

MINISTRY OF FOREIGN AFFAIRS OF DENMARK  
Danida

TECHNICAL ADVISORY SERVICE

# MONITORING AND INDICATORS IN THE ROAD SECTOR



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## List of Abbreviations

ASPS	agricultural sector programme support
Danida	Danish International Development Assistance
DKK	Danish kroner
DROMAS	District Road Management System (in Uganda)
EIA	environmental impact assessment
EU	European Union
GPS	Global Positioning System
HQ	Headquarters
IDA-14	International Development Association – 14 <sup>th</sup> replenishment
MDGs	Millennium Development Goals
PMS	Pavement Management System
RAI	rural access indicator
RSIM	Research Statistics and Information Management Division (in Ghana)
RSPS	road sector programme support
SSATP	Sub Saharan Africa Transport Policy Programme
TA	technical assistance
UN	United Nations
USD	United States dollars
VPA	Annual Business Plan agreed between Danida HQ and Embassy
WB	World Bank

## 1. Introduction

This Note offers a brief and non-technical introduction to indicators and monitoring tools of relevance to the road sector in Danida's countries of programme cooperation. It is primarily aimed at supporting officers at Danish representations or at HQ responsible for preparing and managing Danish bilateral development assistance. The Note may also be useful to staff in partner organisations, Danida-funded technical advisers, and consultants who assist in preparing and managing programmes and projects.

The present Note should be read in conjunction with the technical note on "Monitoring at Programme and Project Level – General Issues", which presents definitions of relevant monitoring terms and explains important aspects of the monitoring challenge at the programme and project level, including the links between monitoring and the international agenda on ownership, alignment, harmonisation, and management for results. The definitions used in the present Note correspond to those presented in the general note.

This Note contains a short background in Chapter 2 about the contents and forms of Danida Road Sector Programme Support (RSPS). It has been decided to concentrate this Note on roads, as this area is the focus of Danida's sector support for transport in all countries where such assistance is provided. In addition, mixed-credit support is given to a number of transport infrastructure projects outside the road sector. However, this Note does not directly cover mixed credits, although several issues addressed here will be relevant to projects using this support modality.

Chapter 3 gives a brief overview of international work and proposals regarding road-sector goals, indicators and targets. This includes a description of how road-sector monitoring and indicators have generally been reflected in the PRSPs of partner countries.

Chapter 4 presents and assesses the typical monitoring indicators used in Danish RSPS. Chapter 5 discusses principles of alignment and the choice of indicators in future Danish road-sector programmes, offering concrete examples of indicators.

Chapter 6 illustrates how Danish RSPS can strengthen appropriate data systems in partner countries. Finally, Chapter 7 summarises conclusions and recommendations for the treatment of monitoring and indicators in Danish support for the road sector.

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## 2. Sector background

Fundamentally, Danida's support for the road sector is governed by bilateral government agreements with a number of developing countries of programme cooperation (in Danida terminology so-called 'programme countries'). In line with general trends in development assistance after the initial PRSPs and the MDGs, Danida reduced its relative support for the infrastructure sectors of energy and transport (roads). In recent years, it has generally been realised that the decline in infrastructure support has worked against achievement of the poverty-reduction targets, including the MDGs. The World Bank, EU and other major

funding agencies have responded by increasing their share of infrastructure allocations. Second-generation PRSPs are generally better at striking a balance between social and economic development needs, including the growth of productive sectors. Infrastructure, including roads, is seen as a prerequisite for development in most other sectors.

The Danish response has been to continue RSPS in a number of countries, and to include significant road components in various agricultural SPS interventions (ASPS). Road components are now included in ASPs for Burkina Faso, Kenya, Tanzania, Mozambique, and is planned for Bangladesh. Currently, full RSPS is provided to Benin, Ghana, Uganda, Tanzania, Zambia and Nicaragua. This note will concentrate on RSPS, but is also relevant to road components of ASPs.

All RSPS undertakings cover a five-year period within budget frames of DKK 200-500 million (USD 30-80 million), consisting of key components, such as national roads, local-government roads, and institutional development.

National-road components generally cover main roads and regional roads under an authority higher than the local government. In the early RSPS phases, investment in rehabilitation and up-grading of trunk and main roads used to be always included. As a result, the national-road component would be predominant in the overall RSPS budget. In the current RSPS for Uganda and Nicaragua, this is no longer the case. Emphasis has shifted towards regional roads, and a higher proportion of the budget is to be spent on local-government roads and institutional support.

The local-government component normally includes investment in road improvement, usually of existing networks, but at times also of new access roads and tracks, as well as pedestrian bridges. This component is normally divided into two sub-components: 1) support for the core district or municipal road network, for which local government is 100% responsible as regards investment and maintenance, and 2) support for community roads, tracks, bridges etc. for whose maintenance the community has full or shared responsibility.

Institutional components present greater variety from one country to another, but often include support to introduce management systems, especially for local governments, to test and develop manuals for labour-based construction and maintenance methods, promotion of traffic safety, support to establish environmental units and to develop guidelines. In some cases, assistance is given in the field of policy work and long-term sector planning, and in one case to develop transport indicators and databases.

Initial phases of RSPS paid much attention to earmarking project funds and producing physical outputs. These aspects have not been abandoned today, but there is a trend towards setting aside more resources to test and develop appropriate approaches to technical solutions (labour-based techniques), to organisational issues (management systems and user committees), and to involvement of private consultants, contractors and users. This reinforces a move towards better alignment and donor harmonisation, which is facilitated by improved capacities, sector plans and management systems.

Current RSPS presents few examples of common donor-funding arrangements compared to SPS in sectors such as health and education. Although RSPS undertakings are moving gradually in that direction, in the RSPS3 for Tanzania and in the planned RSPS2 for Zambia, Danish funds generally remain earmarked for specific interventions. This has implications for the treatment of monitoring and indicators in the following chapters.

### 3. PRSPs and internationally-defined goals, indicators and targets for roads

#### *General status regarding road monitoring and indicators*

The Millennium Declaration, setting out eight Millennium Development Goals (MDGs), has stepped up international pressure to strengthen information systems in order to monitor 48 target indicators. However, none of these are related directly to the road sector, whereas 15 are related directly to health, for instance. This initially left the transport sector (roads) outside the priority focus of the MDGs, as mentioned above, which was further aggravated by the limited inclusion of the road sector in the early PRSPs. This partly explains why road-sector monitoring has failed to attract the needed attention both internationally and in partner countries.

Generally, road-sector indicators in national road-sector programmes and PRSPs are weak, and at times contradictory. Accordingly, donors cannot automatically use the same set of indicators. However, some progress towards better road-sector monitoring has been made in recent years, following renewed prioritisation of transport and roads in second-generation PRSPs. This has resulted in increased funding from the development banks and EU. In addition, some monitoring initiatives have been taken internationally to overcome this inadequacy.

Transport monitoring and indicators were on the agenda at several expert meetings of EU member states in 2001-03. They concluded that a huge challenge lies ahead in harmonising the use of road-sector indicators. At the same time, they called for realism in the level of ambition, as data collection must be based on the systems of partner countries. The earlier practise to assign data collection to consultants resulted in piecemeal information with no continuity over time. This led to discussions with the World Bank (WB) about the need to build capacities in partner institutions and to draw on the common Sub Saharan Africa Transport Policy Programme (SSATP) for initiatives in Africa.

Using SSATP as an instrument, a major effort has been made by the African Union and the UN Economic Commission for Africa in collaboration with the African Development Bank, World Bank and European Union. This is documented in a report entitled "Transport and the Millennium Development Goals in Africa", dated February 2005. It states that "efficient operation of transport infrastructure and services is critical to attainment of the MDGs, and nowhere more so than in Africa". For each of the MDGs, supporting targets and indicators were formulated for the transport sector. For instance, for MDG 1 ("eradicate extreme poverty and hunger"), the transport objective is to improve access to inputs and markets, and to generate employment opportunities. The indicator chosen is the proportion of rural population living further than 2 km from an all-season road, and the target is to halve this proportion by 2015. This 'rural access indicator' and corresponding targets are likewise important to achieve the social MDGs 2-5. At a meeting in Ethiopia in April 2005, African Transport Ministers adopted 16 transport targets and 47 transport indicators (see the list in Annex 1).

#### *Specific World Bank initiative*

The World Bank (WB) initiative called Transport Results Measurement was launched in 2003. The aim is to provide measures and indicators with consistency between three levels: (i) a diagnostic framework at the sector level to support the WB Infrastructure Action Plan, (ii) headline indicators for national and global levels, where the first proposal was the aforementioned rural access indicator, and (iii) core measures for transport sub-sectors, including the road sector.

The rural access indicator (RAI) is *one of two headline indicators* identified for roads. RAI has been tested in a number of countries, showing a clear correlation with poverty, both when comparing between different categories of countries according to per-capita income, and when comparing between the poverty levels of

different areas and population groups within countries. In October 2004, RAI was adopted for IDA-14. Efforts are being made to include RAI as standard measurement in household surveys conducted regularly to assess poverty levels.

The *other headline indicator* concerns the condition of the road network measured as the percentage in 'good' or 'fair' condition, where these terms need to be specified technically for different types of pavement (asphalt, surface dressed, gravel or earth). This relates to the quality of the road to its users, and directly influences the cost of transport. Consequently, it is a vital tool to assess the performance of the road sector, including benchmarking of any management performance contract with institutions responsible for this area at the central and local level.

The WB Transport Result Measurement initiative points to a number of other data needs. Comprehensive lists of indicators are available for each sub-sector, e.g. so-called 'core measures for roads'. The tables were up-dated in 2003. They contain a variety of required data concerning road infrastructure and road transport. As for road infrastructure, it is necessary to know the length of the road network in different categories, the condition of the roads, the value of road assets, etc. In the case of road transport, required data consist of average daily traffic levels counted in number of vehicles in different categories, volumes of cargo moved, passengers transported, tariffs charged, etc. Other indicators concern the institutions responsible for management, e.g. whether road funds are established, if boards include private-sector representatives, etc. Finally, some indicators relate to the financing of maintenance. More information is available at ([www.worldbank.org/transport/transport](http://www.worldbank.org/transport/transport) results measurement).

*The Indicator Initiative of the Sub Saharan Africa Transport Policy Programme (SSATP)*

The SSATP Transport Sector Data and Indicator Initiative can be seen as an effort to translate the aforementioned principles for the design of indicators into action. The initiative has the dual purpose of: (i) coordinating and promoting the establishment of datasets that will enable the generation of key transport sector performance indicators, and (ii) understanding and assessing how capacity constraints affect sustainable data collection. 21 countries have taken part in the first cycle of the undertaking. Preliminary experiences indicate significant data gaps, poor quality of data, and weaknesses in institutional and financing capacities, but also suggest that the proposed SSATP data system needs to be revised and simplified. The Annual General Meeting of SSATP in Mali in November 2005 appealed for proposals to improve national systems and for multi-donor financing of on-going road-sector programmes. At the same time, an action plan was presented for the second cycle involving 17 countries, whose results would be summarised for presentation, review and validation at a workshop in May 2006.

The SSATP work divides data into four areas that are critical to poverty reduction and growth:

- Road-network management (service to users, quality of roads and degree of usage).
- Road-network access of rural populations (closely related to the aforementioned RAI).
- Urban mobility and transport (related to means of transport, costs, and distance and time to work).
- Transport and transit corridors (related to import/export of goods, including containers).

As this paper focuses on roads and rural access, the discussion will concentrate on the first two areas. According to feedback from SSATP, there is common agreement that two indicators are important for road-network management. Both are outcome indicators.

One is the *road condition* indicator measuring the percentage of roads in a good or fair state. This gives an indication of the service level and of the value of the road asset, including the need for improvement. For comparison between countries and over time, it is necessary to define different types of road pavement (asphalt, gravel, etc) and to draw up technical guidelines for what is 'good' and 'fair'. The other important

indicator is the *level of traffic*. There are also serious gaps in data on traffic levels, but major efforts are being made to remedy this shortcoming, especially concerning data on national networks, which provide important inputs to computer-based road-management systems aimed at prioritising investments and maintenance.

#### 4. How indicators have been used in Danish road sector programme support

Generally, the development objective, immediate objectives (outcomes) and outputs of Danish RSPS can be described as follows:

*Development objective*: contribution to poverty reduction through economic growth and social development by means of improved access and reduced transport costs.

*Immediate objectives (outcomes)*: (i) improved access and (ii) reduced transport cost.

*Outputs*: (i) kilometres of road constructed, rehabilitated or spot-repaired for vehicles, (ii) number of foot bridges or kilometres of footpath constructed, (iii) institutional improvements, such as the number of road user committees established, contractors trained, guidelines or manuals produced, and management systems established.

A quick internal survey of Danish RSPS, conducted in 2004, revealed vast disparities in the choice of indicators in different programme documents. Often indicators had been drawn up only to fill out the logical framework matrix, and they were normally relegated to annexes rather than being systematically discussed and justified in the main document. In some cases, this produced indicators that could only be measured by means of costly data-collection efforts. This is especially the case of *impact indicators* of poverty reduction. Here, measurement would require special socio-economic studies, and even this would only yield solid conclusions when compared to the results of baseline studies. The latter were often not carried out, and when they were, the required follow-up, analysis and documentation seldom took place. In a few cases, impact studies were conducted, providing interesting information about the employment generation of labour-based methods, increases in land value, increases in school or clinic attendance, or construction of new social facilities, establishment of public-transport services, etc.

*Outcome indicators* were generally found to be overly ambitious, although some of these are easier to verify. This is the case of access and traffic. For instance, it is possible to obtain data on traffic levels, especially on major roads. This is a relevant proxy indicator of improved access and increased use of the services enabled by the road. If a bad rural road could not be used during the rainy season whatsoever, but becomes an all-weather road after improvement, this can easily be verified afterwards. Reduced transport costs are more difficult to ascertain, but can be computed by the road management, if there is information on road quality ('roughness index') and traffic levels before and after the improvement. However, in Danish RSPS, such outcome data has seldom been collected.

*Output indicators*, on the other hand, have generally been systematically monitored and reported on in progress reports, in performance contract reports to Danida HQ, in Review Aide Memoires and in Programme Completion Reports. This has been facilitated by efforts in the field of output indicators, conducted in the late 90s, when typical indicators for roads were standardised and became widely used. For the physical improvement of roads, this is, of course, relatively simple, measuring the number of kilometres of road. However, the different types of work had to be specified, e.g. new construction, rehabilitation or spot repair, and a distinction had to be introduced between infrastructure for motor vehicles on major roads (asphalt, surface dressing, gravel) and rural roads (gravel and earth), and infrastructure for pedestrians and bicycles (footpaths, bridges etc).

Output indicators of institutional improvements are more varied, and can be difficult to quantify. Nonetheless, a number of examples show that it is possible, as described above. However, they must be tailor-made to the institutional components of each individual RSPS. In some cases, Danida RSPS has supported environmental units in ministries. Outputs have typically been trained staff, established environmental procedures, approved guidelines for EIA of road works, standard contracts, etc.

In many countries support is provided for community infrastructure, where training and establishment of a community organisation is necessary for sustainability. This often results in the set-up of a local road-user committee with responsibilities for various aspects during construction, and subsequently for maintenance. In such cases, one relevant indicator could be the number of road-user committees established. The capacities of private contractors are frequently enhanced either by training new (often labour-based) contractors, or by training existing contractors. Outputs can be defined in numerous ways, for instance the number of contractors trained in the use of new contract documents, trained on the job in particular skills, or having successfully completed a new type of contract. In recent years, more focus has been placed on the development of appropriate management systems, technical standards, etc. This requires alignment to national sector systems, and the indicators need to be harmonised for all parties involved, including all donors.

## 5. Which indicators should be used in Danish RSPS?

Which indicators are relevant and should be chosen in Danida RSPS? The answer is: those that are relevant and realistic for the road sector as a whole in each partner country. 'Relevant' means that the data to be collected must be necessary for good management of the road sector, or for the government in general for the purposes of prioritisation and planning. 'Realistic' implies that the data systems can be maintained and financed when donor assistance ceases.

In most partner countries, necessary and appropriate data for good road management would include:

- Updated data and maps on the length of road infrastructure assets, divided into different categories such as:
  - i. national roads (asphalt, surface-dressed, gravel);
  - ii. district (local-government-controlled) roads (gravel, earth, private/community).
- Annually updated condition of roads in all categories, measured in kilometres in good, fair and bad condition.
- Annually updated traffic levels on all (or most important) national roads.
- Annual plans/targets with budget and physical outputs for investment in improvement of roads, to be compared to expenditure and outputs achieved.
- Annual plans/targets for routine and periodic maintenance in terms of budget allocations and kilometres, compared to expenditure and outputs achieved.
- Management capacity (organisation and systems in place, staffing, appropriate standards, standard documents, budget and expenditure).
- Road-sector policies, strategies and plans in place for the medium-to-long term.
- Stakeholder capacities and availability, including private consultants and contractors.
- Funding needed to preserve asset value of roads (condition) compared to funding available for maintenance.

At the same time, such data will be valuable to substantiate broader development planning in relation to PRSP, sector planning in other sectors, and comparison between different countries. Traffic data broken down into vehicle categories would be a good indicator of the usefulness of road infrastructure. If traffic

levels are increasing, more trucks on the move indicate greater economic activity, while more busses transporting passengers show higher social benefits. How this affects poverty levels can only be ascertained with authority by means of household surveys. The data mentioned above may be supplemented by additional relevant data collected by other institutions, such as the number of registered vehicles by type, transport tariffs charged etc. Computerised road-management systems can calculate the reduction in road-user costs as a result of the improved condition on specific road sections, when fed with road-condition information and traffic data. Reduced road-user costs do not necessarily translate into lower transport charges. That depends on competition in the sector. For the farmers to benefit from better roads, transporters need to operate in a competitive environment.

This leads to the following *summary of key indicators* relevant to Danida RSPS:

Typical *outcome indicators for components investing* in improvement of a section of road will be:

- Quality of road, expected to go from bad to good in condition survey (can be easily reported by the partner's management system and followed for a number of years to check sustainability).
- Traffic level (can be reported by the partner's management system, especially on important roads in the network, and can be followed over several years to see if there is an upward trend, serving as a proxy indicator of development (impact) in the area).

Typical *output indicators* for the same section of road will be:

- Kilometres of road rehabilitated to the specified standard, possibly compared to the target for the relevant year and for the 5-year RSPS (this information is entered into the management system, and is therefore easy to make available for Danida, as long as funding is earmarked for specific investments).
- Number of bridges constructed, compared to target, if defined.

Typical *outcome indicators for institutional components* could be:

- Management system established by means of the RSPS is producing good and up-to-date reports each year after its launch (can be verified by reports produced).
- Management system are being actively used for planning, budgeting and monitoring (this is a higher-level outcome, indicating that the good reports are being actively used).
- Quality of roads maintained or improved (this is at an even higher level, which is not entirely in the hands of the institution responsible for management, because funding is likely to depend on others, and may not be forthcoming).

Typical *output indicators for institutional components* could be:

- Management systems tested and adapted to local conditions (output from consultant).
- Responsible institution trained in use of the system (completed with tests and certificates).
- System firmly established and run by institution without outside assistance (the two outputs mentioned above are likely to be finalised in the first year or two, depending on complexity, while this output may take several years of practical work, getting all inventories updated and becoming familiar with the system, while receiving short-term TA for additional training, validation of data, adjustments in computer programmes, etc. Consequently, this output may be anticipated 3-5 years into the RSPS).

## 6. How can Danish RSPS strengthen appropriate data systems?

As a key conclusion, there is a need to raise the quality and quantity of data required for road-sector management in partner countries, and donors should align the monitoring and indicators of their support programmes to such national sector data. Through initiatives like the one for transport in Africa, taken by AU-UNECA and supported by SSATP, improvements in data can be expected in the coming years. However, carrying out the proposals to this effect requires financing. Donors should allocate part of their road-sector support to this area.

Danida has gradually moved towards strengthening national road-management systems. In Nicaragua, Danida financed establishment of a Pavement Management System (PMS) covering about one third of the total road network in the country. PMS is now assisting both the Road Fund and the Ministry of Transport and Infrastructure in prioritising maintenance interventions. The data inventory, including road history, design criteria and updated traffic figures, has also proven valuable for feasibility studies to substantiate the planning of rehabilitation and other road investments.

In Uganda, Danida supported the testing and development of a simplified 'District Road Management System' (DROMAS). The system includes GPS mapping of all district roads, condition data, etc. It has now been adopted as the national management system for district roads, and has caught the attention of Tanzania and Zambia, where the same model is now being tested and adapted in a Danida-funded intervention.

In Ghana, a new sub-component of transport indicators and databases was formulated in October 2005, under the institutional component of Danida's RSPS. This is the most comprehensive attempt to date to support the establishment of national data systems in the transport sector. The sub-component falls under the Research Statistics and Information Management (RSIM) Division of the Ministry of Road Transport. This division participates in the SSATP and AU Transport Indicators Initiative, which is now into its second cycle. This also involves the Ghana Statistical Service, which is the government agency responsible for the collection and dissemination of statistical information for the planning and monitoring of economic and social infrastructure. This is a good example of synergy between a broad initiative covering many countries (basket-funded by several donors) and bilateral Danish support for concrete implementation at the country level.

## 7. Conclusions on Danish support for road-sector monitoring

At the *international level*, on-going efforts by the World Bank, EU, the African Union, SSATP and others to streamline and support relevant data collection should be encouraged by Danida representatives to contact groups, and be financially supported by continued Danish contributions to programmes such as SSATP.

At the *country level*, Danida should continue to participate actively in donor harmonisation and alignment related to the establishment of national and decentralised systems of road-sector data collection that are relevant to manage the sector efficiently, and to substantiate general planning and information within the sector.

At the *RSPS level*, Danida should continue to assist in testing and establishing appropriate road-management systems at the national and local-government level. Such systems will typically include, as a minimum, GPS mapping of the roads under national authorities and each local government, recording the various road-design standards and pavement categories, such as asphalt, surface-dressed, gravel, and earth. The mapping and statistical base will include information on the length in kilometres of each standard and pavement category. With modern techniques, road maps can easily be combined with maps of demographic aspects, agricultural land, environmental concerns, power lines, location of schools, health centres, etc. This will facilitate improved planning at the local and national level.

Once the basic road inventory is available, the assets are known and can thus be managed wisely with a view to delivering long-term continuous services (outcome) at the expected quality. In order to monitor this, information is needed about wear and tear and other types of deterioration, which are bound to occur. For that reason, condition surveys must be carried out periodically, at least annually. This data is entered into the road-data maps as an additional layer of information, which will enable monitoring over time of the service quality of roads. In aggregate terms, this will allow calculation of the percentage of roads in good, fair and bad condition. For the various road sections, traffic data should be collected or estimated to obtain an idea of the benefits of road services. This information is, in turn, used to plan the optimal strategy for maintenance and investment in rehabilitation and upgrading. Maintenance and investment can thus focus on preserving the asset value of the roads. Ideally, this value should even increase over time to cope with the growing demands arising from social and economic progress.

Not least for alignment purposes, Danish RSPS should continue to support the establishment of appropriate road-management systems (the tools) and the training and capacity development of institutions responsible for management. This will enable all stakeholders (users, government, and donors) to get the most important information from one source, and will reduce the donors' need to collect their own information for monitoring. Accordingly, it will greatly facilitate alignment.

As long as Danish RSPS involves earmarked funding of certain institutional interventions and investments, outcome and output indicators should be carefully selected to coincide with those indicators and data that are readily available from existing management information systems, or will be available when such systems are established.

Finally, Danida's internal use of indicators should be consistent. This means that indicators reported in the Review Aide Memoires must be taken from those in the RSPS documents, either in full, selectively or in aggregated versions. This also applies to Annual Business Agreements (VPA) between the embassies and Danida HQ, i.e. VPA indicators should be selected among the indicators in RSPS documents.

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