Inclusive and Green Rural Roads:
Beyond Connectivity, Accelerating Green Growth
Contribution to the SUM 4ALL Initiative

Frank van Steenbergen, MetaMeta
Rural Roads: Development Vectors
Rural Roads: Development Vectors

Rural roads – a formidable development opportunity:

• Annual investment 1-2 Trillion USD
• Expected new roads to be added from 2010-2050: 25M kilometres (60% increase)
• 20% of land surface within 1 kilometer of a road – 50% of remaining patches < 1km2
• Current connectivity, i.e. population > 2kilometer of all weather road: 1 Billion people globally unconnected; only 30% in SSA

How to capitalize on the opportunity?
How to make roads inclusive and green development vectors?
How to have roads systematically and effectively contribute to many SDGs?
Rural Roads: Development Vectors

(1) Unblock access for goods and services
(2) Create direct employment/ skills development opportunities
(3) Enormously trigger local economy activities
(4) Change land and water environment – for the better
AMBITIONS

- **Equitable**: ensure everyone has access to good-quality transport to reduce economic and social disparities
- **Efficient**: allow people and goods to move from A to B quickly and seamlessly
- **Safe**: halve the number of global deaths and injuries from road traffic accidents
- **Clean**: lower the environmental footprint of the sector to combat climate change and pollution.
SUSTAINABLE mobility™ FOR ALL

A robust global vision around 4 objectives

A global tracking framework to measure global progress

Bold and ambitious actions

Build a global coalition to carry the agenda forward
Case: Ethiopia’s road building program

Average Distance to all-weather roads in Ethiopia

Road Network
Average Distance to All Weather Road (in km)
Area > 5 km from all weather Road (in %)
Area > 2 km from all weather Road (in %)
(1) Increased access to services and opportunities

- Access to services (health and education)
- Access to economic opportunities
- General freedom that comes with mobility
Rural mobility by trip purpose

- Trips in rural areas are often made for economic activities, social services, social activities and community association.

The dominant form of travel in the rural area in Ethiopia is social services mainly education and health, followed by economic activities which includes travel for market, agricultural activities and travel for employment.
Access to health – the importance of ambulances
Access to education: apart from connectivity cost of transport is a main factor
Market access and distance to road

- In developing countries like Ethiopia, transport cost constitutes more than half of the marketing costs.
- More than three fourth of respondents in surveys revealed an increase in marketing of agricultural products after road construction.
- More negotiation-minded – have more options.

<table>
<thead>
<tr>
<th>Product type</th>
<th>Changes in sales</th>
<th>Changes in sales attributed to road</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase</td>
<td>Decrease</td>
</tr>
<tr>
<td>Cereals</td>
<td>69</td>
<td>3</td>
</tr>
<tr>
<td>Vegetables</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Other products</td>
<td>87</td>
<td>2</td>
</tr>
</tbody>
</table>
Yet on feeder roads it is also the traffic that matters

Average Daily Traffic per km

Mean = 2.36
Maximum = 6.06
Minimum = 0.48
Roads are empty
Walking remains most important means of transport
Business operators’ means of transport

Business operators important means of transport

- Walking: 60
- Three wheel drive (Bajaj): 40
- Minibus: 30
- Cart: 20
- Animals: 15
- Lorry: 10
- Motorcycle: 5
- Car: 0
Lack of intermediate means of transport – only ‘bajaj’ fill the gap between walking and trucks/busses
Equity and distance from feeder road (up to 3km) - no clear bias to those along side the road - depends on other factors too
(2) Direct employment opportunities

Jobs
Opportunities for skill development
Capitalizing the local economy
(2) Direct employment: local jobs and injection of cash flow

<table>
<thead>
<tr>
<th>Workers categories</th>
<th>Within the project site (%)</th>
<th>Elsewhere /Outside (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feeder Road Workers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled construction worker (builder)</td>
<td>59.7</td>
<td>40.3</td>
</tr>
<tr>
<td>Unskilled wage labourer</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Sub-contractors</td>
<td>30.2</td>
<td>69.8</td>
</tr>
<tr>
<td><strong>Building material suppliers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>61.4</td>
<td>38.6</td>
</tr>
<tr>
<td>Concrete materials</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>Stone</td>
<td>62.2</td>
<td>37.8</td>
</tr>
</tbody>
</table>

Source: Authors compilation, 2016
## Direct employment: developing useful skills

<table>
<thead>
<tr>
<th>Employment Modality</th>
<th>As Skilled workers</th>
<th></th>
<th>As Unskilled workers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Days worked</td>
<td>Mean DWR</td>
<td>Level of satisfaction of the work (%)</td>
<td>Mean Days worked</td>
</tr>
<tr>
<td>Daily base</td>
<td>349</td>
<td>98.6</td>
<td>60</td>
<td>61.5</td>
</tr>
<tr>
<td>As a foreman</td>
<td>755.5</td>
<td>41.7</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Land clearing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth work</td>
<td>60</td>
<td>7</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Culverts/ditches</td>
<td>336.7</td>
<td>45</td>
<td>33.33</td>
<td>66.67</td>
</tr>
<tr>
<td>Minor maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major maintenance</td>
<td>100</td>
<td>107.5</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>


Direct employment: decent wages and labour arrangements

<table>
<thead>
<tr>
<th>Construction Materials</th>
<th>N</th>
<th>Mean Income in EB</th>
<th>Percentage of satisfied workers</th>
<th>Income</th>
<th>Working suitability</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material supply (sand)</td>
<td>47</td>
<td>1522.8</td>
<td>75.5</td>
<td>79.6</td>
<td></td>
<td>78.7</td>
</tr>
<tr>
<td>Material supply (concrete)</td>
<td>31</td>
<td>1073.9</td>
<td>90.3</td>
<td>86.7</td>
<td></td>
<td>81.8</td>
</tr>
<tr>
<td>Material supply (stone)</td>
<td>55</td>
<td>1340.9</td>
<td>80</td>
<td>75.9</td>
<td></td>
<td>73.2</td>
</tr>
</tbody>
</table>
(3) Creating new business opportunities
Feeder roads are major boost for new business (81% of business) Because of:

- Open connectivity
- Bundling of customers and commodities
- Capitalization of economy
- New orientations
What are the primary constraints for non-farm business operations and growth?

- Lack of access to finance
- Transport related problems
- Access & shortage of power
- High taxes
- Others
New activities are not much diversified
- mainly small convenience stores, bars, hairdressers
- few hardware shops, producers of productive assets/ value addition of local produce

> opportunities for much more? “economy as circular flow of activities”
HH owns shop/kiosk
HH processes & sells...
Owns a professional...
Drives HH owned...
Owns bar
To whom does/did the enterprise mostly sell its product or service?

- Local market
- Woreda market
- Traders

Increasing service provision and potential penetration

Oo useful products
Has the road created new opportunities for your business?

- Yes but not fully seized on the opportunities
- Yes and fully utilized
- No
Issues affecting business related to the use of the road network

- High cost of public transport
- Low frequency of public transport
- Low availability of public transport
- High cost, low frequency and availability of public transport
- High cost and low frequency of public transport
(4) Effect on land, water and air

Roads can have unwanted environmental consequences that affect the livelihood of rural communities.

<table>
<thead>
<tr>
<th>Effects of roads</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding</td>
<td>179</td>
<td>34</td>
</tr>
<tr>
<td>Water logging</td>
<td>61</td>
<td>12</td>
</tr>
<tr>
<td>Erosion</td>
<td>153</td>
<td>29</td>
</tr>
<tr>
<td>Sediment deposition</td>
<td>95</td>
<td>18</td>
</tr>
<tr>
<td>Dust</td>
<td>229</td>
<td>44</td>
</tr>
<tr>
<td>Weeds</td>
<td>47</td>
<td>10</td>
</tr>
</tbody>
</table>

The environmental consequences of roads in the order of number of respondents are:
1. Dust
2. Flooding
3. Erosion
4. Sediment deposition
5. Water logging
6. Weeds

Total observations = 525
Unpaved roads contribute almost 40% of all dust. Long-term exposure to traffic-generated dust has been known to contribute to 1.5-2 million deaths annually.

Layering of dust on crops in road-adjacent fields is known to affect photosynthesis, respiration, transpiration, and to lead to an increase in fungal spots on several crops. Impact of dust from the estimated 13 million km of unpaved roads worldwide is estimated to affect around 26 million hectares of productive land, and lead to a reduction in agricultural revenue to the tune of USD 260 million.

Affects:
- Human health
- Animal health
- Crop production
“Dust covers our cops, it can be the reason for rust (fungus).” Fetyem Gebrekidan, Adikisandet Village, Kilte Awlaelo Woreda
Road surfaces contribute 15-40% of all sediment in watersheds. To this the sediment produced by road gullies should be added. Gullies also cause moisture depletion and are safety hazard and can isolate villages. Roads change the surface hydrology in a major way – now often negative..
Results of transects: ‘roads and water as enemies’

- On average in 10 kilometer > 13-25 problem spots
  - Erosion and sedimentation: 55% of locations
  - Flooding of houses and land: 15% of locations
  - Persistent waterlogging: 30% of locations
  - Lost opportunity to capture water 4 M m³

- Deficiencies in governance process
  - Missing from guidelines
  - No coordination
  - No interaction with road-side communities
Women, Roads, and Transport
Women challenges

Identified by men
<table>
<thead>
<tr>
<th>Men and women</th>
<th>Men</th>
<th>Women top challenges</th>
<th>Men top challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Scarcity MoT</td>
<td>- Alignment of roads is not impartial</td>
<td>- High transport fares</td>
<td>- Flooding and water-borne diseases</td>
</tr>
<tr>
<td>- High transport fares</td>
<td>- Flooding and water-borne diseases</td>
<td>- Accidents</td>
<td>- Paying taxes on expropriated land</td>
</tr>
<tr>
<td>- Accidents</td>
<td>- Paying taxes on expropriated land</td>
<td>- Dust</td>
<td>- Bad road conditions</td>
</tr>
<tr>
<td>- Dust</td>
<td>- Bad road conditions</td>
<td>- First mile is a challenge</td>
<td>- Road is too narrow</td>
</tr>
<tr>
<td>- First mile is a challenge</td>
<td>- Road is too narrow</td>
<td>- Land loss without compensation</td>
<td>- Suboptimal design and maintenance of drainage infrastructure</td>
</tr>
</tbody>
</table>
Women priorities

1. Improved access to MoT
2. Upgrading of feeder road and footpaths (to address risks of accidents and increase motorised transport)
3. Lower and regulated transport fares

Men priorities

1. Improve design of roads and bridges and maintenance of road drainage
2. Upgrading to asphalt
3. Make road wider
4. Regulate transport fares
Key Findings: Gender, Transport, Mobility
Importance of the ‘first mile’
“Forget the (feeder) road. The walkway to it from our homes is so difficult. Pregnant women will have to think many times before using it.” – Melesh Haregu, Aynalem Village, Kilte Awlaelo Woreda, November 2016
“The Bajaj is not very safe. Only last year there was an accident. There have been more earlier. But it is very important, especially in emergency situations” – Ubnesh Kassau and Group, Kebele 028, Raya Kobo Woreda
“If we were men, we could elbow our way through the crowd and capture the empty seats.”

Tsegaye Meharet and Group, Aynalem Village, Kilte Awlælo Woreda

“The buses are too few, and too crowded. They also overcharge, especially the younger conductors. We often prefer walking to Wukro (10 km) instead.”

– Melesh Haregu and Group, Aynalem Village, Kilte Awlælo Woreda
Differential Participation in Road Planning

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women Spouse</td>
<td>14.1</td>
<td>85.9</td>
</tr>
<tr>
<td>Women Headed</td>
<td>14.1</td>
<td>85.9</td>
</tr>
<tr>
<td>Men Headed</td>
<td>44.6</td>
<td>55.4</td>
</tr>
</tbody>
</table>

Participation in Rural Road Development Intervention Meetings
Differential Participation in Road Construction

- Paid maternity leave of up to 17 months from PSNP targets and obligations
- Exemption of women from hard physical work
- Exemption of elderly, sick, and disabled
- Lower daily work targets for women
Non-farm Business ownership structure by gender – work on more opportunities for women
Yield impacts of road form water in Sinqata

Yield (qt/ha)

<table>
<thead>
<tr>
<th>Year</th>
<th>With intervention</th>
<th>During road construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>12.11</td>
<td>12.11</td>
</tr>
<tr>
<td>2009</td>
<td>15.22</td>
<td>15.22</td>
</tr>
<tr>
<td>2010</td>
<td>8.50</td>
<td>8.50</td>
</tr>
<tr>
<td>2011</td>
<td>11.61</td>
<td>11.61</td>
</tr>
<tr>
<td>2012</td>
<td>7.39</td>
<td>7.39</td>
</tr>
<tr>
<td>2013</td>
<td>4.56</td>
<td>4.56</td>
</tr>
<tr>
<td>2014</td>
<td>15.67</td>
<td>15.67</td>
</tr>
</tbody>
</table>
Rural roads as Development Vectors

Rural roads – a formidable development opportunity:

How to capitalize on the opportunity?
How to make roads inclusive and green development vectors?
How to have roads systematically and effectively contribute to all SDGs?
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive, so its benefits accrue to a larger section of rural societies?

1. Prioritize not only roads but also rural transport.
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive, so its benefits accrue to a larger section of rural societies?

2. Intermediate Means of Transport (IMTs) need to be promoted as priority
Mode of transportation

Either

Need to make it available and affordable

Missing Middle (IMT)

OR
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

3. Rethink transport designs – for instance buses
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

4. Work on the first mile
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

5. Use investment in roads to create jobs and capitalize local economy
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

6. Systematically engage women in road development planning
As more and more women come forward and participate in planning of public works… this has many effects that are difficult to quantify. Women’s self-confidence has increased. They are more and more visible in public life; they are more self-reliant now.

*Kebrom Hadush,*
*Head, Women’s Bureau, Kilte Awlaelo Woreda*

We pled with Woreda officials again and again… until we could get the ambulance service connect to our village, even though there is no feeder road yet. We could also get wells dug right here in the village, so we no longer have to walk for many hours everyday.

*Women at a Focus Group Discussion in Buku village, Kobo Woreda*
7. Implement and enforce special work arrangements

- Maternity leave of 6 months before and 6 months after the birth
- Child care
- Equal wages, equal time, equal opportunities
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

8. Use investment in roads to build new skills and introduce new techniques
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

9. Coordinate road/transport development with other development activities (banks, clinics, schools, ambulance services, employment programs) to diversify economy.

Special fares For students/Eldery/PWD?
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

10. Use work on roads can set the basis for increases in local wages/employment conditions
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

11. Integrate beneficial road water management in road development
Conclusions:

How can road infrastructure planning, road development, and transport be more inclusive and greener, so its benefits accrue to a larger section of rural societies?

12. Promote road side tree planting
Thanks for listening..