	Inclusion	Case study	India
53	T-TRIID 2	Transportation Research and Injury Prevention Centre, Indian Institute of Technology Delhi	Gendered approach of addressing adaptation capacity to hot weather conditions	49,711	Urban transport	Inclusion	Case study	India

54	T-TRIID 2	Wanyama Autosafety Initiatives	Autosafety Uganda, Rubaga Chapter - Kampala	49,817	Urban transport	Road safety	Case study	Uganda
55	T-TRIID 2	Islamic University of Technology, Bangladesh	Road Design Guideline Considering Three-Wheeler Slow-Moving Vehicles (Tri-SMV) for Urban and Rural Roads of Bangladesh	25,000	Active mobility & paratransit	Road safety	Case study	Bangladesh
56	T-TRIID 2	Mekelle University	Safety and Mobility Challenges of Persons with Disability in Mekelle City: Towards Inclusive Urban Transport	24,980	Urban transport	Inclusion	Case study	Ethiopia
57	Global sustainable mobility agenda	World Resources Institute	Improving Access to Climate Finance for Transport Projects in Low and Middle Income Countries	249,864	Sectorwide	Climate change	Global mobility agenda	Global (focus countries are Kenya, India and Vietnam)
58	Global sustainable mobility agenda	SLoCaT	Surface Transport Decarbonisation Index	249,573	Sectorwide	Climate change	Global mobility agenda	Global (focus countries to be selected through consultation)
59	Part 2 research	Vectos	Empower II	174,420	Urban transport	Inclusion	Toolkit	Nigeria, Malawi Rwanda, Ethiopia, Uganda, Ghana, Kenya, Mozambique, Sierra Leone, and Zambia
60	Uptake support	Engineers without Borders	Capacity Building in Sustainable Mobility for Low and Middle-Income Countries	75,015	Sectorwide	All main HVT themes	Research uptake support	Global
61	Uptake support	Climate Parliament	Research Uptake: Improving Engagement of HVT Flagship Projects	23,340	Sectorwide	Climate change	Research uptake support	Global
62	Part 2 research	TRL	HrDM5 Gap Analysis and updating of the Functional Requirements	149,995	Road	Decision support systems & data	Engineering research	Global
63	Part 2 research	CEPT	Planning Framework for Low Emission Zone (LEZ) in Core areas of Indian Cities	100,999	Urban transport	Climate change	Policy brief	India
64	Part 2 research	Urban Catalysts	Women on the move - Boosting electric two- and three-wheelers	99,244	Active mobility & paratransit	Inclusion	Policy brief	India
65	Uptake support	TRL	Deeper dive and greater uptake of Road Note 31	57,000	Road	Climate change	Research uptake support	Tropical countries in Africa and Asia
66	Uptake support	Joseph Haule/Kalpana Viswanath	Increasing visibility and engagement with HVT research through international events and ambassadorial roles for senior African and Asian sector leaders	90,000	Sectorwide	All main HVT themes	Research uptake support	Africa and Asia
			SUBTOTAL	**9,087,916**				

HVT = High Volume Transport Programme, ITDP = Institute for Transport Development and Policy, T-TRIID = SLoCaT = Partnership o Sustainable Low Carbon Transport,
Source: PMU data; Consultant.

Appendix G

DETAILS OF RESEARCH PROJECT OUPUTS AND ASSESSED PROJECT QUALITY AND INNOVATION

No.	Research category	Project title	Total budget (£)	Research output	Assessed project quality and innovation [a]
1	Strategic positioning	SoK Paper - Theme 1: Long distance road and rail	315,716	Extensive literature review, and identification and prioritisation of research gaps	Moderate
2	Strategic positioning	SoK Paper - Theme 2: Urban transport	315,651	Extensive literature review, and identification and prioritisation of research gaps	High
3	Strategic positioning	SoK Paper - Theme 3: Low carbon transport	268,055	Extensive literature review, and identification and prioritisation of research gaps	High
4	Strategic positioning	SoK Paper - Theme 4: Inclusion	92,197	Extensive literature review, and identification and prioritisation of research gaps	High
5	T-TRIID 1	T-TRIID Project - Low Carbon Hyderabad Bus Fleets	30,000	Field tested prototype that hoped to reduce the fuel consumption of the Hyderabad bus fleets using HydroGen technology to enhance energy release from fuel. Testing was inconclusive.	Moderate
6	T-TRIID 1	T-TRIID Project -Modification of Pedal Driven Rickshaw to Electric	28,403	Field tested installation and operation of prototype kits converting rickshaws to electric but testing was inconclusive (some rickshaw drivers doubted that the converted vehicles had lower running costs and when vehicles broke down there were delays obtaining spare parts)	Moderate
7	T-TRIID 1	T-TRIID Project - Project Balega	30,000	Project to explore the potential for introducing Moses app linking rail commuters with shared taxis for last mile journey in South Africa. Included travel behaviour surveys and modelling of potential carbon emissions savings	Moderate
8	T-TRIID 1	T-TRIID Project - Smart Eye for Driver	30,000	Proof of concept of camera based solution monitoring and alerts on driver drowsiness to reduce related vehicle accidents. Demonstrated concept but would need further stage funding to develop prototype and bring to scale	Moderate
9	T-TRIID 1	T-TRIID Project - Hubz	25,250	Support for development of IT platform to support low-cost rural courier network in South Africa. Only limited progress was made and the research suppliers said further funding was needed to proceed further	Moderate
10	T-TRIID 1	T-TRIID Project - Feasibility of developing a transport scheme business case tool	30,000	Standardised approach to transport planning data	Moderate
11	T-TRIID 1	T-TRIID Project - Promoting Safety in Urban Transport	28,500	Field tested prototype app to monitor minibus safety	High
12	T-TRIID 1	T-TRIID Project - Network Explorer: a bus network analysis tool	29,878	Prototype bus network visualisation tool field tested in Freetown and Dhaka	High
13	T-TRIID 1	T-TRIID Project - Impact of 'Kids' Court' speed enforcement interventions on vehicle speeds	27,411	Successful trialling of "Kids' Court" community approach to discouraging unsafe driving	High
14	Part 2 research	Business Case for HDM-4	259,005	Stakeholder survey and analysis of scope of updating/development needed for HDM	High
15	Strategic positioning	Bangladesh Scoping Study & Management of Transport Scoping Studies	14,662	Review of country's transport research needs and identification of priorities for HVT research support	Moderate
16	Strategic positioning	Pakistan Scoping Study & Management of Transport Scoping Studies	14,662	Review of country's transport research needs and identification of priorities for HVT research support	Moderate
17	Strategic positioning	Uganda Scoping Study & Management of Transport Scoping Studies	18,122	Scoping report indicating research gaps and priorities for HVT research support	Moderate
18	Strategic positioning	Zambia Scoping Study & Management of Transport Scoping Studies	18,122	Review of country's transport research needs and identification of priorities for HVT research support	Moderate
19	Part 2 research	Update of Road Safety Policy Guide	9,455	Policy guide examining the background and context of the road safety problem in LMICs and establishing the basis for practical actions and solutions to save lives and prevent injury	High

No.	Research category	Project title	Total budget (£)	Research output	Assessed project quality and innovation [a]
20	Part 2 research	Road Safety Initiatives	106,820	Infrastructure toolkit for non-motorised user safety in African cities	High
21	Part 2 research	Update of Overseas Road Note (ORN) 21	103,207	Review of needs and provision for people with disabilities, and guidelines for future provision	High
22	Uptake support	Roundtable meetings with African and Asian Parliamentarians	83,925	Virtual meetings to brief a caucus of African parliamentarians on transport issues and opportunities arising from HVT research	High
23	COVID	Impacts of and responses to COVID 19 in addressing mobility of people with disabilities in Tanzania?	23,820	Case study report on impact of COVID on mobility of people with disabilities and identification of gaps to address in provision in Dar Es Salaam, Kagera and Zanzibar Regions	Moderate
24	COVID	Impacts of Covid-19 on mobility of physically challenged people and older people	19,970	Report on 8 case studies based on questionnaire surveys for a structured sample of respondents	High
25	COVID	Modelling the links between transport, air quality and COVID-19 spread using naturalistic data from Dhaka, Bangladesh	49,970	Quantitative study, conducted during the earlier stage of the pandemic, that used high quality data sources and methods to identify how successive government policy measures on COVID affected transport, air quality and the spread of COVID	High
26	COVID	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	Research study on the options and potential for using tactical transit lanes to improve public transport in Cape Town, Nairobi and Kampala	High
27	COVID	Post-COVID-19 Mobility: An opportunity to reform urban transport systems	30,000	Study and training modules for reforming urban transport systems in India	High
28	COVID	Moving towards gender equitable public transport operations in a post-COVID world	28,998	Based on literature review, stakeholder roundtable, key informant interviews, and telephone/online surveys, identified gaps in existing public transport provision and recommended measures to address women's transport needs	High
29	COVID	Gaining or losing ground? Ensuring that 'post-Covid-19' transportation serves the needs of low-income women in African cities	9,825	Developed tool for assessing gender and mobility gaps	High
30	COVID	Accelerating Covid-19 related 'best practice' in the urban motorcycle taxi sector in sub-Saharan Africa	21,000	In-country surveys of key informants, motorcycle taxi operators and passengers during COVID in six African countries, together with recommendations for improving motorcycle taxi safety during COVID	High
31	COVID	How Exposed have transport workforces been to COVID -19 and what solutions are available to reduce risk and exposure? Case Study Dar Es Salaam Region	10,000	Case study report on exposure of transport workforces to risks during COVID identifying possible solutions	Moderate
32	COVID	Best practice on designing for equitable public transport networks through accessibility modelling in emerging COVID-19 cities	9,780	User guide on application of best practice techniques for designing equitable networks during and following the COVID-19 crisis, drawing examples from Mandalay (Myanmar)	Moderate
33	COVID	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	Case studies of tactical transit options to improve public transport in Cape Town, Nairobi and Kampala	High
34	Part 2 research	An Investigation into the Impact on Social Inclusion of HVT Corridors, and Solutions to Identifying and Preventing Human Trafficking	249,905	Literature review identifying issues and possible solutions to human trafficking on HVT corridors	Moderate
35	Part 2 research	The Impact of COVID-19 pandemic on climate change mitigation: Walking and Cycling Policy and Practice in Africa	87,000	Policy brief for decision makers, drawing upon survey of 54 LMIC governments	High
36	Part 2 research	Climate resilient sustainable road pavement surfacing	499,813	Identified three resilient pavement design options and demonstrated their effectiveness and feasibility through	High

No.	Research category	Project title	Total budget (£)	Research output	Assessed project quality and innovation [a]
				field trials in Ethiopia with support of Ethiopian Road Authority (ERA)	
37	Part 2 research	Novel traction systems for sustainable railway futures in LICs	461,167	Assessment of suitability of low carbon railway traction technologies in Africa	Moderate
38	Part 2 research	Women's Personal Safety, Participation, and Employment Linkage in Urban Public Transport	228,804	Survey of women's use of public transport and proposals for awareness raising and capacity building	High
39	Part 2 research	Empower – Practical tools for decision makers and citizens to tackle sexual harassment in African urban transport	477,035	Range of studies, briefs, awareness raising tools on addressing sexual harassment in urban transport	High
40	Part 2 research	Africa Urban Mobility Observatory	495,000	Trialled urban transport planning tool using mobile phone data	High
41	Part 2 research	Decision Support Systems for Resilient Strategic Transport Networks in Low Income Countries	495,350	Decision support climate resilience simulation model for transport infrastructure in East Africa	High
42	Part 2 research	Transitions - Transitioning the policy debate, stakeholder relations and informal transport services for a low carbon future	462,665	Range of studies, briefs, awareness raising tools on incorporation of informal transport in transport policies and plans	High
43	Part 2 research	City Retrofit for All: Examining Inclusive Infill Transit-Oriented Development Strategies in East Africa's Rapidly Growing Urban Areas	484,334	TOD programme in Dar, land use planning studies in other study cities	High
44	Part 2 research	Inclusive climate resilient transport planning in low income countries in Africa	471,725	Participatory surveys and interviews identifying transport needs of disadvantaged groups. Guidelines for practitioners on using participatory approaches to support inclusive climate resilient transport in Africa.	High
45	Part 2 research	Climate Change Resilient Transport: A Policy Guide for Low-Income Countries in Africa and South Asia	169,137	High level general policy guide for taking practical steps to address the climate vulnerability problem at country level by preparing and implementing adaptation plans for transport resilience to climate change	High
46	Part 2 research	Update of Road Note 31	649,150	Literature review, stakeholder survey, pavement data analysis, updating of ORN 31 for climate resilient pavement design and raising design capacity from 30 million to 80 million standard axles	High
47	Part 2 research	HDM-4 Support with World Bank	99,950	Further support on development of HDM business plan	High
48	Strategic positioning	HVT Transport Scoping Study - Ghana corridor	45,000	Review of country's transport research needs and identification of priorities for HVT research support	Moderate
49	T-TRIID 2	Computer Vision for Public Transport	25,000	Development of app to use vehicle dashcam data to identify concentrations of people and cars and plot visually	High
50	T-TRIID 2	Inclusive Interchanges	50,000	Case studies conducted for two ongoing schemes to upgrade multimodal hubs interchange schemes. This led to improve standards and facilities being incorporated to provide for the needs of users including women and disadvantaged groups. LAMATA is using the appraisal process established by the project to strengthen the design of other hubs.	High
51	T-TRIID 2	Policy and regulation development for motorcycle taxi safety in Nepal	44,423	Mixed-methods, country-based research on the safety of motorcycle taxis in Kathmandu to identify potential changes in policy and regulation to improve safety for riders and passengers	High
52	T-TRIID 2	Safe and Secure Public Transport in Delhi	51,600	Study of potential for digitalisation of public transport systems to address service gaps and enable a safe travel experience for women and girls	High
53	T-TRIID 2	Gendered approach of addressing adaptation capacity to hot weather conditions	49,711	Study examined the effects of hot weather conditions on women and identified measures to address key issues faced by women transport users	High
54	T-TRIID 2	Autosafety Uganda, Rubaga Chapter - Kampala	49,817	Innovative evidence-based local initiative to tackle the problems of high vehicle emissions and fuel consumption due to poor vehicle maintenance standards and practices. Included awareness raising about the potential for drivers to cut emissions and fuel costs through emissions testing, development of practical	High

No.	Research category	Project title	Total budget (£)	Research output	Assessed project quality and innovation [a]
				emissions systems for testing emissions and comparing with manufacturer's estimates, training mechanics, and implementing large testing programme to determine the status of vehicle emissions across all vehicles types in use in the country	
55	T-TRIID 2	Road Design Guideline Considering Three-Wheeler Slow-Moving Vehicles (Tri-SMV) for Urban and Rural Roads of Bangladesh	25,000	Opinion survey and quantitative surveys leading to proposals for design changes to accommodate the needs of 2- and 3- wheelers and their passengers	Moderate
56	T-TRIID 2	Safety and Mobility Challenges of Persons with Disability in Mekelle City: Towards Inclusive Urban Transport	24,980	Worked closely with Mekelle city authorities to prepare proposals for incorporating provision for disability	High
57	Global sustainable transport	Improving Access to Climate Finance for Transport Projects in Low and Middle Income Countries	249,864	Country studies, state of knowledge paper, policy guide, online training course, webinar	High
58	Global sustainable transport	Surface Transport Decarbonisation Index	249,573	Develop TDI tool LMICs can use in support of NDCs	High
59	Part 2 research	Empower II	174,420	Range of studies, briefs, awareness raising tools on addressing sexual harassment in urban transport	High
60	Uptake support	Capacity Building in Sustainable Mobility for Low and Middle-Income Countries: Bring sustainable mobility to life	75,015	Developed high quality guide to make HVT research more easily accessible to practitioners; developed and ran successful 8-week online design challenge (Reshaping Transport) for young engineers to contribute to designing sustainable mobility innovations in LMICs	High
61	Uptake support	Research Uptake: Improving Engagement of HVT Flagship Projects	23,340	Virtual meetings to brief a caucus of African parliamentarians on transport issues and opportunities arising from HVT research	High
62	Part 2 research	HrDM5 Gap Analysis and updating of the Functional Requirements	149,995	Technical analysis of HDM engineering models identifying critical gaps/inaccuracies to be addressed through updating	High
63	Part 2 research	Planning Framework for Low Emission Zone (LEZ) in Core areas of Indian Cities	101,000	Study on establishing a LEZ in city of Ahmedabad in Gujarat, India using an area-based approach to support implementability	High
64	Part 2 research	Women on the move - Boosting electric two- and three-wheelers	99,244	Research identifying opportunities and barriers for women's ownership and use of electric two-wheelers on the basis of vehicle design, financing, driving license process and regulations, charging infrastructure and models, and institutional support	High
65	Part 2 research	Deeper dive and greater uptake of Road Note 31	57,000	ORN31 disseminated through visits to road authorities in Ghana, Rwanda and Zambia and presentation at regional conference	High
66	Uptake support	Increasing visibility and engagement of HVT research through international events and ambassadorial roles for senior African and Asian sector leaders	90,000	Ambassadors appointed to promote HVT research to LMIC decision makers at major events such as the 2024 African Development Bank transport forum	High

[a] Assessed by the external review shortly before HVT programme completion.
Source: PMU data; Consultant.

Appendix H

DETAILS OF ASSESSED UPTAKE OF RESEARCH PROJECTS AT PROGRAMME COMPLETION

No.	Research category	Project title	Total budget (£)	Research uptake	Rating of research uptake [a]
1	Strategic positioning	SoK Paper - Theme 1: Long distance road and rail	315,716	Basis for selecting Part 2 research and contributing body of knowledge about transport in LMICs but less applicable for country-level uptake	Moderate
2	Strategic positioning	SoK Paper - Theme 2: Urban transport	315,651	Basis for selecting Part 2 research and contributing body of knowledge about transport in LMICs but less applicable for country-level uptake	Moderate
3	Strategic positioning	SoK Paper - Theme 3: Low carbon transport	268,055	Basis for selecting Part 2 research and contributing body of knowledge about transport in LMICs but less applicable for country-level uptake	Moderate
4	Strategic positioning	SoK Paper - Theme 4: Inclusion	92,197	Basis for selecting Part 2 research and contributing body of knowledge about transport in LMICs but less applicable for country-level uptake	Moderate
5	T-TRIID 1	T-TRIID Project - Low Carbon Hyderabad Bus Fleets	30,000	Prototype trials were inconclusive about whether the technology was effective. No indications of work continuing to a further stage	Low
6	T-TRIID 1	T-TRIID Project -Modification of Pedal Driven Rickshaw to Electric	28,403	Prototype trials were inconclusive. Some rickshaw drivers doubted that the converted vehicles had lower running costs and when vehicles broke down there were delays obtaining spare parts. No government buy-in	Low
7	T-TRIID 1	T-TRIID Project - Project Balega	30,000	Preliminary study, survey and testing; no indications project was followed by further product development and uptake	Low
8	T-TRIID 1	T-TRIID Project - Smart Eye for Driver	30,000	Demonstrated concept but would need further stage funding to develop prototype and bring to scale. No indication of uptake	Low
9	T-TRIID 1	T-TRIID Project - Hubz	25,250	Initial programme of stakeholder interviews. Would require further phases of development	Low
10	T-TRIID 1	T-TRIID Project - Feasibility of developing a transport scheme business case tool	30,000	Useful initial studies but proposals would have required further development and buy-in from government agencies expected to participate	Low
11	T-TRIID 1	T-TRIID Project - Promoting Safety in Urban Transport	28,500	The field test confirmed the usefulness of the tracking system. The main research supplier is an established company in Kenya and is in the process of engaging with partners and raising next stage funding	Moderate
12	T-TRIID 1	T-TRIID Project - Network Explorer: a bus network analysis tool	29,878	Useful initial progress on developing prototype tool but no further funding was available for further development and uptake	Low
13	T-TRIID 1	T-TRIID Project - Impact of 'Kids' Court' speed enforcement interventions on vehicle speeds	27,411	Trial was successful and contributed to changes in driving behaviour and raised community awareness about road safety. Amend continues to support kid's courts through its country offices and partnerships in multiple African LMICs	Moderate
14	Part 2 research	Business Case for HDM-4	259,005	Study was one of a series of studies that contributed to the World Bank-led multi-stakeholder initiative to develop HDM-5, including restoring its integrity and accuracy and incorporating climate change, road safety and other aspects. Although this took some time, all of the series of studies are now underway or committed and World Bank has called for expressions of interest in preparation for appointing a contractor to implement the upgrading work, with the expectation of high uptake of HDM-5 by LMICs, MDBs and transport professionals working in LMICs once the upgrade becomes available	High
15	Strategic positioning	Bangladesh Scoping Study & Management of Transport Scoping Studies	14,662	Input for selection of Part 2 research but did not significantly influence the composition of the Part 2 research programme	Low
16	Strategic positioning	Pakistan Scoping Study & Management of Transport Scoping Studies	14,662	Input for selection of Part 2 research but did not significantly influence the composition of the Part 2 research programme	Low
17	Strategic positioning	Uganda Scoping Study & Management of Transport Scoping Studies	18,122	Input for selection of Part 2 research that had a small influence on the composition of the Part 2 research programme—as proposed in the scoping study, several Part 2 projects conducted research on improving urban public transport and addressing the needs of	Moderate

No.	Research category	Project title	Total budget (£)	Research uptake	Rating of research uptake [a]
				disadvantaged and vulnerable groups, and a further Part 2 project sought to address vehicle emissions in Kampala	
18	Strategic positioning	Zambia Scoping Study & Management of Transport Scoping Studies	18,122	Input for selection of Part 2 research but did not significantly influence the composition of the Part 2 research programme	Low
19	Part 2 research	Update of Road Safety Policy Guide	9,455	Small project with no direct uptake mechanism. In use by Road Safety Foundation but not known if used by LMICs	Low
20	Part 2 research	Road Safety Initiatives	106,820	In use by Amend, FIA but country-level uptake not known	Low
21	Part 2 research	Update of Overseas Road Note (ORN) 21	103,207	Little uptake support built into project. However, the work was of high quality and was awarded best session at the 2019 World Road Congress. A research team member from Kenya later became a senator and has been preparing five Bill proposals and amendments to current policy in Kenya to include the sustainable and inclusive transport and mobility principles from Road Note 21	Moderate
22	Uptake support	Roundtable meetings with African and Asian Parliamentarians	83,925	Climate Parliament host roundtables, each of about 20 MPs, to raise awareness and influence agendas over the longer term. These are useful as a high-level support for sustainable transport but are not designed to produce early uptake at country-level	Low
23	COVID	Impacts of and responses to COVID 19 in addressing mobility of people with disabilities in Tanzania?	23,820	Without further research funding and government support, there was no basis for continuation of the project activities	Low
24	COVID	Impacts of Covid-19 on mobility of physically challenged people and older people	19,970	Good quality study that documented the travel needs and Covid related and other travel problems of elderly people, a previously neglected topic in LMICs. No government involvement, no indications of uptake	Low
25	COVID	Modelling the links between transport, air quality and COVID-19 spread using naturalistic data from Dhaka, Bangladesh	49,970	Shared findings with government and in local media but lacked access to decision-makers so there was no uptake	Low
26	COVID	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	There was no involvement of national or city authorities. Prospects for uptake are low	Low
27	COVID	Post-COVID-19 Mobility: An opportunity to reform urban transport systems	30,000	Provided training modules as part of National Urban Learning Platform	Moderate
28	COVID	Moving towards gender equitable public transport operations in a post-COVID world	28,998	The locally-based research team worked closely with Delhi authorities on developing guidance proposals and toolkit and provide substantial capacity development support, leading to prospects of uptake in the city bus system	Moderate
29	COVID	Gaining or losing ground? Ensuring that 'post-Covid-19' transportation serves the needs of low-income women in African cities	9,825	Good quality tool developed but there was no involvement of countries or cities so uptake is less likely	Low
30	COVID	Accelerating Covid-19 related 'best practice' in the urban motorcycle taxi sector in sub-Saharan Africa	21,000	Study less likely to bring about change as governments not involved although it strengthened the research capacity of the local NGO researchers involved. Useful resource for addressing transport needs of future pandemics	Low
31	COVID	How Exposed have transport workforces been to COVID -19 and what solutions are available to reduce risk and exposure? Case Study Dar Es Salaam Region	10,000	No government interest/involvement. There has been no uptake	Low
32	COVID	Best practice on designing for equitable public transport networks through accessibility modelling in emerging COVID-19 cities	9,780	Uptake seems less likely as there were no LMIC stakeholders and only limited dissemination (e.g. through HVT website)	Low

No.	Research category	Project title	Total budget (£)	Research uptake	Rating of research uptake [a]
33	COVID	From 'pop-up to permanent' – identifying bikeable, high-volume priority routes for returning workers, developing quick-win interventions, and evaluating impact	19,750	Good quality case studies but city and national authorities not involved so little expectation of uptake	Low
34	Part 2 research	An Investigation into the Impact on Social Inclusion of HVT Corridors, and Solutions to Identifying and Preventing Human Trafficking	249,905	Identified possible solutions, attracted support from some in-country NGOs but not from LMIC governments, unable to proceed further without additional funding	Low
35	Part 2 research	The Impact of COVID-19 pandemic on climate change mitigation: Walking and Cycling Policy and Practice in Africa	87,000	The involvement of LMIC governments was limited to participation in surveys. There are no indications of uptake at country level although it interviews suggested it may have influenced an action plan on active mobility for Africa prepared by UNEP	Moderate
36	Part 2 research	Climate resilient sustainable road pavement surfacing	499,813	Ethiopia's national road authority was closely involved in developing the resilient pavement options and Ethiopia was selected for constructability trials. Given the advantages of the resilient pavement options developed, and Ethiopia's past uptake of ORN31 and other UK-funded road engineering research, prospects for uptake there are good. There is potential for uptake in other African countries but will likely to require promotion and dialogue with African road institutions	High
37	Part 2 research	Novel traction systems for sustainable railway futures in LICs	461,167	The study found that the technologies are not currently feasible for the traffic levels and operational patterns evident on most African railways	Low
38	Part 2 research	Women's Personal Safety, Participation, and Employment Linkage in Urban Public Transport	228,804	City authorities showed interest in developing measures to improve public transport for women. This was deferred due to civil war in Tigray but is now underway	High
39	Part 2 research	Empower – Practical tools for decision makers and citizens to tackle sexual harassment in African urban transport	477,035	High uptake and institutionalisation of SHE CAN tool by supporting decision-making and reform in LAMATA, Lagos; also uptake in Addis Ababa, Zambia Road Safety Trust, and Kampala City Council Authority is forming a committee with the regulatory ministry to examine public transport plans, and will draw on the SHE CAN Tool. Interest also shown by Sierra Leone and several other countries	High
40	Part 2 research	Africa Urban Mobility Observatory	495,000	The project showed great promise but once the project budget was fully utilised the research supplier had no further and the system/database mothballed. An African-oriented green fund has reportedly used the reports on Gaborone and Maseru as an input to investment plans for eMobility in Botswana	Moderate
41	Part 2 research	Decision Support Systems for Resilient Strategic Transport Networks in Low Income Countries	495,350	A useful prototype tool but due to lack of involvement of LMIC governments there are no indications of direct uptake. Senegalese researchers are reportedly using the tool in Senegal and West Africa (PACCIR), funded by Global Centre on Adaptation	Moderate
42	Part 2 research	Transitions - Transitioning the policy debate, stakeholder relations and informal transport services for a low carbon future	462,665	Focus was on conducting the research in six African cities without having given much thought to uptake although the Maputo partner on the project, who runs a local consulting company, reportedly arranged for Portuguese translation of the Routemap Executive Summary with a view advocating uptake by the city	Low
43	Part 2 research	City Retrofit for All: Examining Inclusive Infill Transit-Oriented Development Strategies in East Africa's Rapidly Growing Urban Areas	484,334	Building on the project findings, with the support of other development partners, Tanzanian authorities are now developing a series of local BRT area plans for Dar Es Salaam. Addis Ababa authorities are using TOD study in BRT planning and improving inter-agency coordination	High
44	Part 2 research	Inclusive climate resilient transport planning in low-income countries in Africa	471,725	Project findings shared with in-country stakeholders. In Zambia, conducted first demonstration of the benefits of installing a 3D Zebra crossing for road safety of vulnerable groups, and provided advice on how to implement this approach. This was a useful awareness-raising tool but uptake may be limited due to minimal government involvement	Low
45	Part 2 research	Climate Change Resilient Transport: A Policy Guide for Low-	169,137	This high quality policy guide was targeted at LMIC policymakers but LMICs were not involved.	Low

No.	Research category	Project title	Total budget (£)	Research uptake	Rating of research uptake [a]
		Income Countries in Africa and South Asia		Dissemination was mainly through conference presentations and publications	
46	Part 2 research	Update of Road Note 31	649,150	Ethiopia is expected to incorporate ORN31 in its national manuals. Strong interest from Kenya, Mozambique and Bangladesh which are conducting trials and flood model studies. Nigerian Federal Ministry of Works has drawn upon ORN31 in updating national road design manual. St Helena used the newly-added ORN31 section on concrete roads on a recent road construction project. High downloads from HVT site indicate widespread interest in ORN31	High
47	Part 2 research	HDM-4 Support with World Bank	99,950	Study was one of a series of studies that contributed to the World Bank-led multi-stakeholder initiative to develop HDM-5, including restoring its integrity and accuracy and incorporating climate change, road safety and other aspects. Although this took some time, all of the series of studies are now underway or committed and World Bank has called for expressions of interest in preparation for appointing a contractor to implement the upgrading work, with the expectation of high uptake of HDM-5 by LMICs, MDBs and transport professionals working in LMICs once the upgrade becomes available	High
48	Strategic positioning	HVT Transport Scoping Study - Ghana corridor	45,000	Study was too short to contribute significantly to multi-partner initiatives (supported by FCDO Post) to support development of Ghana's north–south corridor. It also did not influence the composition of the Part 2 research programme	Low
49	T-TRIID 2	Computer Vision for Public Transport	25,000	In undertaking a World Bank-financed study on development of a major transport corridor in Dhaka, the research supplier from the T-TRIID 2 project used the computer vision tool to provide a high-level overview of traffic conditions in the city	Moderate
50	T-TRIID 2	Inclusive Interchanges	50,000	Being used by Lamata in Lagos, Nigeria in development of inclusive passenger station; LAMATA and SLR (formerly Vectos) piloted the Industrial Injuries Disablement Benefit (IIDB) appraisal process at two of the 14 major multi-modal hubs identified in 2014 Transport Masterplan	High
51	T-TRIID 2	Policy and regulation development for motorcycle taxi safety in Nepal	44,423	Based on the study, Nepal's largest motorcycle taxi operator introduced took steps to address accessibility issues experienced by visually impaired passengers and created a list of motorbike and scooter types not permitted for use as motorcycle taxis and banned vehicles. It also banned vehicles with exposed silencers. Based on the study proposals, the transport ministry is preparing regulations on motorcycle taxi operations and use of helmets	High
52	T-TRIID 2	Safe and Secure Public Transport in Delhi	51,600	In a meeting with the Chief General Manager – Operations (CGM-O), the researchers Illustrated a series of measures that can improve safety on Route 78. They have implemented QR codes, stickers and panic buttons on buses to improve security and provide information to allow women to access the public transport system more easily. In view of the researcher's sustained engagement with the Delhi transport authorities, there are prospects for further uptake.	High
53	T-TRIID 2	Gendered approach of addressing adaptation capacity to hot weather conditions	49,711	Multidisciplinary study examined the effects of hot weather on women's use of public transport in Delhi and developed a heatwave action plan to reduce vulnerability of women commuters to hot weather, including through improving thermal conditions on streets and providing amenities such as drinking water and shaded seating areas. Working closely with city authorities, leading to prospects of uptake in city policies and plans for public transport	Moderate
54	T-TRIID 2	Autosafety Uganda, Rubaga Chapter - Kampala	49,817	The initiative has continued and developed further, and has attracted government support and several international development organisations are considering providing further financing	High

No.	Research category	Project title	Total budget (£)	Research uptake	Rating of research uptake [a]
55	T-TRIID 2	Road Design Guideline Considering Three-Wheeler Slow-Moving Vehicles (Tri-SMV) for Urban and Rural Roads of Bangladesh	25,000	The research was more academic in nature and there was no involvement of country authorities	Low
56	T-TRIID 2	Safety and Mobility Challenges of Persons with Disability in Mekelle City: Towards Inclusive Urban Transport	24,980	Research supplier hired by municipality to design and construct road projects in Mekelle City and, with the infrastructure division and city authority, to reconstruct existing roads and designing new ones making streets more inclusive for people with disabilities	High
57	Support for global sustainable transport agenda	Improving Access to Climate Finance for Transport Projects in Low and Middle Income Countries	249,864	HVT financed parts of a detailed WRI research programme on the climate finance report presented at COP29	Moderate
58	Support for global sustainable transport agenda	Surface Transport Decarbonisation Index	249,573	Ongoing. Much of the work has been technical in nature with little involvement of LMICs. While a TDI would be a useful tool, its potential and attractiveness to LMICs may depend on first working with LMICs to strengthen transport data. After the current TDI project, further stages of development and trialling would be needed both to develop a feasible index and to attract LMIC interest and support	Low
59	Part 2 research	Empower II	174,420	In response to interest from African LMICs, provided further support for use application and institutionalising of SHE CAN tool to supporting decision-making and reform LAMATA. Ikeja bus terminal upgraded incorporating features based on SHE CAN principles	High
60	Uptake support	Capacity Building in Sustainable Mobility for Low and Middle-Income Countries: Bring sustainable mobility to life	75,015	High quality research uptake support but this was undertaken in the later part of the programme leaving little time for the work to have more influence	Moderate
61	Uptake support	Research Uptake: Improving Engagement of HVT Flagship Projects	23,340	Climate Parliament roundtables each of about 20 MPs aim to raise awareness and influence agendas over the longer term and are aimed at produced early uptake	Low
62	Part 2 research	HrDM5 Gap Analysis and updating of the Functional Requirements	149,995	Study was one of a series of studies that contributed to the World Bank-led multi-stakeholder initiative to develop HDM-5, including restoring its integrity and accuracy and incorporating climate change, road safety and other aspects. Although this took some time, all of the series of studies are now underway or committed and World Bank has called for expressions of interest in preparation for appointing a contractor to implement the upgrading work, with the expectation of high uptake of HDM-5 by LMICs, MDBs and transport professionals working in LMICs once the upgrade becomes available	High
63	Part 2 research	Planning Framework for Low Emission Zone (LEZ) in Core areas of Indian Cities	101,000	Study nearing completion, expected to include policy framework proposals and early improvements cities can implement. As the city authority is closely involved and has regular dialogue with CEPT, there are prospects of future uptake in Ahmedabad	Moderate
64	Part 2 research	Women on the move - Boosting electric two- and three-wheelers	99,244	Research team have worked closely with government authorities, establishing a promising basis for eventual research uptake. Since the study was still ongoing at the time of review, it will take some time before the proposals reach implementation. It is likely that, alongside this study, the government authorities will also draw upon other sources of advice in deciding the approach	Moderate
65	Part 2 research	Deeper dive and greater uptake of Road Note 31	57,000	There are prospects of uptake by Ghana, Rwanda and Zambia following dissemination visits in October 2024. Engagement with additional LMICs could generate additional uptake.	High
66	Uptake support	Increasing visibility and engagement of HVT research through international events and ambassadorial roles for senior African and Asian sector leaders	90,000	This is a useful mechanism for representing HVT at major international conferences and events, and interesting and engaging senior African and Asian leaders and senior officials in HVT research. The limitation is that the project was undertaken in the later stage of implementation which limited its influence	Moderate

[a] The extent of research uptake relative to the size of the project.
Source: PMU data; Consultant.

Appendix I

HVT RESEARCH PROJECTS TO CONSIDER FOR POSSIBLE FURTHER SUPPORT IN FUTURE

No.	Research category	Project title/s	Research uptake
1	Part 2 research	Several projects on preparation and uptake support for ORN 31: (i) Update of Road Note 31 (ii) Deeper dive and greater uptake of Road Note 31	This high quality research had already led to uptake in national manuals in Ethiopia and Nigeria, with strong interest from Kenya, Mozambique and Bangladesh. Use of ORN 31 is expected to improve the climate resilience of road networks, leading to reduced deterioration in road quality, fewer outages and large savings in life cycle costs. The small "deeper dive" project financed visits to Ghana, Rwanda and Zambia to interest the road authorities in use of ORN 31, and attracted strong interest. A good case can be made for FCDO financing a further project to support for ORN 31 uptake in additional LMICs.
2	Part 2 research	Several projects supporting development of HDM (i) Business Case for HDM-4 (ii) HDM-4 Support with World Bank (iii) HrDM5 Gap Analysis and updating of the Functional Requirements	While it has taken an extended period to firm up plans for upgrading HDM but there are now prospects of proceeding to implementation in 2025. Since the improved accuracy and more comprehensive approach of the new HDM is expected to lead to large benefits for LMICs, it will be useful for FCDO to continue to engage on this important initiative, at least until the upgraded HDM has achieved widespread uptake
3	Part 2 research	Update of Overseas Road Note (ORN) 21	This project produced a high quality update of ORN 21 on disability inclusive transport that should be able to attract high uptake in a manner comparable to ORN 31. However, the work was undertaken as a desk study without involving LMICs and the project included only minimal provision for uptake support. There would be merit in FCDO funding an uptake support project to interest and assist LMIC authorities in making use of ORN 21
4	Covid-19, T-TRIID 2, Part 2 research	Several projects supporting inclusive, gender equitable public transport in Indian cities: (i) Post-COVID-19 Mobility: An opportunity to reform urban transport systems (ii) Moving towards gender equitable public transport operations in a post-COVID world (iii) Safe and Secure Public Transport in Delhi (iv) Women on the move - Boosting electric two- and three-wheelers (v) Gendered approach of addressing adaptation capacity to hot weather conditions	Over the course of the HVT programme, several Indian research suppliers conducted a series of initial studies on making urban public transport inclusive and gender-equitable. Researchers developed close working relations with city authorities in Delhi. There may be potential to support further projects to help Delhi deepen its efforts to make public transport inclusive and gender-equitable, and extend support to other interested Indian cities
5	Part 2 research	The Impact of COVID-19 pandemic on climate change mitigation: Walking and Cycling Policy and Practice in Africa	This project produced a high quality policy and practice guide but the involvement of LMIC governments was limited to participation in surveys and there are only limited indications of uptake at country-level. Since walking and cycling are the main transport modes used by many people in LMICs—especially the poor and disadvantaged groups—it may be useful to finance a follow-on project to assist selected LMIC authorities apply the policy and practice guide at country-level and share experience with other interested LMICs
6	Part 2 research	Climate resilient sustainable road pavement surfacing (CRISP)	Following constructability trials in Ethiopia, it is expected that Ethiopia will make use of the improved pavement surfacing technology developed. Given its advantages and large potential savings in life cycle costs, there is also potential for uptake in other African countries but this will require support for promotion and dialogue with interested African road institutions
7	T-TRIID 2 and Part 2 research	Projects on improving public transport in Mekelle, Ethiopia:	Ethiopian researchers worked closely with the Mekelle city authorities on these high quality studies and then assisted them in design and implementation of improvement measures. Building upon this close cooperation, there may be scope to scale up these improved approaches in other cities in Ethiopian and potentially in other African countries

No.	Research category	Project title/s	Research uptake
		(i) Women's Personal Safety, Participation, and Employment Linkage in Urban Public Transport (ii) Safety and Mobility Challenges of Persons with Disability in Mekelle City: Towards Inclusive Urban Transport	
8	Part 2 research	Empower I and II – Practical tools for decision makers and citizens to tackle sexual harassment in African urban transport:	These innovative projects played a valuable role in raising awareness about women's sexual harassment in public transport in African cities and developed the SHE CAN tool to support decision-making and reform to tackle the problem. This attracted high uptake by LAMATA, Lagos, benefiting millions of female users of public transport. It has also been introduced in several other African countries. Since problems of women's sexual harassment are common in African cities, there is good potential for financing a further research project to assist authorities in other African cities to apply these approaches and potentially benefit millions more women public transport users
9	Part 2 research	Decision Support Systems for Resilient Strategic Transport Networks in Low Income Countries	This project developed a high quality prototype tool that could be a valuable tool to help LMICs address the climate vulnerability of transport infrastructure and facilities. As no LMIC governments were involved in the project, there were no indications of direct uptake. Since the tool could be very useful to LMICs, there is a case for financing a follow-on project to disseminate the tool to selected partner countries and assist interested countries to apply the tool at country-level
10	Part 2 research	City Retrofit for All: Examining Inclusive Infill Transit-Oriented Development Strategies in East Africa's Rapidly Growing Urban Areas	This study developed pragmatic strategies to progressively develop TOD and BRT in East African cities, and attracted uptake by Tanzania in developing a series of local BRT area plans for Dar Es Salaam. Addis Ababa authorities are using TOD study in BRT planning and improving inter-agency coordination. There is considerable potential to apply the approaches developed by this study to assist other partner country cities to improve their urban environments and public transport by implementing TOD and BRT
11	T-TRIID 2	Inclusive Interchanges	The subject of passenger station design has been neglected in African cities. Many stations use outmoded designs that are inefficient, inconvenient for passengers, and offer passengers little personal protection—notably for women who face problems of sexual harassment. This small-scale project successfully applied principles of inclusive, safe and convenient passenger station design to improve convenience and personal safety at two of 14 major multi-modal transport hubs identified in the 2014 Lagos Transport Masterplan. There is potential to provide further research support to extend improved station design to additional African cities, potentially leading to significant benefits for public transport users
12	T-TRIID 2	Policy and regulation development for motorcycle taxi safety in Nepal	This small-scale study worked closely the Nepal authorities to address issues of accessibility and safety of motorcycle taxis. Drawing upon the study proposals, the transport ministry is preparing regulations on motorcycle taxi operations and use of helmets. There may be an opportunity to provide follow-on uptake support on facilitate finalisation of the new regulations and provide inputs to guide implementation
13	T-TRIID 2	Autosafety Uganda, Rubaga Chapter - Kampala	The innovative initiative has continued to develop and implement initiatives to address vehicle-related air pollution by improving vehicle maintenance standards and has attracted government support. Further FCDO support could potentially help to develop further channels for addressing air pollution, enhance measurement and tracking, and assist stakeholders to develop supporting policy, legal and regulatory measures to
14	Support for global sustainable transport agenda	Improving Access to Climate Finance for Transport Projects in Low and Middle Income Countries	HVT financed parts of a detailed WRI research programme on the climate finance report presented at COP29. There is scope for providing further support in future both for global-level research on the overall approaches and mechanisms for climate financing for LMICs, and for county-level research on improving access to climate finance
15	Support for global sustainable transport agenda	Surface Transport Decarbonisation Index	The HVT project conducted high quality initial work on development of a suitable index that could provide a useful tool for tracking decarbonisation in LMICs. Further stages of research and development and country-level trialling would be needed to arrive at a feasible index suitable for implementation by LMICs, and LMICs would first need support to strengthen transport data. FCDO may wish to consider providing further of TDI development and country-level trialling, assuming a realistic plan for further development and achievement of uptake has been prepared, and there are indications of support from other key global-level stakeholders
16	Part 2 research	Planning Framework for Low Emission Zone (LEZ) in Core areas of Indian Cities	HVT researchers worked closely with city authorities of Ahmedabad in India to develop policy framework proposals and identify early improvements cities can implement to develop LEZs. As the city authority is closely involved and has regular dialogue with CEPT, there are prospects of future uptake in Ahmedabad. There may be scope to provide follow-on support to help the city authority with remaining steps of LEZ design and prepare for implementation. There is also scope to apply such approaches to LEZ development in other cities in India, and elsewhere in South Asia and in Africa

No.	Research category	Project title/s	Research uptake
17	Uptake support	Increasing visibility and engagement of HVT research through international events and ambassadorial roles for senior African and Asian sector leaders	This is a useful mechanism for representing HVT at major international conferences and events, and interesting and engaging with senior African and Asian leaders and senior officials in HVT research. It will be useful if further uptake support of this kind is included in the next FCDO transport research programme

Source: Consultant.

Appendix J

HVT LOGFRAME, PART 2

	Indicator	10/19 - 06/20	07/20 - 06/21	07/21 - 06/22	06/22 - 01/23 (EoP)	Assumptions
Impact:	**Increased access to transport services, more affordable trade routes and safer, lower carbon transport in low-income countries**					
Indicator 1	Cumulative cases of policy-makers and practitioners at any level using HVT evidence to inform policy decisions and practice (regulations, legal measures, reform programmes, policy guides, manuals, tools and models etc.)	0	0	H=0 M=0 L=0	H=2 M=1 L=0	- A significant level of interest (and incentives) to adopt research outputs and/or change policy by LIC Governments, MDBs and other potential beneficiaries. - LIC Governments, Donors or Lending Institutions continue to invest in high volume transport solutions. - Timeframes for delivery of research results are adequate. - Annual spend allocation from FCDO does not restrict research or research uptake activities.
Indicator 2	Urban and Low Carbon Transport: Municipal-wide policies, manuals and documents approved and published that have been modified, introduced or informed as a result of HVT research. (Examples include regulations, legal measures, reform programmes, policy guides, tools and models, etc.)	0	0	H=0 M=0 L=0	H=2 M=1 L=0	
Indicator 3	Gender and Inclusion: Cumulative number of practical changes made to public transport infrastructure and services that improves mobility for women and the vulnerable attributable to HVT	0	1	H=5 M=3 L=1	H=7 M=4 L=2	
Source:	*National government and financier country, programme and progress reports, annual survey of HVT network and stakeholders incldiuing gender specialists. Does not include outputs related to COVID-19.*					

The logframe for this programme assigns targets for high, medium and low scenarios for programme performance for each indicator. These are calibrated such that the medium scenario is in line with programme expectations for the reporting period, the high scenario moderately above expectations, and the low scenario moderately below expectations. This establishes clear thresholds for assessing programme performance, providing clarity for both FCDO and implementing partners on how performance will be assessed. COVID targets are mainstreamed across all output indicators.

Indicators highlighted in green are tracked against ICF indicators

Outcome	**Evidence base strengthened in African and Asian LICs on the most strategic, cost effective, safe and lower carbon passenger and freight transport investments and services**					
Indicator 1	Cumulative number of citations in academic articles of peer-reviewed publications	7	61	H=150 M=130 L=90	H=180 M=165 L=110	- A significant level of interest (and incentives) to adopt research outputs and/or change policy by LIC Governments, MDBs and other potential beneficiaries. - Project is able to pivot from defined research priority areas to procure research relative to COVID-19. - Programme attracts high calibre and experienced research consortia. - LIC Governments, Donors or Lending Institutions continue to invest in high volume transport solutions. - Timeframes for delivery of research results are adequate. - Annual spend allocation from FCDO does not restrict research or research uptake activities. - If required, other financial support is available for modifying generic research outputs and policy to specific country context, conditions and environments.
Source:	*Citation counts in google scholar, MDPI citation tracker and other citation indices.*					
Indicator 2	Cumulative number of citations in codes, standards and specifications for national transport documentation, etc (incl. working papers, conference papers, transport and project documents, etc.)	3	4	H=15 M=10 L=4	H=20 M=15 L=8	
Source:	*Municipal and city government and financier progamme and progress reports, annual survey of HVT network, stakeholders/recipients, internet searches and citation.*					
Indicator 3	Co-funding and VfM savings: Cumulative value co-funding, value for money savings and pro bono inputs to HVT activities.	£249,229	£689,901	H=£1,350,000 M=750,000 L=£700,000	H=£4,000,000 M=775,000 L=£715,000	

Source:	*MDB reports and project records: numerical count of co-funded projects. This might include where partners have contributed through material or labour.*					
Indicator 4	Cumulative number of stakeholders/ policy-makers actively considering using evidence from HVT research outputs into national specifications and standards for road design, planning, construction, maintenance or operations	0	2	H=5 M=4 L=2	H=8 M=6 L=3	- Capital investment into road and rail transport continues at current levels to 2040 - MDBs influence stakeholders based on HVT outputs - National policy in LICs remain consistent and aligned with HVT programme objectives and research priorities. - Annual spend allocation from FCDO does not restrict research or research uptake activities.
Source:	*A survey of stakeholders is conducted at the end of the Programme, feedback from research suppliers on engagement with project beneficiaries and stakeholders*					
Indicator 5	Cumulative number of downloads of HVT outputs from the website, social media and mailing list etc. related to research outputs and knowledge products	12,077	43,873	85,000	100,000	
Source:	*Web and social media analytics, progress reports, data relating to cumulative numbers of downloads and shares.*					
Output 1: Research: Generation, validation and updating of evidence for effective policies and practices on high volume transport in each of the selected research thematic areas (Weighting - 40%)						
Indicator 1.1	Cumulative number of research projects procured and awarded during Part 2 of HVT	8	44	45	45	- Current PMU management resource levels remain unchanged - Strong interest and response from research suppliers submitting valid proposals - Annual spend allocation from FCDO does not restrict research or research uptake activities - x no. of peer reviewed outputs will be COVID-related
Source:	*Numerical count of projects awarded, progress reports, programme finance forecast/ tracker.*					
Indicator 1.2	Evidence published: Cumulative No. of published papers in peer reviewed journals and policy briefs	20	28	36	50*	
Source:	*Numerical count of published papers in peer reviewed journals, and policy briefs including major "think pieces" and reviewed conference papers. *Confirmation of publication of some journal papers may occur after the programme completes. For Journal papers submitted but not published, a success rate of 60% will be assumed.*					
Indicator 1.3	Other Evidence published: Cumulative number of other research outputs (final research reports, books, insight articles, chapters in books, national standards, unrefereed conference papers and specifications modified etc.)	22	40	H=80 M=70 L=65	H=90 M=85 L=75	
Source:	*Progress reports, project website.*					
Output 2: Capacity Development: The enhancement of African and Asian Research capacity on high volume, transport in each of the selected research thematic areas (Weighting - 25%)						
Indicator 2.1	Cumulative number of capacity building and research uptake activities **led by HVT** (including training sessions, knowledge sharing webinars, workshops, conferences, etc.)	15	76	110	125	- Capacity building partner agencies able to build adequate links with beneficiary country governments - Regional Organisations and MDBs engaged and interested - Sufficient interest from beneficiaries and stakeholders to attend workshops and contribute to process

Source:	*Numerical count of training focussed webinars, seminars, delivered conference presentations, training events, workshops. Events are implemented either by the HVT PMU or Research Suppliers. Each audience should exceed 5 persons in number, data is disaggregated.*					
Indicator 2.2	Cumulative number of events **led by other partners** in which HVT participates, to build capacity, raise awareness and share knowledge in key research priority areas with stakeholders at all levels	19	58	H=85 M=75 L=65	H=90 M=80 L=70	- the Programme has the financial and human resources to organise and attend events
Source:	*Numerical count of HVT events. Events could be part of wider fora or make use of HVT networks (in person or remotely). Attendance numbers are recorded, data is disaggregated.*					
Indicator 2.3	Cumulative number of journal papers, insight articles/ think pieces, research reports, unrefereed papers, specifications, capacity building or networking webinars or seminars, events with partners, and communications including videos, blogs or workshops generated to raise awareness and share knowledge with stakeholders at all levels on the impact of COVID-19 for the transport sector.	39				
Source:	*Numerical count of outputs as detailed above produced either by HVT directly or in partnership with other organisations/ programmes. Where possible, outputs will cross-cut other sectors (e.g. health, environment).*					
Output 3:	**Operational Understanding and Knowledge Management: Improved understanding of high volume transport across each of the thematic areas and the enhancement of knowledge management, lesson learning and dissemination (Weighting - 15%)**					
Indicator 3.1	Cumulative number of knowledge management and communications activities including social media posts, videos, blogs, newsletters, workshops and networking webinars produced and disseminated	66	178	H=275 M=250 L=215	H=340 M=300 L=250	- E-based knowledge management systems available to all beneficiaries - Strong degree of buy-in from LIC institutions and decisions makers
Source:	*Numeric count of all signficant programme activities that relate to research uptake and knowledge management, Progress reports, website analytics, data is disaggregated.*					
Indicator 3.2	National and international co-operation between HVT and UK or international partners. Cumulative number of meetings held with FCDO-funded and other programmes, international development partners, international transport partners	59	140			See output indicator 5.1
Source:	*Monthly summary meetings and quarterly progress reports. Meeting note summaries. Measured by numerical count of meetings held. Includes meetings with UK organisations (non-governmental), FCDO-funded and other programmes, donor partners (e.g. bilateral or MDBs) or other international partners (e.g. PIARC). Includes activity related to COVID-19*					
Output 5:	**Engagement & Knowledge Exchange: Effective engagement with national and international partners to amplify and influence uptake of evidence (Weighting - 20%)**					
Indicator 5.1	National and international co-operation between HVT and UK or international partners. Cumulative number of meetings held with FCDO-funded and other programmes, international development partners, international transport partners, cross-Government departments, FCDO and FCDO country offices			H=250 M=220 L=175	H=280 M=250 L=200	- The Programme has the financial and human resources to attend international events
Source:	*Monthly summary meetings and quarterly progress reports. Meeting note summaries. Measured by numerical count of meetings held. Includes meetings with UK organisations (non-governmental), FCDO-funded and other programmes, donor partners (e.g. bilateral or MDBs) or other international partners (e.g. PIARC). Also includes meetings with Research Suppliers as part of market engagement. Includes activity related to COVID-19*					

Appendix K

OVERSEAS ROAD NOTES SERIES

ORN1 - Road maintenance for district engineers

ORN2 - Maintenance techniques for District Engineers

ORN3 - A guide to surface dressing in tropical and sub-tropical countries

ORN4 - Field survey techniques and analysis for urban bus operators

ORN5 - A guide to road project appraisal

ORN6 - A guide to geometric design

ORN7 Vol 1 - A guide to bridge inspection and data systems for district engineers

ORN7 Vol 2 - Bridge Inspector's Handbook

ORN8 - A user's manual for a program to analyse dynamic cone penetrometer data

ORN9 - A design manual for small bridges

ORN10 - Costing road accidents in developing countries

ORN11 - Urban road traffic surveys

ORN12 - Design guidelines for busway transit

ORN13 - The use of traffic signals in developing cities

ORN14 - Hydrological design manual for slope stability in the tropics

ORN15 - Guidelines for the design and operation of road management systems

ORN16 - Principles of low cost road engineering in mountainous regions

ORN17 - Road safety education in developing countries - Guidelines for good practice in primary schools

ORN18 - A guide to the pavement evaluation and maintenance of bitumen-surfaced roads in tropical and sub-tropical countries

ORN19 - A guide to the design of hot mix asphalt in tropical and sub-tropical countries

ORN20 - Management of rural roads

ORN21 - Enhancing the mobility of disabled people: Guidelines for practitioners

ORN22 - A guide to pro-poor transport appraisal - The inclusion of social benefits in road investment appraisal

ORN31 - A guide to the structural design of bitumen-surfaced roads in tropical and sub-tropical countries (5th Edition)

ORN40 - A guide to axle load surveys and traffic counts for determining traffic loading on pavements

Source: TRL 2024.