

SOURCE destination

For major networks in developing countries

This method, which has been validated for the typical landscape of major road networks in Africa, would not be suitable for groups of countries with much better road characteristics (the differentiation of road condition on the basis of common traffic speed declines significantly in quality for the top end of the range).

It is also important for a sufficient portion of the network under study to reach substantial traffic levels (the accuracy of macro-indicators is determined by the accuracy obtained over major routes). SOURCE is not suitable for aggregates consisting of rural earth roads only. SOURCE is therefore a method specific to **trunk networks** in developing countries.

Area of validity

The SOURCE method is suitable for networks with the following characteristics:

Network structure

- Few motorways or sections of more than 2 lanes
- Mixed paved / unpaved roads
- Mainly deteriorated condition

Range of speeds

- Common traffic speeds globally much slower than standard speeds in the West. Mostly below 90 km/h

Range of traffic

- Traffic levels usually low to very low compared with standard levels in the West. Mostly below 700 light vehicles per way and per day. But at least a few major road links exceeding 350 LVs per way and per day.
- Network far from generally saturated (except peri-urban areas).

This is solely the limit of validity of statistical processes. This limitation of use does not mean that the general specifications of the monitoring tool are substandard.

On the contrary, great importance has been given to the conclusions and recommendations for road monitoring, given by PIARC (World Road Association, see particularly the work entitled HPMS – Highway Performance Monitoring Systems) to enable compliance with major specifications worldwide.

What information?

As an illustration, here are the results post-edited for the very first full-scale SOURCE measurement campaign conducted in March-April 1999.

Recap Sheet			SOURCE Ref. Network (Ranks 1 to 3)										SOURCE Paved/L	
GHANA Country			43 links										257	
Measured From: Mar-99 To: Apr-99			Dry season, business day, business hour										100%	
After Traffic Rectification			Standard Indexes										48	
			43 links										247	
			Gross Length 3827 Km										70	
			Rough % Paved 87%										1.0	
			1-way LV Traffic Level 33 LV/h											
			2-way LV Hourly Traffic Volume 25h x 1000 (LV x Km) / h											
			LV Common Speed 69 Km/h											
			LV Travel Speed 64 Km/h											
			Travel / Common 0.9											
Link Code	Min	Max	L1	L2	L3	L4	L5	L6	L7	L8				
[1 to 4]	1	4	1	4	4	4	2	4	4	2				
SOURCE Rank														
Road Class and Codes														
Start														
End														
Characteristics														
here just a visual survey														
Km	Gross Length	3	387	186	188	21	21	178	19	48	84			
LV/h	1-way LV Traffic Level	0	182	117	27	43	12	18	82	18	47			
(LVxKm)/h	2-way LV Traffic Volume	0	68,488	46,489	8,580	1,767	484	5,698	3,582	1,804	5,99			
min	LV Travel Time	11	340	164	149	19	20	180	14	86	111			
Km/h	LV Common Speed	28	95	61.9	73.7	65.3	62.5	65.9	60.8	58.2	63.4			
Km/h	LV Travel Speed	24.7	97.7	64.8	72.4	64.6	62.7	68.3	61.3	31.3	34.1			
mm-dd-yy	Measuring period	From	Mar-30-99	Mar-23-99	Mar-23-99	Mar-23-99	Mar-23-99	Mar-29-99	Mar-23-99	Apr-14-99	Mar-24			
mm-dd-yy		To	Apr-10-99	Mar-23-99	Mar-23-99	Mar-23-99	Mar-23-99	Mar-30-99	Mar-23-99	Apr-14-99	Mar-24			

Since this campaign in Ghana was part of the method development at the pre-consolidation step, it does not obey 100% of the rules of the final measurement protocol. Hence these results are shown here as specimens only.

Fig.2. Characteristics and results for the 81 links of the network under study, some 6,400 km long. (extract)

The macro-indicators

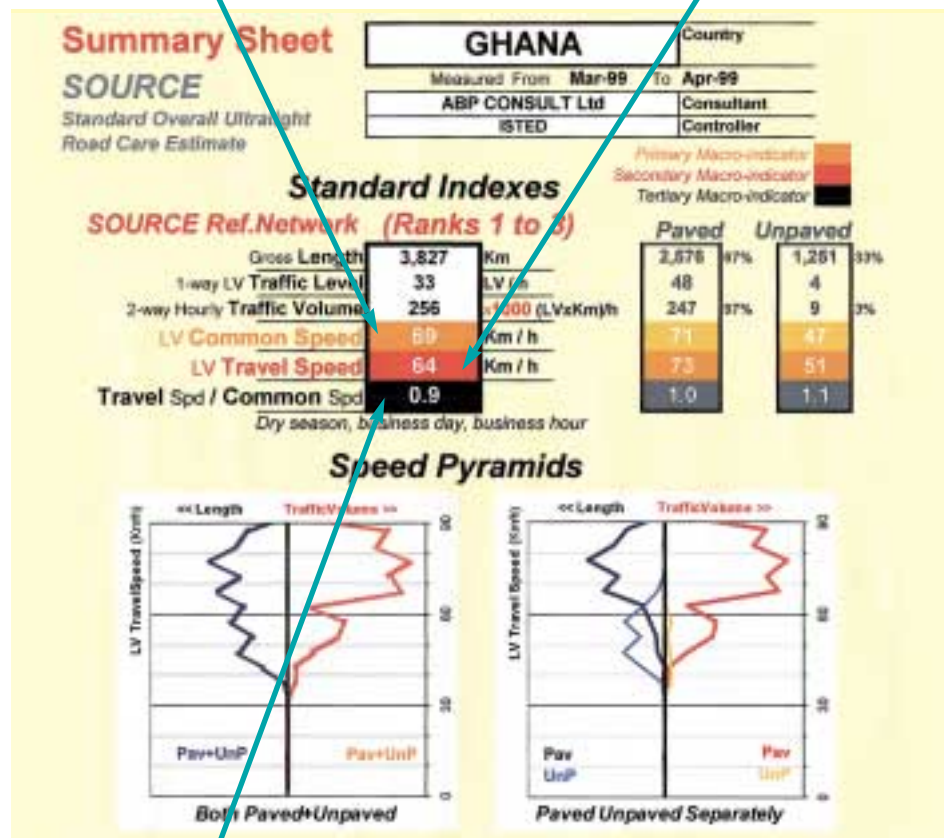
SOURCE indicators are national aggregates evaluated for the entire reference network of the relevant country. They apply to the dry season, for business times and days.



Fig.3. Examples of SOURCE graphic output: above, the network under study, below, the combined LV speed /traffic map.

SOURCE primary indicator: "common speed" of LVs on the reference network. This indicator is calculated as follows: harmonic mean of LV speeds, measured section by measured section, weighted by hourly LV traffic volumes in both ways of travel. This speed is said to be "common" because it is the most probable speed of a LV travelling on the network, chosen at random. This indicator is expressed in km/h.

SOURCE secondary indicator: "travel speed" of LVs on the reference network. It is the harmonic mean of LV speeds, measured section by measured section, simply weighted by the lengths of these sections. This speed is called the "travel speed" because it is the resultant speed of a LV that has travelled once over the entire network, adopting the exact common speed as recorded on each section. This indicator is expressed in km/h.



SOURCE tertiary indicator: ratio of secondary indicator to primary indicator. This index relates to the homogeneity of the network situation. It requires careful interpretation. Practically, for a country network, it is a number between 0 and 1.

Fig.4. SOURCE summary sheet for Ghana (extract): macro indicators, network profiles and classes of service. The profiles compared by traffic volumes and lengths are sophisticated aids for interpreting the tertiary macro indicator, reserved for specialists.

From one period to another, comparing costs and service gains

The SOURCE primary macro indicator is thus expressed as a speed (designed to be levelled off to 90 km/h). It breaks down naturally into two sub-indicators, for paved roads and unpaved roads.

Given the major roadwork program of the previous three years, the difference recorded on the SOURCE primary indicator can be divided into 3 cumulative differences, related to the corresponding budgetary flows:

- gain in speed due to new works,
- gain in speed due to periodical maintenance,
- loss of speed due to ageing of the network resulting from the climate and traffic but moderated by routine maintenance.

Thus globally, it is possible to obtain the direct economic balance of a medium and long-term road policy, by measuring the part of the profits attributable to each of its heavy components.

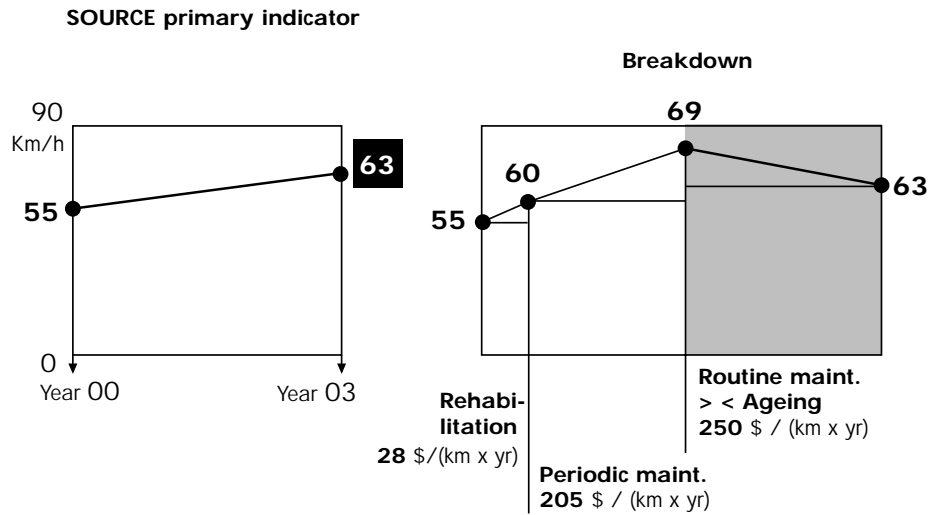


Fig.5. Breakdown principle of the intercycle difference of the SOURCE primary indicator. Note: here the budget flows are related to the km of the complete reference network, and not the km of works.

