THE DISSEMINATION AND EMBEDMENT OF APPLIED RURAL TRANSPORT RESEARCH

J. R. Cook, L. Sampson, P. Starkey and C. Visser 1

ABSTRACT

Rural road infrastructure and associated transport services facilitate efficient and effective transport. They are essential in providing reliable, affordable and sustainable access to essential services and markets for poor communities and underpinning key Sustainable Development Goals (SDGs). Advances in relevant applied research can play a significant role in improving the effectiveness and sustainability of such infrastructure. However, barriers to the implementation of new research outcomes remain a major challenge to the application of new knowledge in the rural transport sector. One significant barrier may be the inherently conservative nature of infrastructure practitioners. However, it is very likely that it is the lack of focus on the dissemination, uptake and embedment of research outcomes within relevant policies, practices and procedures that hinders an effective application of insights. It is now becoming clear that undertaking and reporting research outcomes is not nearly sufficient to achieve the necessary improvements in rural access and rural transport services.

This paper reviews key points with respect to the sustainability of projects, the uptake and embedment of their outputs and it outlines possible approaches to overcoming the challenges inherent in the application of research.

INTRODUCTION

Rural transport and rural access can be directly associated with four of the recently adopted United Nations Sustainable Development Goal targets and indirectly associated with three others (Peet, 2015):

Direct Targets

- Target 1.4: Equal access to economic resources/basic services
- Target 2.1: End hunger and ensure access to safe, nutritious food
- Target 9.1: Develop regional and trans-border infrastructure
- Target 11.2: Provide access to safe and sustainable transport systems

Indirect Targets

- Target 6.1: Access to safe drinking water
- Target 12.3: Reduction of postharvest food losses
- Target 13.1: Climate change adaptation and mitigation

The ability of local engineers to identify problems and to devise solutions that provide sustainable cost-effective access for the rural poor is a key factor in the pursuit of the United Nations Sustainable Development Goals and their overarching aims of poverty reduction and socio-economic development. Applied research, capacity development, knowledge exchange and the uptake and embedment of innovative and cost-beneficial solutions are fundamental elements in this process.

In the course of the past 20 years, many multilateral and bilateral donors have supported research and knowledge transfer on various aspects of rural infrastructure, specifically with the aim of reducing costs and increasing the effectiveness of transport services for rural and peri-urban communities. Much of this targeted research has been particularly successful in the identification of innovative and unconventional approaches that can provide highly beneficial and cost effective solutions for low volume roads in the affected countries. However, it may be argued that less success has been achieved with the embedment of these approaches in policy and regulation such that the outcomes

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are sustained beyond the immediate timescales of the research programmes (Greening et al, 2010). The consequent fragmentation of research knowledge hinders the progress towards optimal provision of infrastructure and services for the road transport sector in the developing world as a whole (Sampson and Geddes, 2013).

THE CHALLENGES

BARRIERS TO UPTAKE AND EMBEDMENT

Resistance to the implementation of new rural transport techniques continues to be an obstacle to the application of new knowledge in the sector. While this may be at least partly due to the inherently conservative nature of the professionals in the sector, it is more likely the consequence of a lack of focus on following through from research output to embedment in policy. It would be unrealistic to expect rural transport planners, designers, contractors or service operators to shoulder the full risk of innovation solutions without the protection of an appropriate framework of relevant standards, specifications and regulations.

It takes a significant amount of time for any study to progress from research to full embedment. Most donor-funded initiatives do not last enough to realize the embedment of their research. The donor support phase usually has a limited time-frame, with the assumption that the “client” will be aware of the potential benefits of the project and will embed the initiatives into national policies and strategies as a matter of course. However, donors have an unrealistic expectation that the research they fund would be quickly adopted by recipients. Unfortunately, many initiatives, however potentially beneficial they may be to the recipient, often fall away within a relatively short period after donor support is withdrawn.

THE RESEARCH CHAIN

There is growing acceptance in the research community that it would be prudent to consider the whole research-embedment chain when designing and implementing a rural transport project (Cook et al, 2015). It has also become clear that undertaking research and developing likely solutions are not nearly enough. While previous rural transport research has delivered well in terms of output and adequately in terms of dissemination, it has performed less well thereafter down the chain. Figure 1 illustrates a typical rural transport research chain.

Figure 1 The Research Chain

The key links in a typical research chain are defined and reviewed in the light of recent research initiatives in Table 1.
### Table 1 Research links and their issues

<table>
<thead>
<tr>
<th>Link</th>
<th>Definition</th>
<th>Issues</th>
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<tr>
<td>Research</td>
<td>Undertaking a defined programme within a framework of Terms of Reference and Quality Management.</td>
<td>Usually well done with possibly some increased focus required on quality management.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Compilation of the research findings, analysis and conclusions.</td>
<td>Usually well done.</td>
</tr>
<tr>
<td>Dissemination</td>
<td>The knowledge transfer or distribution of the research outcomes to identified stakeholders.</td>
<td>Traditionally undertaken through workshops and distribution of hard copy reports, manuals etc. Requires an increased focus on electronic media distribution and use of local languages.</td>
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<tr>
<td>Demonstration</td>
<td>The validation of the outcomes through trials and monitoring.</td>
<td>Commonly incorporated in projects but with frequent questions marks as to the ongoing monitoring of assumptions and outcomes.</td>
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<td>Training (Capacity Building)</td>
<td>Instruction or guidance to key stakeholders or operatives concerned with wider application of the research.</td>
<td>In the past this activity has either been essentially an end-of-project action or short separate activity. Requires more in-project focus.</td>
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<tr>
<td>Uptake</td>
<td>The use or application of the research evidence at a major project level by practitioners and/or policy makers.</td>
<td>Generally not well addressed as an integral part of research projects.</td>
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<tr>
<td>Embedment</td>
<td>The formal inclusion of the research outcomes in Government policy, or mandatory standards, specifications and manuals.</td>
<td>Largely ignored as a project activity. Significant timescale problems.</td>
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**ILLUSTRATIVE HISTORICAL CASE: VIETNAM RURAL ROAD SURFACING RESEARCH**

Where there actually has been commitment to a completed chain from research into practice in live programmes, significant benefits of that research have been achieved, as evidenced by the Vietnam Rural Road Surfacing Research programme.

Between 1998 and 2013 the Ministry of Transport, Viet Nam (MoT) embarked on improving rural access as a support to the poverty alleviation programme. These phased rural transport programmes comprised rehabilitation or upgrading of thousands of kilometer of poor quality district and commune roads. Respective donors supported the Ministry of Transport in research and including innovation into projects. There were, however, significant concerns during phase 2 in 2000-2001 that predominantly unsealed roads constructed during phase 1 were not performing well and alternatives need to be researched to provide evidence-based data to enhance the decision making process for the provision of alternative surfacing for rural roads.

The benefits were achieved through evidence-based research programmes, feeding data into decision making processes. An example of this approach was the Rural Road Surfacing Trials (RRST) project, initiated in 2002. This project became part of the South East Asian Community Access Programme (SEACAP) in 2004 and continued through to 2009 producing significant amounts of performance data on gravel surfacing and a range of selected alternatives. The programme included increased focus on climate resilience and application in practice.

Key dates are the following:

- Research need identified: 2000
- Research scoping: 2001
- Funding secured: 2002
- Research initiated: 2003
- First trials completed: 2005
- Monitoring: 2005-2011
Valuable lessons on the timescale of uptake and embedment may be drawn from the overall phasing of the RRST programme. These timescales are considerably in excess of what used to be normal timescales for international funded research. The research uptake feedback loops are summarized in Figure 2. The benefits of the research have led to a shift from a network of 80 per cent unsustainable unsealed roads in 2002 to the provision of a network with 80 per cent sealed roads in 2014 that are much more sustainable and cost-effective with suitable management and maintenance interventions.

Figure 2 Research Uptake-Feedback Loops Rural Road Surfacing Trials (RRST) Viet Nam

The key lesson to be drawn from the multi-funded RRST work is that it is both essential and possible to achieve good “down-chain” success if donors and researchers adopt a more comprehensive view of the research aims and objectives. Fundamental to the ongoing success of this project was the guidance provided by an in-country stakeholder steering committee under the chairmanship of the Ministry of Transport of Viet Nam. Keeping stakeholder groups involved throughout the whole life of a research project is vitally important in terms of the continuity, ownership and direction (Sampson et al, 2014).

The current initiative, together with associated steering and executive committees, has taken these lessons on board and has focused efforts on achieving the uptake and embedment of applied research, rather than merely research dissemination.
KEY ISSUES AND PRINCIPLES

PROJECT SUSTAINABILITY

When the assumed post-project uptake and embedment does not occur, or fails, efforts on research and development initiatives go to waste. Even more damaging for vulnerable rural groups and poor communities are circumstances where improvements in livelihoods, which began under the initiatives, become undone when they fail. Focus on the application of evidence-based results of research in situations, where they can have significant and lasting impact, is an important component of rural transport research initiatives.

There has to be a framework for the effective application of research outputs. For example, the value of constructing pavement or surfacing research trials is strictly limited without the additional time being put into not only their monitoring and evaluation but into a framework within which they can be applied in practice. Hence, suitable rural road standards are essential to provide the context within which local resource-based pavement options may be assessed and selected for appropriate use. The key components of sustainability of research and its application are summarized in Table 2.

Table 2. Key sustainability factors

<table>
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<tr>
<th>Component</th>
<th>Requirement</th>
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<tr>
<td>1. Politically supported</td>
<td>The research programme and its continuing development is compatible with an identified national policy driven by established government and is supported in all its aspects at the highest level.</td>
</tr>
<tr>
<td>2. Financially sound</td>
<td>Adequate funding in place for the establishment, staffing, resourcing and management of the research programme with a funding mechanism identified for long-term continuance and application of outcomes.</td>
</tr>
<tr>
<td>3. Technically appropriate</td>
<td>The research programme, its continuation and uptake are compatible with capacity of the relevant country institutions and staff. Its outputs are compatible with clearly identified national rural transport requirements and clearly identified technical needs.</td>
</tr>
<tr>
<td>4. Socially acceptable</td>
<td>The research programme is capable of being embraced by and fostering existing social safeguards. There is clear focus on issues such as: community acceptance and participation, gender equality, and protection of vulnerable groups.</td>
</tr>
<tr>
<td>5. Institutionaly possible</td>
<td>The research programme has an institutional home with the necessary resources, knowledge and experience to carry forward the outcomes. This home must have a clear leadership and career progression framework with sufficient skilled managers and researchers.</td>
</tr>
<tr>
<td>6. Economically viable</td>
<td>The benefits accruing from a continuing research programme in terms of social and economic developments must be greater than its initial and on-going costs.</td>
</tr>
<tr>
<td>7. Uptake or Embedment Potential</td>
<td>There are practical arrangements through an appropriate Road Research Centre (RRC), university or Government Department for the review, adoption, acceptance and embedment of research findings into standards, specifications and every day operations.</td>
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Within the overall context of sustainability and research uptake DFID has identified four strategic issues that should underpin the planning of a sustainable research project:

1. **Stakeholder Engagement**: Identification of relevant stakeholders and their context. Research must be tailored to meet user needs and structured to include ongoing discussion and engagement with stakeholders.
2. **Capacity Building**: Assessment of existing capacity shortfalls and implementation of a capacity building strategy.
3. **Communication**: Identify and design a communication strategy relevant both to the research aims and the stakeholder environment.
4. **Monitoring and Evaluation**: Ongoing gathering of data on uptake and adoption of a flexible approach to the research path.
There is an overwhelming demand and compelling argument to improve accessibility of the rural poor in Africa and Asia to economic opportunities and social facilities through improvements to infrastructure and transport. The immediate focus is on strengthening the evidence base on more cost effective and reliable low volume road and transport services approaches, thereby influencing policy and practice. Donors and development banks have responded to this with the DFID funded Research for Community Access Partnership (ReCAP), which incorporated current programmes and past projects.

Recognizing that innovation of local solutions has greatly benefitted rural connectivity implementation programmes. Two recent programmes for the transport sector in developing countries are focused on applied research in the area of low-volume rural roads and transport services: the South East Asia Community Access Project (SEACAP) and the Africa Community Access Project (AfCAP). The former carried out applied research in low volume rural roads in Viet Nam, Cambodia and Lao PDR, while latter conducted applied research in low-volume rural roads and transport services with focus on seven countries – the Democratic Republic of Congo (DRC), Ethiopia, Kenya, Malawi, Mozambique, South Sudan and Tanzania.

Building on the success of these two projects, a second phase of AfCAP and a similar applied research focused on South Asia, the Asia Community Access Partnership (AsCAP), were initiated in 2014. The programme focusses on high quality research and takes forward sustainability issues, in which the results of the research are adopted in practice and influence future policy in Africa and Asia.

A PROPOSED FRAMEWORK FOR THE SUSTAINABLE EMBEDMENT OF APPLIED RESEARCH IN THE FIELD OF RURAL TRANSPORT

Evidence from various donor-sponsored programmes suggests that in the development of an adequate framework for applied rural infrastructure research, greater focus needs to be put on the uptake of research into practical usage and embedment of the results of research into policies and standards. To maximize the likelihood that their research findings achieve sustainable outcomes, it is fundamentally important that a dedicated research uptake strategy will be planned and implemented in a proactive manner.

A key principle should be the Integration of capacity building and knowledge management into the framework of research projects as vital elements in achieving uptake and embedment. Capacity building and knowledge management must be considered and taken on board from the earliest concept and definition stages of a project, as shown in Figure 3. The Research for Community Access Partnership (ReCAP) has already incorporated these ideas into their activities and is currently striving for more effective means of research embedment.

Figure 3 Coordinated Research

Local problems need local solutions and knowledge transfer in the field of rural transport must not only respond to a clearly defined need, it must also be compatible with local transport environments.
Greater emphasis on regional and international partnerships serves to extend the impact of the research programmes beyond the limited number of partner countries. An example for this is ReCAPPS's support to the African Road and Transport Research Forum (ARTReF) as a regional network of research centres. Establishing ARTReF has not only been important for the immediate implementation of ReCAP but also its future sustainability, including financial sustainability. Regional hubs such as ARTReF provide a mechanism to consolidate and utilize the fragmented information that has been generated throughout the region for better implementation (Sampson and Geddes, 2013).

RESPONSES TO SUSTAINABILITY, UPTAKE AND EMBEDMENT

A powerful response to the need to improve the management and delivery of embedded research is the adoption of a pro-active and holistic approach to the design of research projects. From such a perspective, all the relevant parts of the research chain (Figure1, Table 1) should be, where relevant, integral parts of the project and included in the terms of reference.

Achieving the aim of rural transport and transport services, research sustainability must be founded on ensuring not only the sustainability of individual research outcomes but more fundamentally on the sustainability of partner country research institutions to act as ongoing guardians and promoters of research with an established financing mechanism. An essential element of this is demonstrating the value of such research to partner country stakeholders through strengthening the evidence of the benefits of research by cost benefit analyses.

Key sustainability issues can be addressed using the following responses, which are currently implemented within the ReCAP system (Table 3).

Table 3  Responses to Key Sustainability Issues

<table>
<thead>
<tr>
<th>Sustainability Component</th>
<th>Recommended Practice</th>
</tr>
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<tbody>
<tr>
<td>Politically supported</td>
<td>All national level projects should originate from country partner organisations. All regional level projects should have buy-in from at least one country partner and be approved by the Regional Steering Committee (RSC).</td>
</tr>
<tr>
<td>Financially sound</td>
<td>Budgets are an integral part of the project concept assessment and approval system.Partner countries are expected to have a clear commitment, either in through financial or in-kind support. Figure 4</td>
</tr>
<tr>
<td>Technically appropriate</td>
<td>Each project should be defined through a short Concept Note (CN), subject to in-house PMU quality control. Larger projects are subject to RSC overview with the largest (&gt;UK£500k) subject to Executive Committee Approval. All projects should be available for technical comments by an independent Technical Panel of experienced specialists. For larger projects this should be mandatory.</td>
</tr>
<tr>
<td>Socially acceptable</td>
<td>There should be an emphasis in the Terms of Reference (ToR) and procurement procedures on gender balance. Other issues of socio-economic or environmental impact should be reviewed as part of the CN reviews.</td>
</tr>
<tr>
<td>Institutionally possible</td>
<td>The feasibility of the project should be reviewed as part of the CN and ToR quality check process and overviewed by the TP.</td>
</tr>
<tr>
<td>Economically viable</td>
<td>The economic viability should be an integral part of the review process. For many of the larger or more difficult projects there is a distinct initial scoping phase, sometimes separated contractually from any follow-on. This allows for a further review of economic, institutional and technical viability, including elements of cost-benefit analysis</td>
</tr>
<tr>
<td>Uptake/Embedment</td>
<td>The project design model should be built around the concept of a holistic approach to integrating research, capacity building and knowledge management into one programme, with uptake and embedment as key targets at national, regional and general Community of Practice levels. Where appropriate this should be contained within the CN and the ToR.</td>
</tr>
<tr>
<td>Stakeholder Engagement</td>
<td>Stakeholder engagement derives initially from the mandatory country partner origins of national projects and the required engagement in the development</td>
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</table>
and implementation of regional projects. Stakeholder workshops and ongoing involvement of National Committees and RSCs should ensure active stakeholder engagement.

<table>
<thead>
<tr>
<th>Capacity Building</th>
<th>Capacity building should be an integral part of all relevant projects and where appropriate specifically included within the CNs and ToR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Apart from traditional hard-copy distribution of outputs, a wide variety of communication modes should be used. Through websites with freely accessible documents of participating subprojects and countries, quarterly e-Newsletters, social media (Twitter, Facebook and LinkedIn) as well as dedicated online user forums, insights can be disseminated.</td>
</tr>
<tr>
<td>Monitoring and Evaluation</td>
<td>The developed logical framework should be the primary tool to be used for high level monitoring of the programme as a whole. All technical projects should be assessed for their contribution to meeting the logframe targets. The TP should have an important oversight role in monitoring outputs.</td>
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**ILLUSTRATIVE EXAMPLES**

**ECONOMIC GROWTH THROUGH EFFECTIVE ROAD ASSET MANAGEMENT**

This is a regional project whose purpose is to achieve economic and social benefits for local communities in rural areas as a result of improved performance in road asset management. Although a designated regional project, it is closely associated with stakeholders in three partner countries and one resource-demonstration country (South Africa).

The project provides technical assistance to achieve improvements in asset management performance on a selected network of rural roads within each participating country. The performance will be measured against a new framework for rural road asset management that is being developed as part of the study. Measurements will also be taken of the road network condition and the impact of the road condition on the rural economy. Meetings with stakeholders will be used as part of an influencing and peer review strategy to achieve improvements to the management of rural roads and build a maintenance culture.

The approach to the project seeks to foster self-reliance in road agencies in the project areas and encourage greater accountability to road users and other sector stakeholders. It provides flexibility and space for the participating road agencies and their stakeholders to determine their own project outcomes.

A cornerstone of the approach is assisting each participating area to analyze the strengths and weaknesses of their own road asset management systems and propose modifications and improvements at all levels. The findings of the project data collection will be discussed with sector stakeholders locally and in a wider project implementation team involving other AfCAP countries. Agreed outcomes and relative performance measurements will be disseminated.

This project illustrates the application of the following key principles:

- A regional project based on detailed requirements of participating country partners – strong political support.
- A project firmly focused on stakeholder needs – technically appropriate.
- Project aims that include planning for post-project sustainability – uptake and embedment
- Active involvement of stakeholders throughout the project – communication
- Ongoing stakeholder engagement through the PIT and local discussion groups

**GENDER MAINSTREAMING IN RURAL TRANSPORT**

This research cluster programme, which originated from research in the fields of gender mainstreaming and rural transport, commenced in October 2015. Discussions were facilitated using websites, social media and email, with a view to identifying relevant research topics for further exploration. Four research themes were developed by participating stakeholders:
• Transformative impact of gender mainstreaming at household, community and national levels.
• Transformative impact of gender mainstreaming within rural transport institutions.
• Potential for gender-focused rural transport initiatives be scaled-up and mainstreamed and importance of rural transport policy.
• Methodologies, analytical frameworks and indicators to monitor effective gender mainstreaming in the rural transport sector.

A call for research concepts was issued in January 2016. It resulted in thirty-four responses from participating stakeholders, which were evaluated in March 2016 and, ultimately, seven research concepts were selected for full proposals. Together, these will involve a range of research themes, including research on gender mainstreaming in eight countries in Asia, West Africa and Eastern Africa. All will be implemented by gender-balanced teams, with African and Asian researchers involved at a senior level.

This project demonstrated the application of the following principles:

• Use of social media (effective communications)
• Involvement of stakeholders for project inception
• Gender focus
• Inter-linked research (knowledge transfer)
• Use of gender balanced teams
• Ensuring African and Asian researchers take responsibility for the research
• Rural transport and vulnerable groups

SUMMARY OF WAY FORWARD TO UPTAKE AND EMBEDMENT

The previous research initiatives on rural transport in Africa and Asia alike, have been assessed as being highly successful in their production of high quality research in the areas of low volume rural roads and, to a lesser extent, in rural transport services. Significant further room for improvement has been identified within the crucial process from research dissemination to uptake and embedment. The key lessons from the analysis of these projects are the following:

• It is essential to establish a home for the research in each partner country, which acts also as a focal point for knowledge management and transfer.
• Undertaking and disseminating research is not enough – this must be seen only as an interim step towards uptake and embedment.
• Research, capacity building and knowledge transfer should not be seen as separate activities. It follows from the previous point that projects must be more focused from the very start on the prioritized targets of uptake and embedment.

In moving on from the initial programmes donors have to take a much more proactive view of uptake and embedment. The achievement of uptake and embedment are key indicators within the programme logframe and at a project level these issues need to be included within individual research terms of reference.

REFERENCES


