ESTIMATING THE IMPACT OF RURAL ROAD INVESTMENTS ON SOCIO-ECONOMIC DEVELOPMENT

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OUTLINE

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INTRODUCTION

- Inadequate transport infrastructure in rural Africa limits economic growth and socio-economic development
- Transport infrastructure pre-requisite development, MDGs
- African rural roads infrastructure neglected
- Increased interest in impact of rural roads investment
INTRODUCTION

• Estimation of rural road investment benefits complex to quantify

• Impact important indicator for justification of costs involved in investment

• This paper reviews methodologies for estimating impact of rural road investment
ROAD INVESTMENT, RURAL TRANSPORT, POVERTY ALLEVIATION & ECONOMIC GROWTH

• Many studies indicate link between inaccessibility & poverty
• Transport infrastructure essential component of sustained poverty alleviation
• Inadequate roads infrastructure limits:
  – Accessibility & mobility
  – Educational access
  – Health access
  – Social activity
  – Trade opportunities – local and regional
ROAD INVESTMENT, RURAL TRANSPORT, POVERTY ALLEVIATION & ECONOMIC GROWTH

• Roads primary mode of transport in Africa
• SADC: 80% of goods & services by road
• Africa’s rural road infrastructure inadequate & underdeveloped
• Lowest density of paved roads when compared to rest of world
• Limits economic growth & development
Estimated 1.8 mill km of roads in Sub-Saharan Africa – only 284000 km (16 %) paved
ROAD INVESTMENT, RURAL TRANSPORT, POVERTY ALLEVIATION & ECONOMIC GROWTH

- Lack of sufficient funds for:
  - development / expansion of road network
  - routine / periodic maintenance of existing roads

External Investment in Economic Infrastructure 1990-1996

Source: United Nations Food & Agriculture Organization (FAO) 2002
ROAD INVESTMENT, RURAL TRANSPORT, POVERTY ALLEVIATION & ECONOMIC GROWTH

• Financing needs for road network development in Africa substantial

• Challenges:
  
  – Determination of road financing needs
  
  – Accurate assessment of nature & extent of Africa countries road network
  
  – Identification of financing sources
  
  – Attract sound & sustainable road investment
ROAD INVESTMENT, RURAL TRANSPORT, POVERTY ALLEVIATION & ECONOMIC GROWTH

- Road investment focuses on strategic components - primary roads & roads in urban centers
- Increasing awareness of rural roads – poverty alleviation link
- Rural transport infrastructure consists mainly of:
  - Rural roads
  - Tracks
  - Trails
  - Footpaths
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Why quantify impacts?

• Limited, competing resources
• Choose between
  – Various options on same road
  – Different projects
  – Programme prioritisation
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Review of methodologies to estimate impact of rural roads investment:

- Benefits of road investments
- Appraisal techniques
- Alternative impact assessment techniques
- Impact of rural roads investment on socio-economic development
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

• Benefits of road investments
  – Direct benefits
    • Savings in Vehicle Operating Costs (VOCs)
    • Travel time savings
    • Reduced accident costs
    • Possible savings in road maintenance costs
  – Indirect benefits
  – Induced benefits
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

• Appraisal techniques:
  – Most frequent-used mechanisms: historical CB appraisal:
    impact of proposed investment: comparison of costs x benefits

  – Software tool: World Bank Highway Development & Management Model (HDM-4)

  – HDM-4:
    • Support decision-making on road management & expansion of traffic capacity
    • Designed to appraise projects
    • Develop road programmes
    • Evaluate long-term road system investment alternatives
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

• Traditional CBA methods not always suitable for low volume roads appraisal

• Rural roads most often have low traffic volumes

• Tool developed for low volume roads: Roads Economic Decision (RED) Model – developed by World Bank 2003

• RED:
  – Aimed at improving decision-making process for development & maintenance of low-volume roads
  – Perform economic evaluation of road investment options
  – Benefits calculated for respective traffic components
  – Benefits expressed into VOCs, travel time & accident costs
Sub-Saharan Africa Transport Policy Program
SKTP Working Paper No. 76

Roads Economic Decision Model
Software User Guide & Case Studies

Afbeko Yekine
The World Bank
July 2006

Africon
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

COMPARISON: HDM-4 vs RED

<table>
<thead>
<tr>
<th>HDM-4</th>
<th>RED</th>
</tr>
</thead>
<tbody>
<tr>
<td>High volume roads (VPD &gt; 200)</td>
<td>Low volume roads (VPD &lt; 200)</td>
</tr>
<tr>
<td>Detailed economic evaluation</td>
<td>Simplified economic evaluation</td>
</tr>
<tr>
<td>More complex input data required</td>
<td>Low input data requirements</td>
</tr>
<tr>
<td>Complex to apply to economic evaluation of low-volume roads</td>
<td>Easier to apply to economic evaluation of low-volume roads</td>
</tr>
<tr>
<td>Limited allowance for incorporation of induced / development traffic</td>
<td>Allow incorporation of induced / development traffic</td>
</tr>
<tr>
<td>Exclude NMT benefits</td>
<td>Include NMT benefits</td>
</tr>
<tr>
<td>Feasibility indicators: B/C Ratio, NPV &amp; IRR</td>
<td>Feasibility indicators: B/C Ratio, NPV, IRR &amp; MIRR</td>
</tr>
</tbody>
</table>
Other techniques to support HDM & RED:

- Multi-Criteria Analysis (MCA)
  - Ranking of Rural Transport Infrastructure (RTI) investments
- Cost-Effective Analysis (CEA)
  - Compares cost of interventions with their intended impacts
  - Appraisal of investments in social sector
  - Rarely been applied in transport sector – however: now receive more attention with increased focus of African countries on poverty alleviation
Alternative Impact Assessment Techniques

– Focus on estimation of indirect- and induced benefits
– Supported by additional data collection methods
– Frequently used method: socio-economic household surveys
– Main benefit: questionnaires structured to obtain perceived benefits
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

SE HH surveys typically collect following data:

- Perceived impact on community activity
- Existing transport constraints experienced due to insufficient road investment
- How investment will solve transport constraints
- Impact of investment on daily activities / living conditions
- Link between proper rural roads infrastructure & poverty, accessibility & mobility
- Whether accessibility to facilities vary by income & location
- Gender impact of rural road investment
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Zambia case study
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT
Zambia case study

Distribution of People Interviewed

- District Council & DA’s office: 32%
- Agriculture: 15%
- Health: 11%
- Education: 16%
- Community representatives (MP, Chief, Headman, local residents): 11%
- Other (Missions, Transporters, Police, Women Development Ass): 15%
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Study results indicated:

- Self-employment among men & women
- Range of economic activities: trading, logging, carpentry etc
- Individual farmers organize own transport to market place
- Subsistence farmers transport produce on bicycles
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Zambia case study
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT

Zambia case study
# Estimation of Impact of Rural Road Investment

## Zambia Case Study

<table>
<thead>
<tr>
<th>Province</th>
<th>Agriculture sector</th>
<th>Health sector</th>
<th>Education sector</th>
<th>Security aspects</th>
<th>Gender equality</th>
<th>Traffic / Transport</th>
<th>Consultation with District Councils</th>
<th>Overall rating**</th>
<th>Level of satisfaction ***</th>
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<tbody>
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<td>✓</td>
<td>Fair to good</td>
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</tr>
</tbody>
</table>

- **Definite signs of improvements compared to pre-ROADSIP conditions**
- **Impact of road improvement not evident or difficult to establish**
- **Definite signs of deterioration compared to pre-ROADSIP conditions**

* Consultation during the process of selecting roads for the ROADSIP programme
** Based on comparison with pre-ROADSIP conditions
*** Based on amount of reasonable complaints received from stakeholders
ESTIMATION OF IMPACT OF RURAL ROAD INVESTMENT ON SOCIO-ECONOMIC DEVELOPMENT

Typical conclusions:

- Significant socio-economic / indirect benefits
- Creation of short-term employment opportunities through road construction
- Long-term employment opportunities through continuous road maintenance
- Improved accessibility / mobility
- Correlation between poverty & low accessibility
- Correlation between inadequate all-weather road network & limited accessibility to other facilities
- HH income & location impact on accessibility
SUMMARY AND CONCLUSIONS

• Paper reviewed mechanisms to estimate impact of rural road investment

• Rural roads infrastructure essential source of economic growth

• Several appraisal techniques exist

• Qualitative methods can be used for impact determination