

Road Cost Knowledge System (ROCKS) Updated Manual

In 1999, the Transport Unit of the World Bank Group (WBG) first developed the Road Costs Knowledge System (ROCKS), an empirical study of road-related projects completed by the WBG. The study was designed to obtain average and range of unit costs based on historical data that could improve the reliability of new cost estimates and reduce the risks generated by cost overruns. The Transport Unit last updated the study in 2008. The database of the original ROCKS exercise contained more than 3,000 records covering 89 low and middle-income countries. Key features of this database include:

- A classification of the road works in categories of work type (e.g. new road construction, resurfacing, routine maintenance, widening, etc.);
- The estimated and actual unit costs of the road works defined as costs per km and per m²;
- The estimated and actual length of works executed; and
- The primary details of each project (e.g. country, date, currency, pavement width, terrain type, etc.).

To allow comparability, all costs are brought to a single currency (the US dollar) and converted using the exchange rate of a reference year (the year 2000).

Over the last year, the *Doing Business* team updated the ROCKS database by adding more recent data. The team analyzed all WBG-financed projects with a road component that were completed between the years 2000 and 2017, and extracted information on project cost, length and duration from Project Appraisal Documents, Contracts and Completion Reports. This update led to the inclusion of more than 150 new projects (approximately 1,800 records) in over 70 countries.

The team complemented the upgrade by also including road-related projects from the African Development Bank and the Asian Development Bank. A total of 20 projects (48 records) financed by these multilateral development institutions throughout 16 countries were added. These projects were completed between the years 1998 and 2017. The Asian and African development Banks publish their project documents on their websites. These sources were used to identify the 20 road-related projects which documents are comprehensive, and from which key variables needed for the analysis could be extracted.

The projects data resulting from the ROCKS upgrade is categorized as follows:

- Country in which each project is carried out;
- Type of road works done (e.g., rehabilitation, new highway construction, routine maintenance, etc.);
- Road sections or components: A road section is one where the starting and finishing points of the works executed on one road is defined (i.e., works are carried out from points A to B of a road). A road component is made up of a package of multiple road sections. The scope of a project can cover multiple road components and sections, as well as different work types. Evaluating data at the sectional level provides better accuracy in the data analysis.
- Cost of the works:

- . Types of cost: Cost estimated at project appraisal, actual cost at project completion, and - when available, contract cost at contract signing);
- . Ratios of cost: Actual unit cost to estimated unit cost ratios are available by country, project, road component and road section (e.g., a road section estimated to cost US\$100,000/km, but that ends up costing US\$70,000/km has a unit cost ratio of 70%);
- . The maximum, minimum and average unit cost per km and m² of road works can also be generated.

- Length of the works:

- . Ratios of the number of km on which the works are executed: Actual length to estimated length ratios are available by country, project, road component and road section (e.g., a road section projected to cover 10 km at the planning phase, but ends up covering 7 km has a length ratio of 70%).

Finally, to complement the quantitative analysis, the upgraded analysis describes the main reason for divergence between actual and estimated length and/or unit cost - whenever such ratio is an outlier (i.e., the ratio is less than 50% or greater than 150%). The reasons for divergence are characterized per the following 10 categories:

Source	Reason	Examples
External factors	1. Macroeconomic conditions	Changes in input prices; fluctuations in exchange rate
	2. Political events	Election; coup d'état; nation-wide referendum; lack of security in project areas
	3. Weather shocks	Natural disasters (flooding, landslide, cyclone ...)
Counterpart government	4. Procurement system	Procurement laws and regulations and their implementation
	5. Administrative processes	Burdensome approval process that requires 40 signatures
	6. Capacity	Staff/skill/budgetary constraints; lack of understanding of the WB rules
Contractor	7. Capacity	Technical/financial/managerial/human capital constraints
Market structure	8. Competition	Lack of competition in the construction sector, which leads to less bidders and higher costs
WB – project design and implementation	9. Quality of estimates/planning	Poor/insufficient cost estimates and capacity assessment; allocation of contingencies, land acquisition and resettlement; renegotiations
	10. Change of project scope	Project components or sections added/dropped/changed during implementation (length, materials, scope of work...)