March 2026

DATA USE MANUAL

A Guide to Turning Infrastructure Data into Actionable Insights

Infrastructure Transparency Initiative

Abbreviations

CoST	CoST – the Infrastructure Transparency Initiative
CoST IDS	CoST Infrastructure Data Standard
IAD	Infrastructure Analytical Dashboard
IPPI	Information Platform for Public Infrastructure
KADPPA	Kaduna State Public Procurement Authority
KPI	Key Performance Indicators
MSG	Multi Stakeholder Group
PDF	Portable Document Format
OC4IDS	Open Contracting for Infrastructure Data Standard
OCDS	Open Contracting Data Standard
OCP	Open Contracting Partnership
SDG	Sustainable Development Goals
WIN	Water Integrity Network

Glossary

Data: Raw, unprocessed facts that require context to be meaningful. When data is accessible, usable, and shareable by anyone, it is referred to as open data.

Data completeness: Extent to which required data fields are populated within a dataset and available for analysis, either across the full project cycle or by project phase.

Data quality: Degree to which data is accurate, consistent, timely, and fit for its intended use.

Disclosure completeness: Proportion of required data fields that are disclosed or made available upon request in accordance with defined standards (e.g., OC4IDS), either across the full project cycle or disaggregated by project phase.

Information: Data that has been processed and organised to provide meaning and value.

OC4IDS required fields: Data fields designated as necessary to meet disclosure requirements, in line with the OC4IDS.

Project-level KPIs: Quantitative measures that assess whether an individual infrastructure project is delivered as planned, in accordance with its approved scope, budget, and schedule.

Risk indicators: Specific signals derived from project data that are statistically or empirically associated with a higher likelihood of delivery, fiduciary, or integrity problems.

Trend indicators: Aggregated analyses of KPIs and other indicators over time, such as investment, budgeting, procurement, and transparency, across multiple projects, agencies, or sectors, used to identify patterns and changes in performance.

Contents

1 Introduction

1.1 COST'S PURPOSE AND APPROACH

The purpose of CoST – the Infrastructure Transparency Initiative (CoST) is to contribute to improving performance in the procurement[1] of public infrastructure by identifying, highlighting, and helping address the risks of inefficiency, mismanagement, and corruption. Good performance in this regard means the achievement of value for money by procuring:

- **the right infrastructure** (requiring effective planning), through
- **fair processes** (requiring effective tender management), that deliver
- **infrastructure as contracted** (requiring effective contract administration), that results in
- **relevant service provision** (requiring effective stakeholder engagement)

In working towards its vision of quality infrastructure, stronger economies, and better lives, CoST enables a multi-stakeholder approach to the publication, validation, and use of infrastructure data. This improves transparency, participation, and accountability and contributes to the delivery of high-quality infrastructure that meets people's needs.

This approach finds practical expression through four pillars: data publication, independent review, multi-stakeholder working, and social accountability. These provide a global standard for enhancing infrastructure transparency and facilitating accountability. Whilst the standard is universally applied by CoST members in low-, medium-, and high-income countries, it is adapted to suit different political, economic, and social contexts.

a. Publication of data

It is the disclosure of data from infrastructure projects, i.e., making that data publicly available. Data is published by procuring entities at key stages throughout the entire project cycle in the Open Contracting for Infrastructure Data Standard (OC4IDS) or CoST Infrastructure Data Standard (CoST IDS) format. These ensure that data on the purpose, scope, costs, and execution of infrastructure projects is open and accessible to the public, and is published in a timely manner. Specified data points or 'elements' defined in these standards relate to the identification, preparation, completion, operations, maintenance, and decommissioning of projects, as well as the tender management and implementation stages of constituent projects.

b. Independent review[2]

This process validates the accuracy and completeness of the published data and turns it into compelling information, highlighting issues of concern and areas of good practice. It entails communicating issues both visually and in plain language. Making it easier for all stakeholders to be aware of what is happening strengthens accountability mechanisms and allows decision-makers to be held to account more readily.

c. Multi-stakeholder working

To be trusted by all parties, the above activities related to the publication of data and independent review must be seen to be independent. Multi-stakeholder working brings government, the private sector, and civil society together in a concerted effort to pursue the common goal of improving transparency and accountability in public infrastructure. This is typically achieved through a multi-stakeholder group (MSG)[3] where each set of stakeholders has an equal voice in leading a CoST member following accepted principles. Decisions made by the MSG that are then implemented by a CoST member secretariat[4].

d. Social accountability

Stakeholders such as the media and civil society play an important role in holding decision-makers to account. Social accountability refers to efforts to ensure that published data and independent review reports are taken up and used by stakeholders, especially civil society and the private sector, to strengthen accountability and deliver practical improvements. Building on the foundation laid by the publication of data and accountability, CoST can provide training in the most constructive and effective ways to use those resources.

[1] Procurement is not limited to tender management, but refers to the whole process of creating, managing, and fulfilling contracts. This is consistent with the CoST approach of taking an interest in all stages of contract and project cycle.

[2] This process was known previously as 'Assurance'.

[3] In some circumstances, particularly in high-income countries, it may be possible for effective multi-stakeholder working to be achieved without the establishment of a tailor-made CoST MSG. However, for the purposes of this Manual, it is assumed that an MSG has been established.

[4] Referred to in the remainder of this document as simply "the Secretariat". In contrast, the CoST International Secretariat is referred to as "the International Secretariat."

Some CoST members may at times choose to engage directly with intended beneficiaries rather than simply with relevant civil society organisations. This can further extend awareness of the results of the CoST independent review, while helping to clarify the effectiveness or otherwise of established systems and procedures for community engagement in project planning, preparation, and implementation.

1.2 DATA USE

The OC4IDS data creates value when it is used systematically. For instance, infrastructure data can be used to monitor Key Performance Indicators (KPIs) at the project level, to perform trend analysis through Infrastructure Analytical Dashboards (IAD) that explain how the system is behaving, and to identify risk indicators using red-flag systems that highlight where action is required. When used together, these tools enable OC4IDS to support better decision-making, stronger oversight, and improved infrastructure outcomes.

OC4IDS data use is most effective when the following elements are applied in sequence and in combination:

- **KPIs** identify *what* is happening at the project level
- **Trends** explain *how* the system is behaving over time
- **Risk indicators** determine *where* and *when* action is required

By structuring data analysis around KPIs, trends, and risk indicators, the OC4IDS moves beyond data publication and turns data into action. It becomes a practical management and governance tool that supports better project delivery, stronger oversight, citizen monitoring, independent review and policy and systems improvements.

1.3 PURPOSE AND STRUCTURE OF THIS MANUAL

The primary purpose of this manual is to provide guidance for translating published data into improved monitoring, reporting, and decision-making processes.

A secondary objective is to support users in interpreting infrastructure data. Such users may include contract monitors, journalists, oversight authorities, independent review professionals or evaluator teams applying the CoST Independent Review Manual (Volume 1 and 2) or the CoST Infrastructure Transparency Index Manual.

This manual is structured around four main chapters:

Chapter 2 defines project-level Key Performance Indicators (KPIs) with mappings to data fields, including new modules for environmental, social, economic and institutional sustainability, as well as for tracking climate finance infrastructure projects, providing an example of how this helps procuring entities with monitoring and reporting.

Chapter 3 explains trend analysis methods and guides on developing Infrastructure Analytical Dashboards (IAD), with examples of how OC4IDS publishers have been applying this feature to use published data.

Chapter 4 catalogues risk indicators and describes how to implement red flag systems for early warning, providing an example of such a system.

Chapter 5 explores how data use relates to other CoST pillars.

The chapters reference various tools and resources. Annexes provide supporting tools, documented use cases, and guidance on developing new use cases.

2 Monitoring Key Performance Indicators (KPIs)

2.1 DEFINITIONS AND CHARACTERISTICS

Project-level KPIs are quantitative measures that assess whether an individual infrastructure project is delivered as planned, in accordance with its approved scope, budget, and schedule. KPIs provide a snapshot of project-level performance at a given point in time. However, **KPIs alone do not explain *why* performance is good or bad, nor do they indicate whether observed issues are isolated to a single project or reflect systemic patterns**.

The main characteristics of KPIs are that they are calculated on a per-project basis, compared against planned or baseline values, and do not imply risk or wrongdoing.

2.2 USING OC4IDS DATA FOR THE PROJECT AND CONTRACTING PROCESS MONITORING

OC4IDS data helps track and report on projects, compare performance and support accountability by measuring outcomes and efficiency at the level of a single project or contracting process.

OC4IDS publishers can use infrastructure and procurement data, where available, to monitor project performance using KPIs specific to each project phase. The KPIs below are just examples; **Annex 2** presents a comprehensive list of indicators, ordered by project phase and category, with calculation methods to facilitate their implementation in the reporting and monitoring sections associated with infrastructure data publication platforms.

2.2.1 Identification and preparation phases

OC4IDS enables procuring entities, for instance, to track timelines between project phases and completeness of data and information required for adequate project preparation, as shown in **Tables 1** and **2**.

DEFINITION	**The time taken between project identification and formal budget approval.**	
CALCULATION	Preparation Duration = $t_{\text{budget approval}} - t_{\text{project start}}$	
DATA FIELDS REQUIRED	**Project start date**	*identificationPeriod.startDate*
	Project budget approval date	*Budget.ApprovalDate*
EXPLANATION	This indicator provides a snapshot of the time required to move from project identification to tender management.	

Table 1. Project lead time

DEFINITION	**The extent to which key project information is disclosed at the planning stage.**	
CALCULATION	Scope Completeness (%) = $\frac{N_{\text{fields completed}}}{N_{\text{required fields}}} \times 100$	
DATA FIELDS REQUIRED	**Project description**	*project.description*
	Sector classification	*project.sector*
	Project location	*project.location*
	Purpose	*project.purpose*
	Project scope	*document with .documentType of 'projectScope'*
EXPLANATION	This indicator measures whether sufficient information is available to understand the project scope.	

Table 2. Project scope disclosure completeness

2.2.2 Tender management phase

Using OC4IDS project-level data and contracting process-level data, procuring entities can monitor, for instance, the estimated budget accuracy as shown in **Table 3**.

DEFINITION	**The difference between the planned budget estimate and the award value of the contract (s) (design, supervision, works).**	
CALCULATION	$\text{Budget Accuracy} = \frac{\textit{Total Award Value - Estimated Budget}}{\textit{Estimated Budget}} \times 100$	
DATA FIELDS REQUIRED	**Planned budget estimate**	*budget.amount*
	Awarded contract value	*contractingProcesses.summary.contractValue*
EXPLANATION	This indicator measures the accuracy of cost estimation during the planning phase by comparing the project budget with the actual contract award value[5].	

Table 3. Estimated budget accuracy

2.2.3 Implementation

OC4IDS records of modifications to contract duration, scope, and value enable procuring entities to track changes, for instance, an increase in contract value after award, as shown in **Table 4.**

DEFINITION	**The percentage change in contract value after award, resulting from contract amendments, relative to the original awarded contract value.**	
CALCULATION	$\text{Cost Variation} = \frac{\textit{Final Contract Value - Awarded Contract Value}}{\textit{Awarded Contract Value}} \times 100$	
DATA FIELDS REQUIRED	**Original contract value**	*contracts.value.amount*
	Contract amendments	*contractingProcesses.summary.modifications.id*
	Updated contract value	*contractingProcesses.summary.contractValue and contractingProcesses.summary.finalValue*
EXPLANATION	This indicator measures the extent to which contract values change after award due to amendments or modifications.	

Table 4. Cost variation after award

2.2.4 Completion

With OC4IDS data, procuring entities can calculate value for money KPIs, such as cost overruns and time overruns, as shown in **Tables 5 and 6**:

DEFINITION	**Percentage difference between the final project cost and the originally approved project budget.**	
CALCULATION	$\text{Cost Overrun} = \frac{\textit{Final Project Cost - Original Budget}}{\textit{Original Budget}} \times 100$	
DATA FIELDS REQUIRED	**Original approved budget**	*budget.amount*
	Final project cost	*completion.finalValue or total contract values*
EXPLANATION	This indicator measures the extent to which actual project costs at completion deviate from the originally approved budget.	

Table 5. Cost overruns

[5]This indicator is best calculated once all contracts have been awarded.

DEFINITION	**The percentage difference between the actual project duration and the originally planned project duration.**	
CALCULATION	$\text{Time Overrun} = \frac{\textit{Actual Project Duration - Planned Project Duration}}{\textit{Planned Project Duration}} \times 100$	
DATA FIELDS REQUIRED	**Planned project duration**	*period.endDate - period.startDate*
	Actual project duration	*period.startDate - completion.endDate*
EXPLANATION	This indicator measures the extent to which the overall project duration deviates from the original plan	

Table 6. Time overruns

2.2.5 Operations and maintenance

With OC4IDS data, procuring entities can calculate KPIs during the operation and maintenance of assets, such as deviation of the maintenance costs considering what was planned and what is actually occurring, as shown in **Table 7**:

DEFINITION	**The percentage difference between actual maintenance costs and planned lifecycle maintenance costs.**	
CALCULATION	$\text{Maintenance Cost Deviation} = \frac{\textit{Actual Maintenance Cost - Planned Maintenance Cost}}{\textit{Planned Maintenance Cost}} \times 100$	
DATA FIELDS REQUIRED	**Planned maintenance cost**	*project.budget.amount with type set to 'maintenance' or budget.budgetBreakdown with description set to 'maintenance' or 'operation'*
	Actual maintenance cost	*project.completion.finalValue*
	Project type	*type is set to 'maintenance'*
EXPLANATION	This indicator measures the accuracy of lifecycle cost planning, either understating or overstating maintenance costs.	

Table 7. Maintenance cost deviation

2.2.6 Decommissioning (disposal)

With OC4IDS data, procuring entities can calculate KPIs, such as time overruns, as shown in **Table 8**:

DEFINITION	**The percentage difference between the planned and actual duration of the decommissioning phase.**	
CALCULATION	$\text{Decommissioning schedule deviation} = \frac{\textit{Actual Decommissioning Period - Planned Decommissioning}}{\textit{Planned Decommissioning Period}} \times 100$	
DATA FIELDS REQUIRED	**Planned decommissioning period**	*decommissioningPeriod*
	Project type	*type is set to 'decommissioning'*
	Actual decommissioning period	*period*
EXPLANATION	This indicator measures implementation efficiency at the end of asset life, commonly known as asset disposal.	

Table 8. Decommissioning duration deviation

2.2.7 During the entire project cycle

KPIs related to transparency and data completeness can be monitored at every phase of the project cycle by checking the number of completed data fields. Procuring entities can demonstrate compliance with formal disclosure mandates, including the transparency and access to information regulatory framework, as shown in **Table 9**.

NAME	DEFINITION	DATA FIELDS REQUIRED	RATIONALE
Data publication completeness	Share of required OC4IDS fields that are populated.	*Field presence checks per project phase*[6]	Data publication is a prerequisite for accountability.
Update timeliness	Time lag between a project event and its publication.	*Event dates vs publication dates*	Late publication of data reduces its value for monitoring.

Table 9. Transparency and data completeness KPIs

2.3 USING THE OC4IDS SUSTAINABILITY MODULES DATA

Sustainable infrastructure refers to projects that are planned, designed, constructed, operated, and decommissioned in a manner that ensures economic and financial, social, environmental (including climate resilience), and institutional sustainability throughout the project's life cycle[7].

To expand its assessment capabilities and enable procuring entities to explore specific areas of sustainability in greater depth, the OC4IDS includes optional data sets designed to capture the multidimensional value of infrastructure investments. The datasets are grouped into four areas of sustainable infrastructure: **environmental and climate resilience; social; economic and financial; and institutional dimensions**.

2.3.1 Environmental sustainability (including climate resilience)

Using the OC4IDS data from this module helps monitor environmental and climate resilience metrics in infrastructure projects, such as greenhouse gas emissions and disaster risk assessments, and understand the applicability of environmental mitigation measures associated with a project and its contracts. **Table 10** lists basic indicators applicable at the project and contracting processes levels.

NAME	DEFINITION	DATA FIELDS REQUIRED	IMPLICATIONS
Environmental impact assessment (EIA coverage) and category	Whether a project includes a disclosed environmental impact assessment.	*environment.impactCategories* *environment.hasImpactAssessment*	Indicates whether and how environmental risks were identified and assessed before implementation, as well as the category that reflects the magnitude of environmental impact.
Environmental mitigation measures defined	Whether environmental mitigation measures are specified in the project documentation.	*environment.climateMeasures* *environment.goals* *Linked contract documents*	Projects without defined mitigation measures are less likely to manage environmental risks effectively.
Climate risk assessment completed	Whether climate risks (e.g. flooding, heat, sea-level rise) are assessed for the project.	*documents.type of 'climateAndDisasterRiskAssessment'*	Indicates climate-related disaster risks in informed project design and planning.

[6]The required OC4IDS fields may be assessed on a phase-by-phase basis or across the full project cycle (considering all relevant fields).

[7] Inter-American Development Bank. 2019. "Attributes and Framework for Sustainable Infrastructure. Consultation Report." Washington DC: IDB. https://doi.org/10.18235/0001723

Climate adaptation measures specified	Presence of defined climate adaptation or resilience measures.	*environment.climateMeasures* *environment.goals*	Shows whether identified climate risks are translated into design or operational responses.
Emissions estimation reporting	Whether estimated greenhouse gas emissions are reported.	*metrics.title of 'Greenhouse gas emissions (carbon dioxide equivalent)'* *documents.type of 'ghgEmissions'*	Supports climate accountability and comparability across projects.

Table 10. Environmental sustainability (including climate resilience) KPIs

2.3.2 Social sustainability

OC4IDS data related to this module help determine whether projects meet social needs, encourage community engagement, manage land, implement resettlement measures, and uphold health and safety standards. **Table 11** includes some KPIs to tackle the social sustainability of infrastructure projects.

NAME	DEFINITION	DATA FIELDS REQUIRED	IMPLICATIONS
Social impact assessment coverage	Whether social impacts (e.g. resettlement, livelihoods, community effects) are assessed.	*document.documentType of 'socialImpact'* *social.landCompensationBudget*	Identifies whether and how social risks were considered before implementation.
Stakeholder engagement conducted	Whether stakeholder consultation or engagement activities are available.	*social.consultationMeetings*	Meaningful engagement reduces conflict and implementation delays and is a metric of accountable decision-making.
Grievance redress mechanism in place	Whether a grievance or complaints mechanism is defined.	*social.laborObligations.obligations of type 'grievanceMechanism'*	Provides accountability and early conflict resolution channels.
Land acquisition disclosure	Whether land acquisition requirements are disclosed.	*social.landCompensationBudget* *documents.documentType of 'landAndSettlementImpact'*	Land issues are a leading cause of project delays and disputes.
Resettlement planning completeness	Whether resettlement plans are disclosed where required.	documents.documentType of 'resettlementPlan' or 'landAndSettlementImpact'	Indicates preparedness to manage the impacts of social displacement.
Worker's health and safety	Whether projects monitor labour conditions, such as accident and fatality statistics.	metrics.title of 'Worker fatalities' or 'Worker accidents'	Assess whether projects are protecting labour conditions and complying with basic safety standards.

Table 11. Social sustainability KPIs

2.3.3 Economic and financial sustainability

Using the OC4IDS data from this module helps determine whether projects generate lasting value by balancing short-term costs with long-term benefits. It also considers the short- and long-term fiscal and budgetary viability of projects. **Table 12** lists one basic indicator applicable at the project level.

NAME	DEFINITION	DATA FIELDS REQUIRED	IMPLICATIONS
Lifecycle sustainability considerations	Whether economic sustainability is considered across the asset lifecycle (construction, operation, maintenance).	*costMeasurements.lifeCycleCosting. value.amount* *maintenancePeriod* *budget.budgetBreakdowns. budgetBreakdown*	Helps understand viability and sustainability beyond construction to long-term service delivery.

Table 12. Economic and financial sustainability KPIs

2.3.4 Institutional sustainability

OC4IDS data for this module helps ensure that all infrastructure decisions are based on robust policies and reliable public data. **Table 13** includes KPIs to grasp the institutional sustainability of infrastructure projects.

NAME	DEFINITION	DATA FIELDS REQUIRED	IMPLICATIONS
Institutional role completeness	Whether all key institutional roles for a project are clearly identified.	*parties.roles of funder, publicAuthority, procuringEntity* *parties.name* *parties.id* *publicAuthority* *contractingProcesses.summary.tender. procuringEntity*	Clarity on the institutional ownership and roles of the project owner/public authority, the procuring entity, and the contracting authority.
Policy coherence	Transparency in the alignment of the project with existing plans and policies.	*policyAlignment.policies* *policyAlignment.description* *documents.documentType of 'policyAlignment'*	Supports analysis of strategic consistency, reduces the risk of fragmented or ad hoc investments, and strengthens accountability in project selection and prioritisation.

Table 13. Institutional sustainability KPIs

2.4 USING THE OC4IDS CLIMATE FINANCE DATASETS

The OC4IDS includes a module focused on climate finance data sets. It tracks investments that support mitigation and adaptation efforts, offering a comprehensive view of the financial landscape in this crucial area. More detailed guidance on the climate finance datasets is available here.

Table 14 presents selected KPIs to monitor infrastructure projects financed with climate funds.

NAME	DEFINITION	DATA FIELDS REQUIRED	IMPLICATIONS
Climate alignment identification	Whether a project explicitly identifies its climate objectives.	*environment.goals*	Climate relevance known or assessed, improving climate accountability and risks of climate finance misuse.
Climate finance source	Assesses the transparency of climate finance sources supporting the project.	*budget.finance.source* *contractingProcesses.summary.finance.source*	Indicate transparency in climate funding arrangements
Climate Instrument	Whether the financial instruments used for climate finance are published.	*budget.finance.type* *budget.finance.concessional* *budget.finance.resultsBased*	Supports assessment of concessionally and risk sharing.
Climate risk assessment disclosure	Whether climate risks are identified and available.	*documents.documentType of 'environmentalImpact' or 'climateAndDisasterRiskAssessment'*	Critical for resilience and long-term sustainability.
Climate finance disbursement	Measures the transparency of climate finance disbursements.	*transactions.source* *milestones.title* *milestones.status* *milestones.dueDate* *milestones.dateMet* *milestones.type* *milestones.value* *transactions.value* *transactions.payer* *transactions.payee* *transactions.relatedImplementationMilestone*	Could indicate risk of climate finance misreporting.
Impact measurement	Measures project results and alignment with planned climate objectives.	*documents.documentType of 'impactMethodology' or 'technicalAuditReport'*	Strengthens accountability for climate commitments and outcomes, and helps assess potential risks of climate finance misuse.

Table 14. Climate finance KPIs

The list of KPIs above is only indicative. The procuring entities should define the KPIs they are required to monitor or report to internal and external stakeholders, including the entities' heads, project owners, funding partners, or oversight bodies.

2.5 DEVELOPING AN AUTOMATED REPORT SYSTEM

Ideally, the selected KPIs should be incorporated into the publication platforms to enable automatic report generation.

One example is the reporting capability on the Kaduna State Public Procurement Authority (KADPPA) Disclosure portal in Nigeria (**Figure 1**). Each procuring entity can generate two types of reports directly from its management dashboard:

- A portfolio report (a full summary of their projects, budgets, procurement methods, and data quality scores); and
- A project audit dossier (a detailed Portable Document Format (PDF) for any individual project, covering its lifecycle, contracts, parties, documents, and compliance flags).

With this feature, procuring entities no longer need to request data extracts or wait for manually compiled reports. They can generate print-ready PDFs on demand at any time directly from their login section, as shown in **Figure 1**.

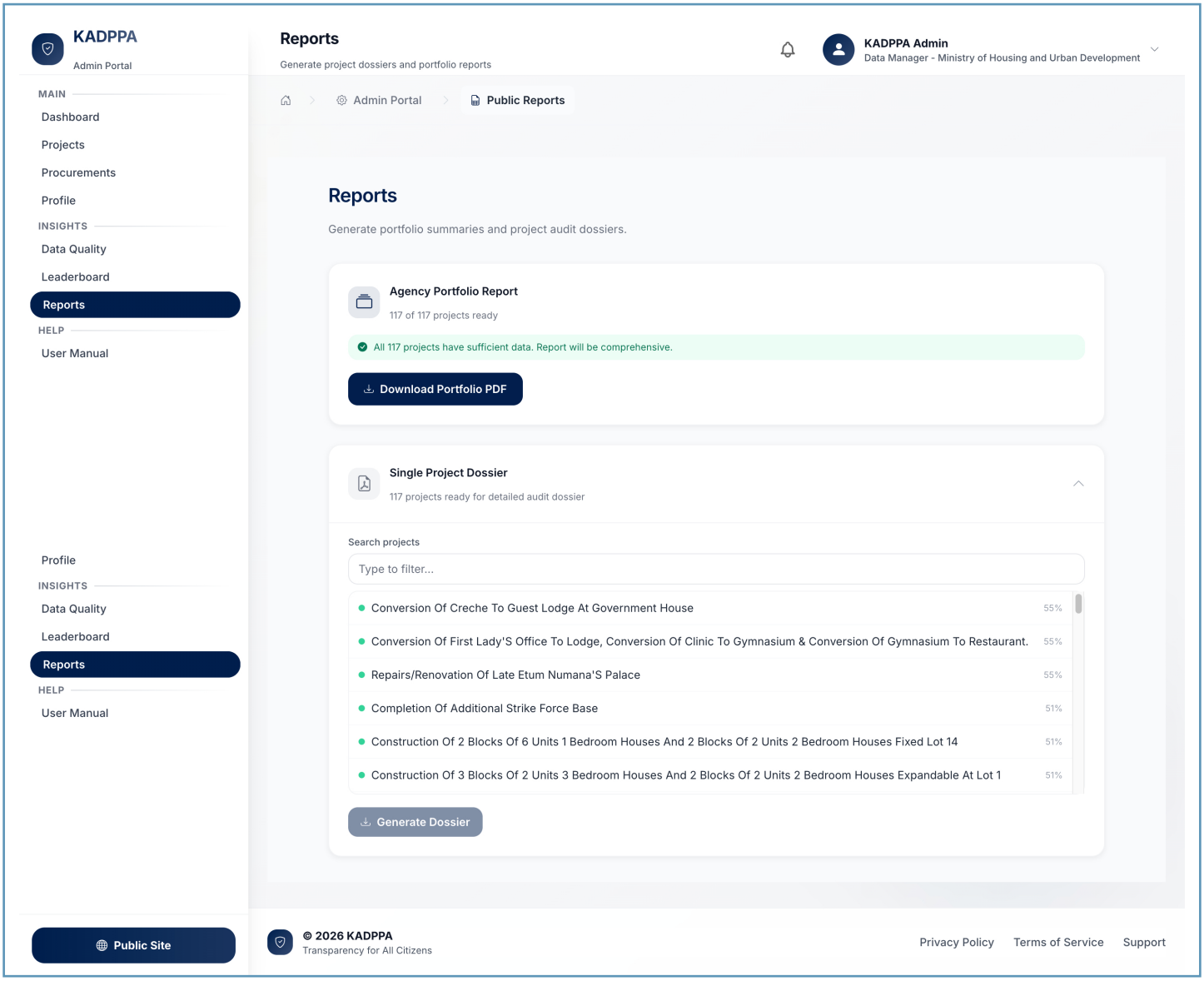


Figure 1. Overview of the automatic reporting feature in the KADPPA disclosure portal

3 Developing infrastructure dashboards for trend analysis

3.1 DEFINITIONS AND CHARACTERISTICS

Trends are aggregated analyses of key performance indicators and other indicators over time, across multiple projects, agencies, or sectors, used to identify patterns and changes in performance. Trends reveal behaviour that cannot be observed in individual projects. They help determine whether reforms are having the intended effect, whether one-off project failures stem from structural problems, or whether temporary shocks are masking persistent weaknesses. **However, trends do not, in themselves, indicate where immediate intervention is required**.

The main characteristics of trends are that they are based on groups of projects, time-based (e.g., annually or quarterly), explanatory rather than operational (i.e. they are used to explain how the system is performing, rather than to manage individual projects), and that analysis reveals systemic strengths or weaknesses that can inform decision-making.

3.2 USING THE OC4IDS DATA FOR TRENDS ANALYSIS PER PROJECT PORTFOLIO

OC4IDS data and, where available, procurement data can be used to assess whether performance is improving, deteriorating, or remaining stable across the project portfolio or over time. Using OC4IDS time-stamped data, trend analysis can help to examine, for instance:

- Investments trends
- Budgeting and funding trends
- Social impact trends
- Beneficial ownership transparency trends
- Procurement trends
- Time and delivery trends
- Transparency trends

OC4IDS publishers can use infrastructure and procurement data analysis to support policy and regulatory reform, institutional performance assessment, strategic planning, and capacity-building decisions by analysing common trends at project and contracting process levels. **Annex 3** presents a comprehensive list of trends by category, along with calculation methods to facilitate automated data analysis.

3.3 INVESTMENT TRENDS

Analysis of infrastructure investment trends can reveal important patterns in resource allocation, infrastructure activity by period, and government priorities (see **Tables 15** and **16** as examples). Together, these trends can provide a comprehensive view of how infrastructure investment evolves, from identification to completion.

DEFINITION	**How total infrastructure budgets change over time across the project portfolio.**
DATA FIELDS REQUIRED	*budget.amount* *period.startDate* *project.sector* (optional for disaggregation)
TREND QUESTIONS	● Is total infrastructure investment increasing, decreasing, or unchanging over time? ● Do certain sectors receive a growing or declining share of the total portfolio? ● Did major policy or fiscal reforms affect overall infrastructure spending?
IMPLICATIONS	Reveals trends in government investment priorities and fiscal commitment to infrastructure.

Table 15. Annual Infrastructure Investment

DEFINITION	**How the number of projects entering the infrastructure pipeline changes over time.**
DATA FIELDS REQUIRED	*id* *period.startDate* *project.sector* (optional for disaggregation)
TREND QUESTIONS	● Is the number of new projects entering the pipeline increasing or decreasing? ● Do certain sectors show stronger pipeline growth than others? ● Does pipeline growth align with national development strategies?
IMPLICATIONS	This trend indicates the strength and sustainability of infrastructure planning systems.

Table 16. Project Pipeline

3.4 BUDGETING AND FUNDING TRENDS

OC4IDS captures key planning-stage information, such as budget allocations and funding sources, allowing analysts to examine how planning practices evolve rather than treating them as isolated decisions.

Analysing budgeting and funding trends (See **Tables 17** and **18**) helps identify whether projects are systematically under-budgeted, whether fiscal discipline and risk management are lacking, whether gaps exist between planned budgets and actual allocations, and weaknesses in public investment management systems. These issues may not be visible at the level of individual projects but become clear when patterns are examined across portfolios or over multiple years.

DEFINITION	**Changes in the gap between initial budget estimates and actual costs at completion.**
DATA FIELDS REQUIRED	*budget.amount* *budget.approvalDate* *completion.finalValue*
TREND QUESTIONS	● Are initial-cost estimates becoming more realistic? ● Do some procuring entities consistently underestimate project costs? ● Did new appraisal requirements improve budget accuracy?
IMPLICATIONS	Shows whether appraisal processes are functioning effectively and areas where additional support and control may be required.

Table 17. Budget realism trends

DEFINITION	**Changes in funding sources and multi-year budget stability.**
DATA FIELDS REQUIRED	*budget.budgetBreakdowns.budgetBreakdown.sourceParty* *budget.budgetBreakdowns.budgetBreakdown.period* *budget.approvalDate*
TREND QUESTIONS	• Are projects increasingly reliant on single funding sources? • How often are budgets revised mid-project? • Does funding instability correlate with delays?
IMPLICATIONS	Funding instability is a common cause of implementation disruption.

Table 18. Funding stability trends

3.5 SOCIAL IMPACT TRENDS

Infrastructure investments generate not only economic outcomes but also significant social benefits. The OC4IDS enables the publication of data on key social indicators, such as the number of beneficiaries and jobs created for each infrastructure project. As a result, social impact trends (see **Tables 19** and **20** for examples) can be analysed and communicated to the public, helping to demonstrate how infrastructure investments translate into broader social outcomes alongside economic impact.

DEFINITION	**How the average number of beneficiaries per infrastructure project changes over time across the project portfolio.**
DATA FIELDS REQUIRED	*benefit.beneficiaries.numberOfPeople* *id* *period.startDate* *sector* (optional for disaggregation)
TREND QUESTIONS	• Is the average number of beneficiaries per project increasing or decreasing over time? • Are projects for the current fiscal year reaching more beneficiaries than earlier ones? • Do certain sectors deliver higher social reach per project?
IMPLICATIONS	Provides insight into the social reach and inclusiveness of infrastructure investments.

Table 19. Beneficiaries' trends

DEFINITION	**How the total number of jobs created by infrastructure projects changes over time across the project portfolio.**
DATA FIELDS REQUIRED	*metrics.title set to 'Jobs created'* *metrics.observations.measure* *period.startDate* (for time grouping) *sector* (optional for disaggregation) *id* (for project-level aggregation and counting)
TREND QUESTIONS	• Is the total number of jobs created by infrastructure projects increasing or decreasing over time? • Are newer projects generating more employment than earlier ones? • Do certain sectors consistently create more jobs than others?
IMPLICATIONS	Shows how infrastructure investment translates into employment outcomes over time.

Table 20. Jobs creation trends

3.6 BENEFICIAL OWNERSHIP TRANSPARENCY TRENDS

Infrastructure investments require strong transparency and accountability in the selection of contractors. The OC4IDS enables the publication of data on contractors, supported by documentation on the registration and ownership of firms. As a result, trends in the share of contractors with disclosed ownership (see **Table 21** as an example) can be analysed and communicated to the public to assess progress in transparency and identify potential integrity risks associated with undisclosed ownership structures.

DEFINITION	**How the share of contractors with disclosed beneficial ownership changes over time across infrastructure projects, based on the availability of ownership and registration information.**
DATA FIELDS REQUIRED	parties.beneficialOwners *documents.documentType = "registrationAndOwnership"* (to confirm supporting disclosure) *contractingProcesses[].summary.tender.datePublished* (for time grouping) *sector* (optional for disaggregation)
TREND QUESTIONS	● Are contracts being awarded to firms without disclosed ownership information? ● Is the share of contractors with disclosed beneficial ownership increasing over time? ● Do certain sectors have higher or lower ownership transparency?
IMPLICATIONS	Reflects the extent to which supporting documentation is published and accessible, strengthening trust in procurement processes.

Table 21. Contractors with disclosed ownership trends

3.7 PROCUREMENT TRENDS

Analysing procurement trends (See **Tables 22** and **23** as examples) helps identify how infrastructure projects are structured, whether competitive procurement is the norm or the exception, and whether deviations are justified or systemic. Repeated use of non-competitive procedures, weak justifications for exceptions (such as emergency procurement), or frequent post-award contract changes can indicate institutional weaknesses, market capture, or heightened integrity risks. These patterns are often invisible when projects are assessed individually but become clear through trend analysis.

DEFINITION	**Frequency, timing, and value of contract amendments over time.**
DATA FIELDS REQUIRED	*contractingprocesses.summary.modifications.id* *contractingprocesses.summary.modifications.date* *contractingprocesses.summary.modifications.newContractValue* *contractingprocesses.summary.modifications.oldContractValue*
TREND QUESTIONS	● Are amendments becoming more frequent and/or larger? ● Are amendments increasingly occurring late in implementation? ● Do some procuring entities amend contracts more than others?
IMPLICATIONS	Highlights systemic weaknesses in scope definition, risk allocation, or contract management.

Table 22. Contract amendments trends

DEFINITION	**How the number of contracts associated with each project changes over time across the project portfolio**
DATA FIELDS REQUIRED	contractingProcesses.id *period.startDate* *sector* (optional for disaggregation)
TREND QUESTIONS	● Are projects becoming more fragmented (more contracts) or more consolidated? ● Do certain sectors (e.g. transport vs buildings) systematically require more contracts? ● Are multi-contract projects associated with higher delays or cost overruns?
IMPLICATIONS	This trend provides insight into how projects are structured and delivered.

Table 23. Contracting activity per project

3.8 TIME AND DELIVERY TRENDS

Time and delivery trend analysis reveals how reliably infrastructure projects progress from planning to completion and whether delivery systems function as intended over time. Infrastructure projects are inherently complex, and delays rarely result from a single event. Instead, they emerge through concurrent patterns of missed milestones, slow decision-making, weak coordination, or ineffective contract management.

Analysing delivery trends (See **Tables 24** and **25** as examples) helps distinguish isolated delays from systemic problems. When similar projects, sectors, or procuring entities consistently experience schedule slippage, this points to underlying institutional or governance weaknesses rather than project-specific technical issues.

DEFINITION	**Explores changes in delivery delays across the project portfolio over time.**
DATA FIELDS REQUIRED	*period.startDate* *period.endDate* *Compare preparationPeriod.endDate with project.budget.approvalDate* *Compare planned completionPeriod.endDate with completion.endDate* *project.status*
TREND QUESTIONS	• Are projects being delivered faster or slower over time? • By comparing planned and actual completion, which delivery phase accounts for most delays? • Are reforms reducing average delay durations?
IMPLICATIONS	Indicates whether delivery capacity and coordination amongst units, departments and procuring entities are improving.

Table 24. Time overrun trends

DEFINITION	**How the average time from project start to completion changes over time across the project portfolio.**
DATA FIELDS REQUIRED	*period.StartDate* *period.EndDate* *completion.endDate* *sector* (optional for disaggregation)
TREND QUESTIONS	• Is the average project duration increasing or decreasing over time? • Are projects being completed faster in recent years compared to earlier cohorts? • Do certain sectors consistently experience longer project durations? • Did reforms (e.g. procurement, project management, or supervision) reduce delivery timelines?
IMPLICATIONS	Reveals whether project delivery efficiency is improving across the portfolio.

Table 25. Average/median Project Duration

3.9 TRANSPARENCY TRENDS

Transparency trend analysis is fundamental when using OC4IDS data because it shows whether openness in infrastructure investment is improving in practice, not just in policy commitments. While many governments adopt transparency rules or publish data at a single point in time, the real question is whether data publication becomes more complete, consistent, and timely over successive projects and over time.

Analysing transparency trends (See **Table 26**) helps distinguish between one-off data publication and sustained institutional practice. Patterns such as recurring gaps in planning documents, missing contract amendments, or incomplete payment data often point to structural weaknesses in transparency systems or limited institutional capacity.

Transparency trend analysis also supports accountability and reform. By identifying which types of information are consistently disclosed and which remain opaque, governments and development partners can target reforms, technical assistance, and system improvements more effectively. Over time, improvements in data publication trends can be linked to better oversight, reduced governance risks, and stronger public trust in infrastructure decision-making.

DEFINITION	**Changes in the completeness and timeliness of OC4IDS data publication.**
DATA FIELDS REQUIRED	• *Presence/absence of required fields* • *Update frequency*
TREND QUESTIONS	• Is data publication improving over time? • Which procuring entities consistently under-report? • Do improvements in data publication coincide with better performance?
IMPLICATIONS	Transparency trends often mirror institutional accountability and data maturity.

Table 26. Data completeness trends

To select the relevant trends for internal use by procuring entities, or trends that address areas of interest among different stakeholders, including oversight bodies, the private sector, civil society, the media, and citizens, OC4IDS publishers are encouraged to develop "use cases" before embarking on the task of developing Infrastructure Analytical Dashboards (IAD). This involves mapping user perspectives and identifying how each group might interact with the data visualisations, including the questions they want to address. **Annex 4** provides a guide for developing use cases, and **Annex 5** provides examples of OC4IDS use cases.

3.10 DEVELOPING INFRASTRUCTURE ANALYTICAL DASHBOARDS (IAD)

Several CoST members have implemented IADs to present trend analysis to a wider audience. By integrating analytics features, data platforms significantly enhance the accessibility and usability of infrastructure information. This strengthens a pillar of the CoST approach: equipping the public with clear, actionable insights that enable stakeholders to better understand infrastructure performance and hold decision-makers to account.

Examples include the IAD implemented by Sekondi Takoradi Metropolitan Assembly, which provides a comprehensive, interactive overview of infrastructure data across nine procuring entities. The dashboard aggregates key project- and contract-level data and transforms it into statistical summaries, infographics, and interactive visualisations, enabling users to examine expenditure patterns, delivery performance, and compliance with environmental and social requirements.

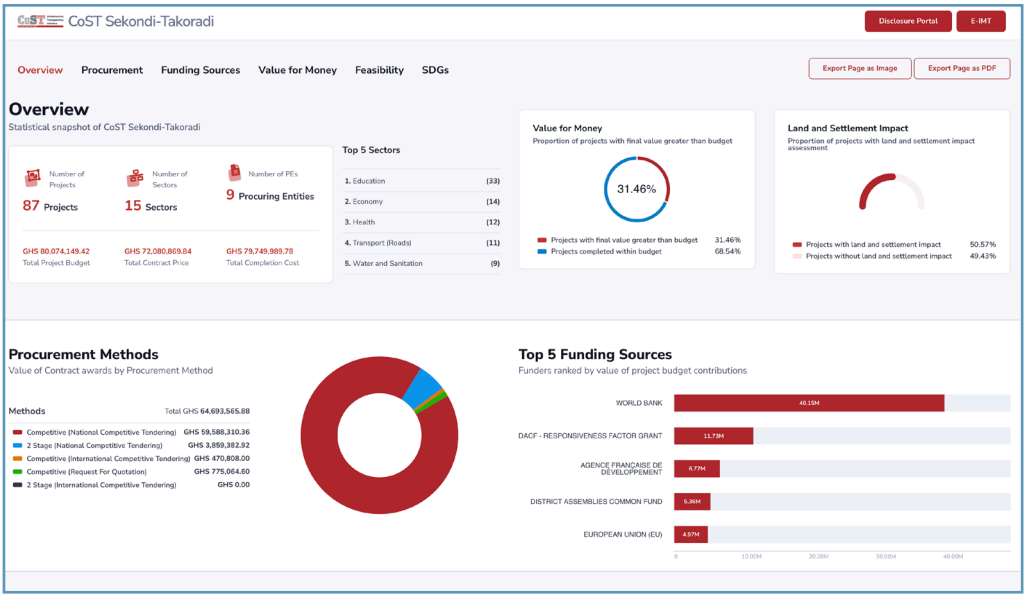


Figure 2. Overview of Sekondi-Takoradi IAD

Its core functionalities include displaying the five largest funding sources and identifying contractors associated with time and cost overruns. It highlights the most frequently used procurement methods, allowing users to understand the dominant approaches. In addition, the dashboard presents the proportion of projects that have conducted land and settlement impact assessments and environmental impact assessments.

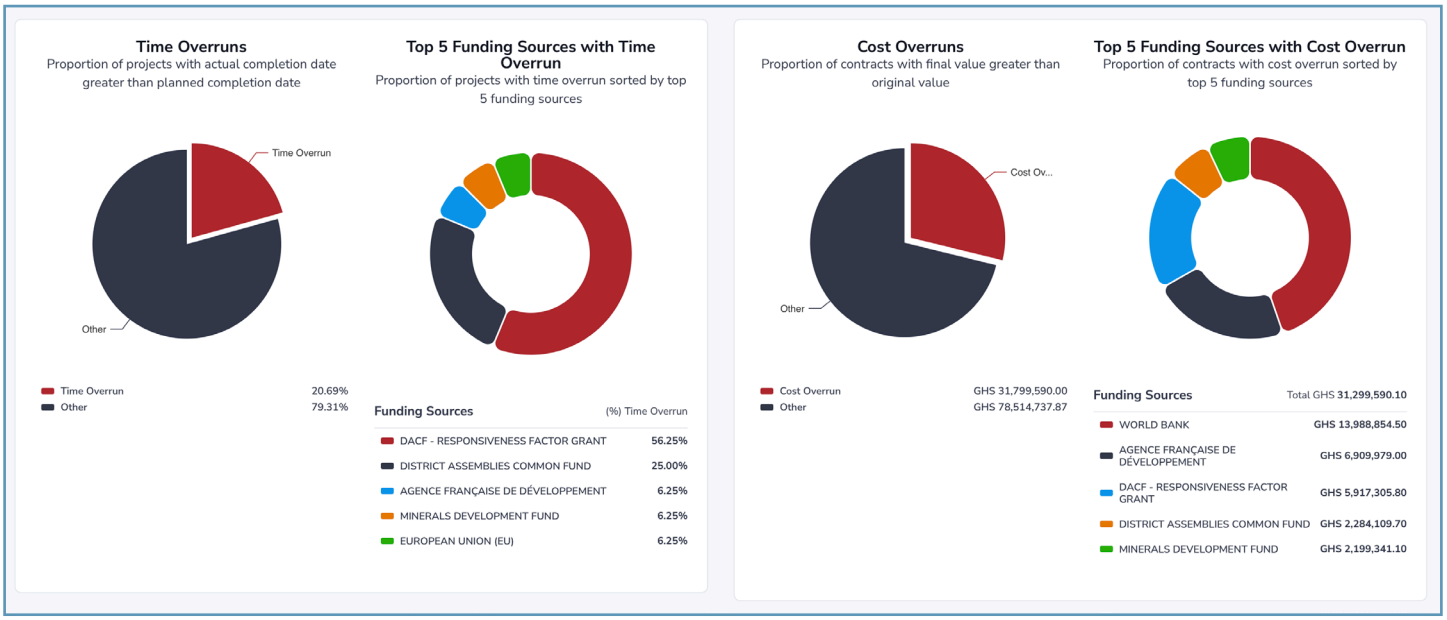


Figure 3. The five largest funding sources and contractors used by Sekondi-Takoradi IAD

It also identifies the proportion of projects that contribute to the Sustainable Development Goals (SDGs), providing insight into how the portfolio aligns with broader national and international development priorities.

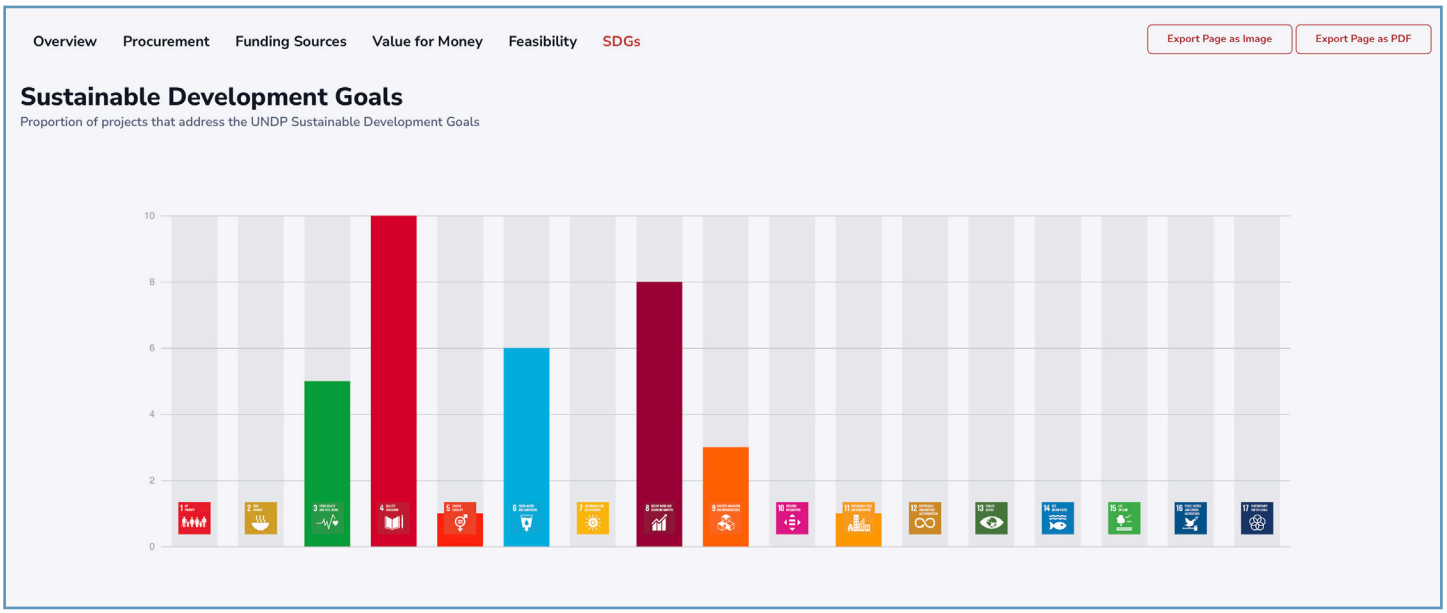


Figure 4. Sustainable Development Goals used by Sekondi-Takoradi IAD

Malawi offers an example of a set of data-visualisation tools built in the country's Information Platform for Public Infrastructure (IPPI). The dashboard enables users to view interactive summaries of all registered projects by status, project type, sector, implementing entity, funder, contractor, and geographic distribution (district-level mapping). Users can explore trends in project start dates, time overruns, contract counts, and the distribution of budgets and performance over time. The interface allows dynamic filtering, for example, by selecting a district on the map and viewing the characteristics of the projects in that region. The underlying raw data are also available for bulk download, enabling users to conduct their own analysis.

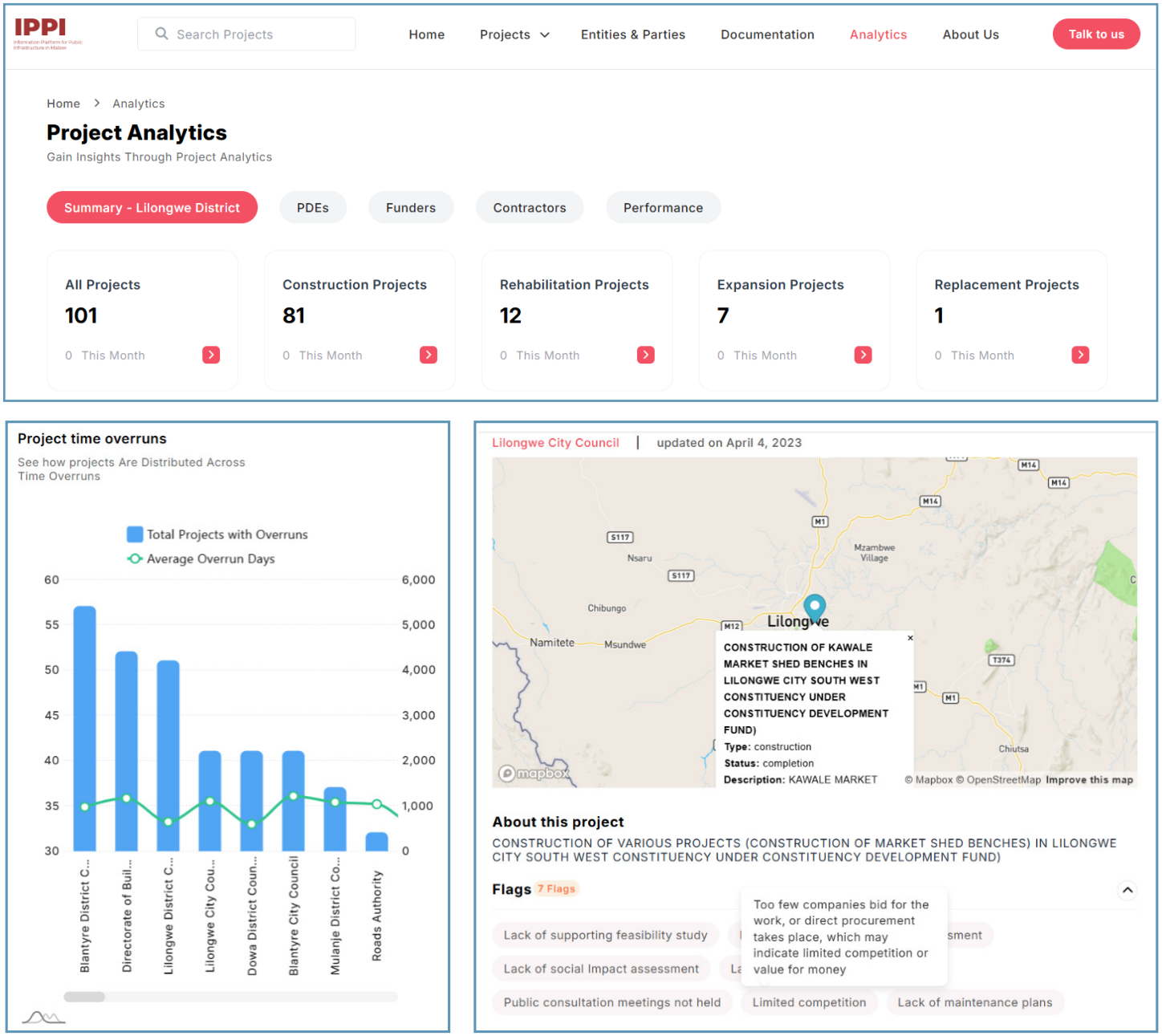


Figure 5. Overview of IPPI with the filter applied to Lilongwe District

3.11 PROBLEM-SOLVING DASHBOARDS

The ultimate purpose of IAD is to drive action; only by communicating the right data to the right people will the intended purpose be achieved. Before embarking upon a dashboard development process, it is important to be clear about the purpose, expressed in terms of the specific problems and areas of interest that the IAD is intended to address.

3.9.1 Areas of interest

IADs are useful when complex, categorised information is massive and broad, and typically spans different areas of likely interest. It may include financial, social and economic aspects, as well as procurement analytics and other key areas of interest.

An example of a financial and economic trends analysis is the IAD implemented by Sekondi-Takoradi. Using simple data points, such as the number of projects awarded, contract value and contract firm, Sekondi-Takoradi developed a set of charts to show an overview of the top five contractors and the most frequently used procurement methods. These types of charts enable private-sector companies to identify procurement trends and inform their bidding strategies, helping them target opportunities more effectively. At the same time, they provide procuring entities with valuable insights into supplier concentration, highlighting which top suppliers receive the largest share of public budgets and allowing for more informed oversight.

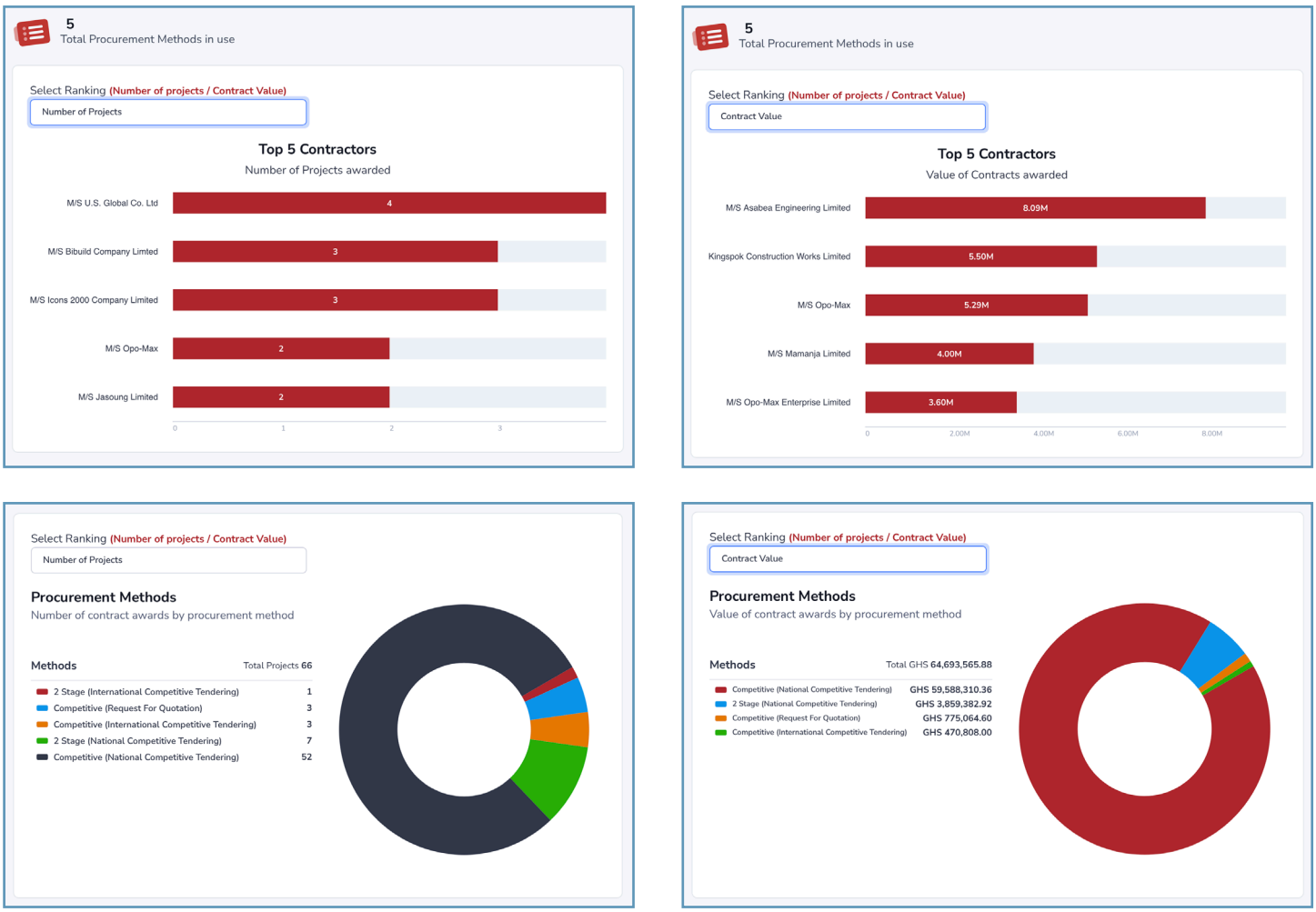
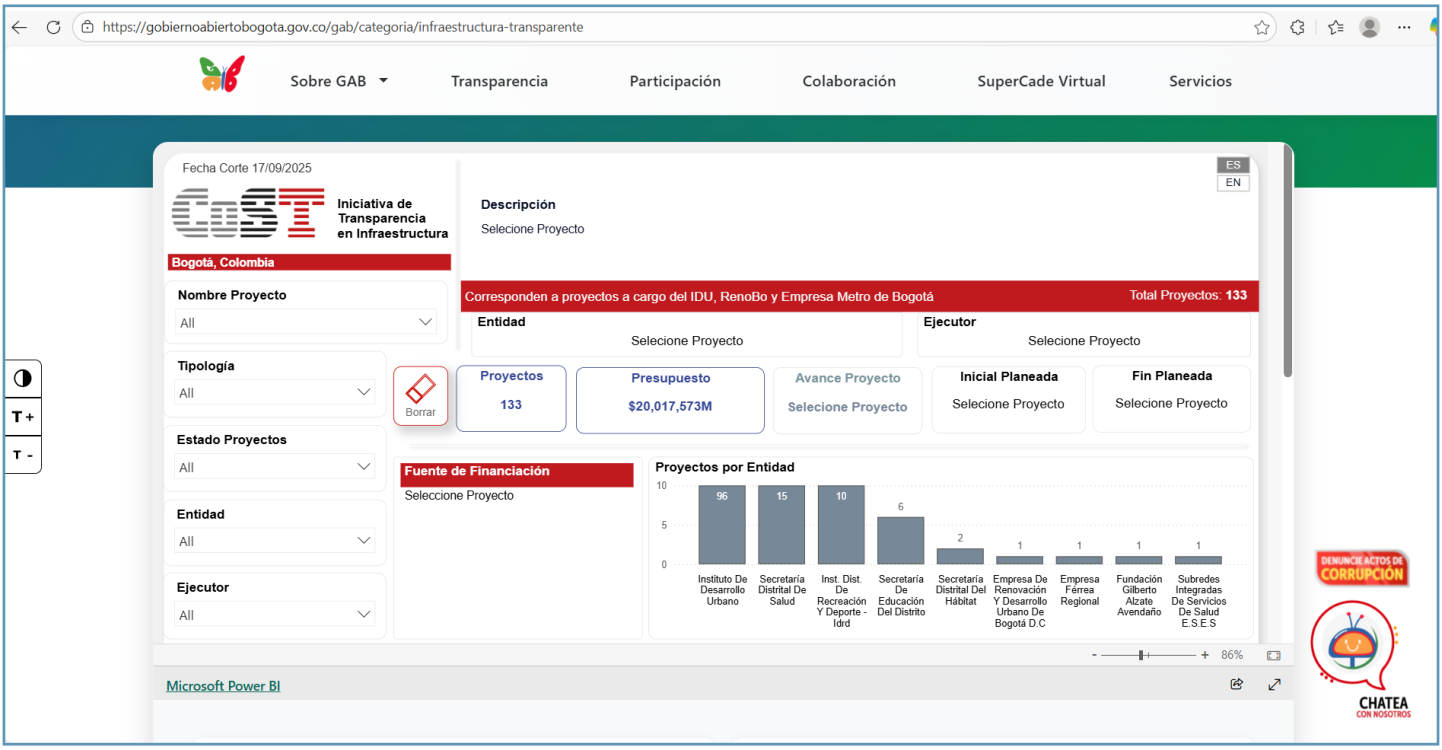


Figure 6. Example of financial and economic dashboards – Sekondi-Takoradi

The tools integrated into the City of Bogotá's portal provide another example of a financial dashboard. By comparing the percentage of physical progress with the percentage of disbursements for each project, the tools allow users to quickly identify cases where payments are lagging behind and potentially creating financial constraints for contractors. Timely payments are critical for maintaining contractor capacity and keeping projects on schedule, so delays in disbursements can cascade through project timelines. This analysis can provide valuable insight for both market contractors, who can better plan cash flow and resource allocation, and procuring entities, who can identify bottlenecks and take corrective action. The comparison of physical and financial progress is also combined to produce an overall physical-financial progress rate.



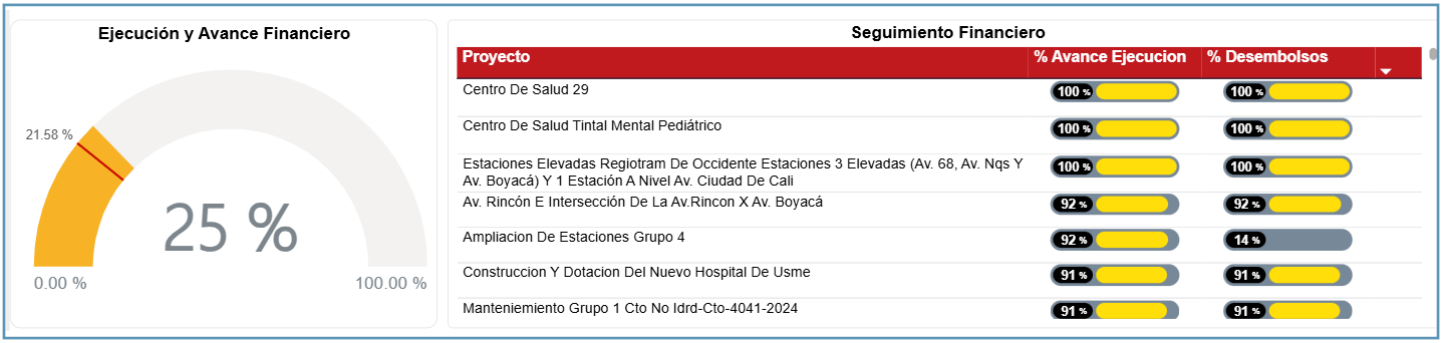


Figure 7. Example of financial and economic dashboards – Bogota

IADs can also track trends in tender management and the stages of procurement contract implementation. These stages generate large volumes of data and enable various types of analysis for different stakeholders. For example, Sekondi Takoradi selected a set of data points on the procurement method, the number of firms submitting tenders, the contract value and the procuring entity. By analysing these trends, the dashboard highlights which procuring entities are achieving more competitive bidding processes and the extent to which local contractors are being engaged.

Figure 8. Example of procurement dashboards – Sekondi-Takoradi

Dashboards in the State of Kaduna Infrastructure Portal also provide procurement insights. A Market Competition Health score is calculated using several indicators, including the level of market concentration among suppliers, the percentage of new suppliers entering the market, the proportion of tenders receiving only one bid, the share of procurements conducted through competitive processes, and the average number of suppliers bidding on each tender. This is combined with a Transparency Performance score, which considers the percentage of required data fields completed in the system, the share of contracts published within required timeframes, and the proportion of documents made publicly available.

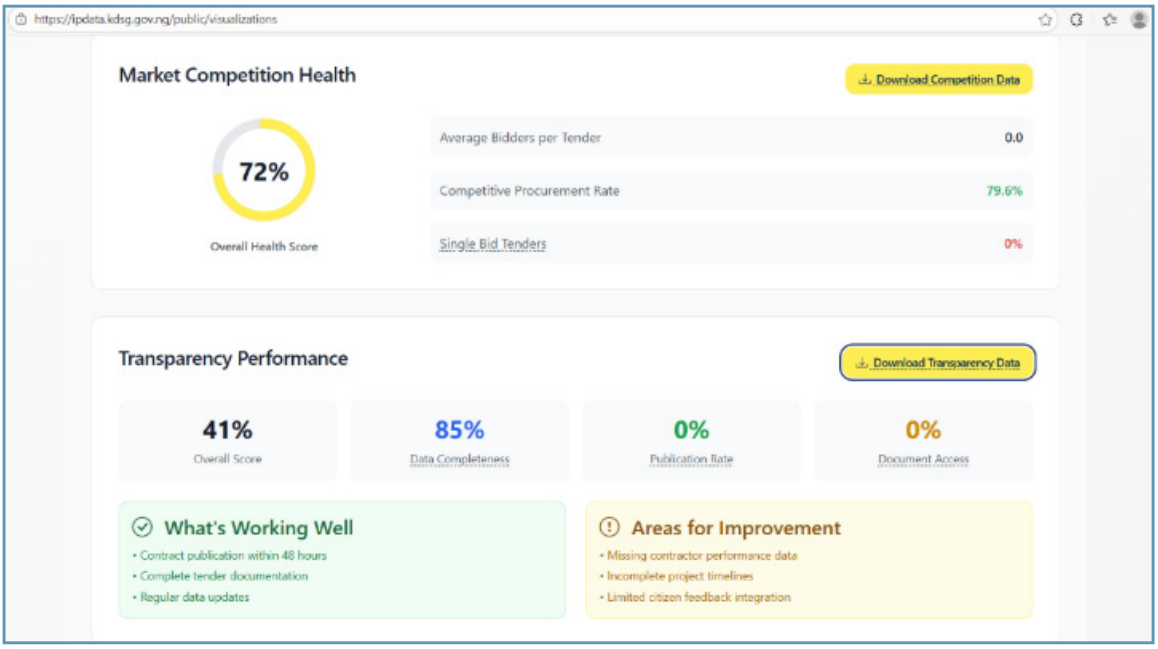


Figure 9. Example of procurement dashboards – State of Kaduna

IADs can also be thematic, focusing on areas of specific interest to the procuring entity. In Mozambique, the climate impact of road projects (projects with climate objectives) was identified as a key trend to help decision-makers and users better understand trade-offs and identify risks. Payments were identified as another priority area. Individual invoices (with invoice numbers, amounts, dates, and descriptions of what the payment covers) are being disclosed as payment milestones against active contracts. A dedicated dashboard was also developed to monitor payment performance, providing real-time visibility into the total invoiced (total facturado), total paid (total pago), outstanding balance (saldo pendente), and payment rate (taxa de pagamento). This level of financial granularity allows closer monitoring of payment delays and cash-flow risks during project implementation.

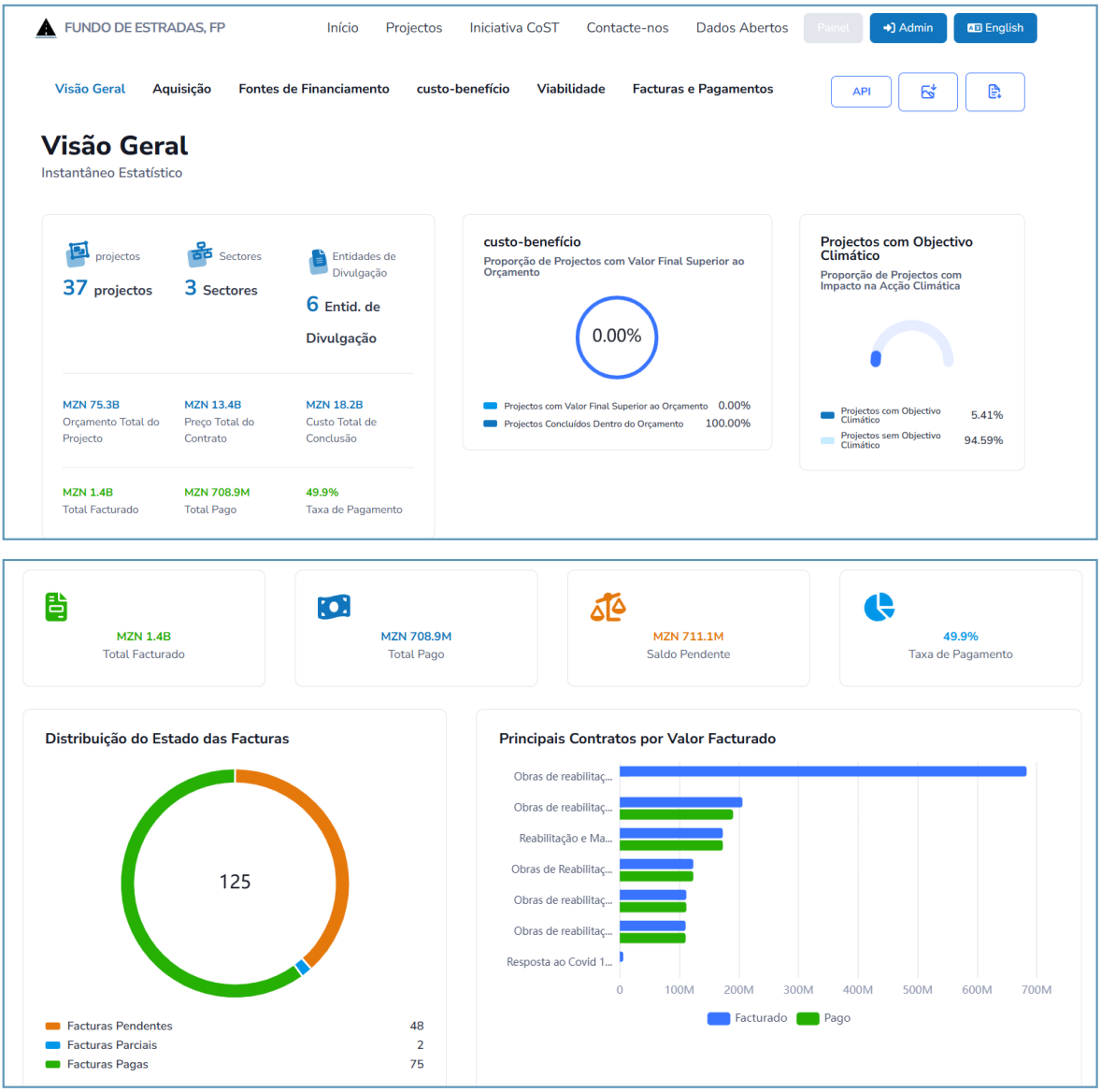


Figure 10. Example of thematic dashboards – the Road Fund Mozambique

3.12 IMPLEMENTING SUCCESSFUL IAD

Based on OC4IDS publishers experience and design principles available online, some guidelines will help ensure success when implementing an IAD.

Consider the audience. OC4IDS publishers and other interested parties will need to know who will use an IAD, as well as the context and access devices. This will inform the process of adding value to available data by presenting it as readily understandable information that addresses user needs and facilitates decision-making.

Provide context. Always try to provide relevant context for the information provided. Even if some elements of this may seem obvious, the audience might find it useful. Without context, users cannot tell whether the numbers shown in a chart are good or bad, or whether they are typical or unusual.

Choose relevant key performance indicators. It is important to select the right key performance indicators to shape the content of an IAD, as these metrics will provide visual representations of relevant insights across specific aspects of the infrastructure sector.

Select the appropriate dashboard and chart. Each set of graphics in an IAD should be designed for a particular user group, with the specific aim of helping them decide on an appropriate response. Information is valuable only when it is directly actionable. Additionally, it is important to understand what type of information the OC4IDS publishers, multi-stakeholder groups, and other interested parties want to convey, and to choose a data visualisation suited to the task. Different types of charts should be selected depending on what an IAD is trying to show: relationships, distributions, compositions, or comparisons.

- **Line charts** are great when it comes to displaying patterns of change across a continuum. The line chart format is commonly used, so most people can easily analyse it.
- **Bar charts** are good for quick comparison of items in the same category, for example, page views by country. Again, such charts are easy to understand, clear and compact.
- **Pie charts** rank low in precision because users find it difficult to compare the sizes of the pie slices accurately. Although such charts can be scanned instantly, users will notice the largest slice immediately, but the smallest slices may be too small to display.
- **Sparklines** work well when there are many metrics, and it is only important to show trends. They can be rapidly viewed and are very compact.

Prioritise simplicity. Designing an IAD dashboard should be a well-thought-through process so that end-users can visualise a simple data story, with the main points highlighted and immediately clear. Continuous iteration and user feedback are essential to keep dashboards relevant and useful.

Be careful with colours. What is important is to stay consistent and not use too many different colours. A good approach is to choose just two or three colours and then use colour gradients. The same colour should be used for matching items across all charts. Doing so will minimise the mental effort required from a user's perspective, thereby making an IAD more comprehensible. When using traffic light colours, for most people red means "stop" or "bad" and green represents "good" or "go." This distinction can prove very useful when designing an IAD, but only when these colours are used accordingly.

Be consistent with labelling and data formatting. In terms of functionality, the main aim of an IAD is to enable the extraction of important insights at a glance. It is critical to ensure that all labelling and formatting of charts and tools are consistent across key performance indicators, tools, and metrics.

3.13 NEVER STOP EVOLVING

The next step in the evolution of platforms and infrastructure data systems is the integration of AI-driven analytics that can process large datasets, detect anomalies, and automatically flag potential integrity risks. Beyond these functions, AI can support predictive analysis, identify emerging trends, and enhance decision-making for both procuring entities, contractors and oversight bodies. As AI technology continues to advance, its expanding capabilities offer significant promise for OC4IDS publishers, enabling greater efficiency, automation, and the application of intelligent analytical tools to strengthen transparency and accountability.

4 Addressing risk indicators

4.1 DEFINITIONS AND CHARACTERISTICS

Risk indicators are specific signals derived from project data that are statistically or empirically associated with a higher likelihood of delivery, fiduciary, or integrity problems. Risk indicators enable early warning. They allow organisations to prioritise attention and resources before problems escalate into major cost overruns, delivery failures, or integrity breaches. **However, risk indicators are not evidence of wrongdoing. They signal the need for closer review, management attention, or corrective action.**

The main characteristics of risk indicators are that they are applied selectively to projects or contracting processes, are predictive or early-warning in nature, are used for prioritisation rather than conclusions, and require follow-up and qualitative review.

4.2 USING THE OC4IDS DATA FOR IDENTIFYING AND ADDRESSING RISK INDICATORS

OC4IDS data and, where available, procurement data can be used to identify risks associated with projects and contracting processes, including integrity and delivery risks. Using OC4IDS risk indicators, publishers can identify red flags in thematic areas such as:

- Budgeting and planning risks
- Procurement and competition risks
- Financial management and payment risks
- Time and delivery risks
- Transparency and data quality risks

OC4IDS publishers can use infrastructure risk indicators to improve supervision and audit planning, target interventions, and take preventive integrity and governance measures. **Annex 6** presents a more comprehensive list of potential risk indicators that procuring entities and management teams can monitor over time. Below are some examples per thematic area.

4.3 BUDGETING AND PLANNING RISK INDICATORS

Budgeting and planning risk indicators (See **Tables 27-29**) are critical when using OC4IDS data because they provide early, project-level signals of fiscal, delivery, and governance risk before procurement begins. Risk indicators focused on budgeting and planning highlight conditions that increase the likelihood of downstream problems, such as incomplete cost estimates, missing budget approvals, unclear project justification, or frequent scope and timeline revisions. These signals help distinguish well-prepared projects from those that are likely to experience cost overruns, delays, or renegotiation once implementation begins. Because planning weaknesses often cascade into procurement and delivery failures, early risk identification is particularly valuable.

Budgeting and planning risk indicators also support stronger fiscal discipline and investment management. By flagging projects with weak budget linkage, uncertain financing sources, or unrealistic schedules, governments and development partners can prioritise corrective action, require additional appraisal, or delay procurement until risks are addressed. This helps prevent the accumulation of unfunded commitments and contingent liabilities that can undermine public finances.

INDICATOR	**The sum of all contract values significantly exceeds the original budget estimate (e.g.,>15%)**
DATA FIELDS REQUIRED	*budget.amount* *contractingProcesses.summary.contractValue.amount*
INTERPRETATION	Suggests optimism bias or strategic misrepresentation at the budget approval stage[8].

Table 27. Large budget–award gap

[8] Comparison with the initial budget is more precise after all contracts have been awarded.

INDICATOR	**Approved budgets are revised mid-project.**
DATA FIELDS REQUIRED	*budget.approvalDate* *budget.budgetBreakdowns.budgetBreakdown.period*
INTERPRETATION	Frequent revisions undermine fiscal discipline and predictability.

Table 28. Budget revisions during implementation

INDICATOR	**Funding source not published or changes repeatedly.**
DATA FIELDS REQUIRED	*budget.finance.source* *budget.budgetBreakdowns.budgetBreakdown.sourceParty*
INTERPRETATION	Funding instability is a common cause of delays and scope reductions.

Table 29. Unclear or unstable funding sources

4.4 PROCUREMENT AND COMPETITION RISK INDICATORS

Procurement and competition risk indicators (See **Tables 30-32**) are essential when using OC4IDS data because they provide project-level signals of integrity, market, and value-for-money risk at the intersection of public and private interests.

Risk indicators focused on procurement and competition highlight conditions that increase the likelihood of collusion, favouritism, or market capture. Indicators such as single-bid tenders, repeated awards to the same firms, non-competitive procedures without justification (such as emergency procurement), or limited bidder participation signal elevated risk that procurement outcomes do not reflect genuine competition. These signals do not prove wrongdoing, but they identify projects that warrant closer scrutiny or additional safeguards.

Procurement and competition risk indicators are also critical for protecting value for money. Weak competition is strongly associated with higher prices, lower quality, and increased likelihood of post-award renegotiation.

By using OC4IDS data to flag procurement processes with limited competition or opaque decision-making, governments and development partners can intervene early to strengthen market conditions, adjust procurement strategies, or enhance oversight.

INDICATOR	**Only one bidder submits an offer.**
DATA FIELDS REQUIRED	*contractingProcesses.summary.tender.numberOfTenderers*
INTERPRETATION	Low competition correlates with higher prices and a higher risk of corruption.

Table 30. Single-bid procurement

INDICATOR	**Use of direct awards or restricted procedures.**
DATA FIELDS REQUIRED	*contractingProcesses.summary.tender.procurementMethod* *contractingProcesses.summary.tender.procurementMethodDetails*
INTERPRETATION	Non-competitive methods increase discretion and reduce transparency.

Table 31. Non-open procurement methods

INDICATOR	**A supplier receives a high share of awards from the same procuring entity.**
DATA FIELDS REQUIRED	*parties.id with role 'supplier'* *contractingProcesses.summary.suppliers* *publicAuthority* *contractingProcesses.summary.tender.procuringEntity* *budget.amount* *contractingProcesses.summary.contractValue*
INTERPRETATION	May indicate favouritism or weak market competition.

Table 32. Repeated awards to the same supplier

4.5 FINANCIAL MANAGEMENT AND PAYMENT RISK INDICATORS

Financial management and payment risk indicators (See **Tables 33** and **34**) are essential when using OC4IDS data because they provide project-level signals of fiduciary risk and weaknesses in public financial control during implementation. Even when projects are well-planned and competitively procured, failures in financial execution, such as irregular payments, delayed disbursements, or opaque fund flows, can undermine delivery, create opportunities for the misuse of funds, and erode trust.

Risk indicators focused on financial management and payments highlight conditions that increase the likelihood of mismanagement, fraud, or delivery disruption. These include missing or incomplete payment records, payments that do not align with contractual milestones, long delays between work completion and payment, or frequent changes to payment schedules. Such signals do not in themselves prove wrongdoing, but they flag projects where financial controls may be weak and where closer oversight is warranted.

Financial management and payment risk indicators also support the continuity of project delivery. Delayed or unpredictable payments are a common cause of stalled work, contractor disputes, and claims, which, in turn, lead to cost escalation and renegotiation. By identifying payment-related risks early, governments and development partners can intervene to resolve bottlenecks, strengthen financial processes, or provide targeted support to implementing agencies.

INDICATOR	**No transaction data reported during implementation.**
DATA FIELDS REQUIRED	*transactions.value when status is 'implementation'* *contractingProcesses.summary.transactions.date* *contractingProcesses.summary.transactions.value*
INTERPRETATION	Opacity in payments weakens fiduciary assurance.

Table 33. Missing payment data

INDICATOR	**Long gaps between payments or unusually large lump-sum payments.**
DATA FIELDS REQUIRED	*transactions.date* *transactions.value*
INTERPRETATION	Irregular payments can signal cash-flow problems or control weaknesses.

Table 34. Irregular payment patterns

4.6 TIME AND DELIVERY RISK INDICATORS

Time and delivery risk indicators (See **Tables 35** and **36**) are critical when using OC4IDS data because they provide early, project-level signals of implementation and institutional risk, rather than retrospective performance assessments. Infrastructure projects are highly sensitive to delays, and schedule slippage is often a leading indicator of deeper problems such as weak contract management, coordination failures, funding disruptions, or unrealistic planning assumptions.

Risk indicators focused on time and delivery track deviations from planned schedules, such as missed milestones, extended implementation periods, or repeated deadline revisions. These signals help distinguish normal, manageable delays from patterns that indicate a project is at risk of cost escalation, contractual disputes, or service-delivery failure. Because delays often precede cost overruns and renegotiations, time-based risk indicators are particularly valuable for preventive action.

Time and delivery risk indicators also support stronger oversight and management. By flagging projects with significant schedule slippage or weak milestone reporting, governments and development partners can prioritise monitoring, technical support, or corrective interventions where they are most needed. This allows limited oversight capacity to be allocated based on risk, rather than spread evenly across all projects.

INDICATOR	**Key milestones are not met on time or remain incomplete.**
DATA FIELDS REQUIRED	*milestones.status* *milestones.dueDate* *milestones.dateMet*
INTERPRETATION	Missed milestones often precede major delivery failure.

Table 35. Missed critical milestones

INDICATOR	**The same supplier or procuring entity is associated with delays in multiple projects.**
DATA FIELDS REQUIRED	*parties.id* *milestones.dateMet* *milestones.dueDate*
INTERPRETATION	Pattern-based risks are higher than single-project signals.

Table 36. Repeated delays across projects

4.7 TRANSPARENCY AND DATA QUALITY RISK INDICATORS

Transparency and data quality risk indicators (See **Tables 37** and **38**) are critical when using OC4IDS data because they provide project-level signals of whether transparency systems are functioning in practice, not just whether data publication rules exist. Incomplete, inconsistent, or low-quality data can undermine oversight, obscure governance risks, and limit the utility of infrastructure data for decision-making.

Risk indicators focused on transparency and data quality highlight conditions that increase the likelihood of hidden risks or weak accountability. These include missing key documents, incomplete lifecycle data, inconsistent values across planning, contracting, and implementation stages, or outdated information that is not regularly updated. Such signals indicate that decision-makers, auditors, and citizens may not have a reliable picture of a project's progress or of how public funds are being used.

Transparency and data quality risk indicators are also essential for prioritising oversight and technical support. Projects with significant data publication gaps or poor data quality can be flagged for follow-up, validation, or targeted capacity building before more serious problems emerge. This helps ensure that limited oversight resources are focused on projects where insufficient information poses a material risk.

INDICATOR	**Missing required OC4IDS fields (e.g. milestones, amendments, suppliers).**
DATA FIELDS REQUIRED	*Field completeness checks*
INTERPRETATION	Poor data publication is often associated with increased risks.

Table 37. Incomplete data publication

INDICATOR	**Long delays between events and data publication.**
DATA FIELDS REQUIRED	*Date fields* *Last update*
INTERPRETATION	Delayed publication of data reduces the value of data for early warning.

Table 38. Late or inconsistent updates

4.8 DEVELOPING A RED FLAG SYSTEM

In Malawi, the IPPI embedded a "red-flag" system into its data publication portal to help proactively identify projects with potential governance or implementation risks. The system allows analysis of individual issues in isolation while also capturing common risk patterns across the project lifecycle. The system highlights issues such as the absence of feasibility studies, missing environmental or social impact assessments, unrealistic budgets or timelines, limited competition, and implementation delays.

To do this, eighteen key categories of commonly observed risks were identified. Each category is clearly described and linked to easily observable features in the project data, making these risks practical proxies for red flags. This approach makes complex governance and delivery challenges visible and actionable.

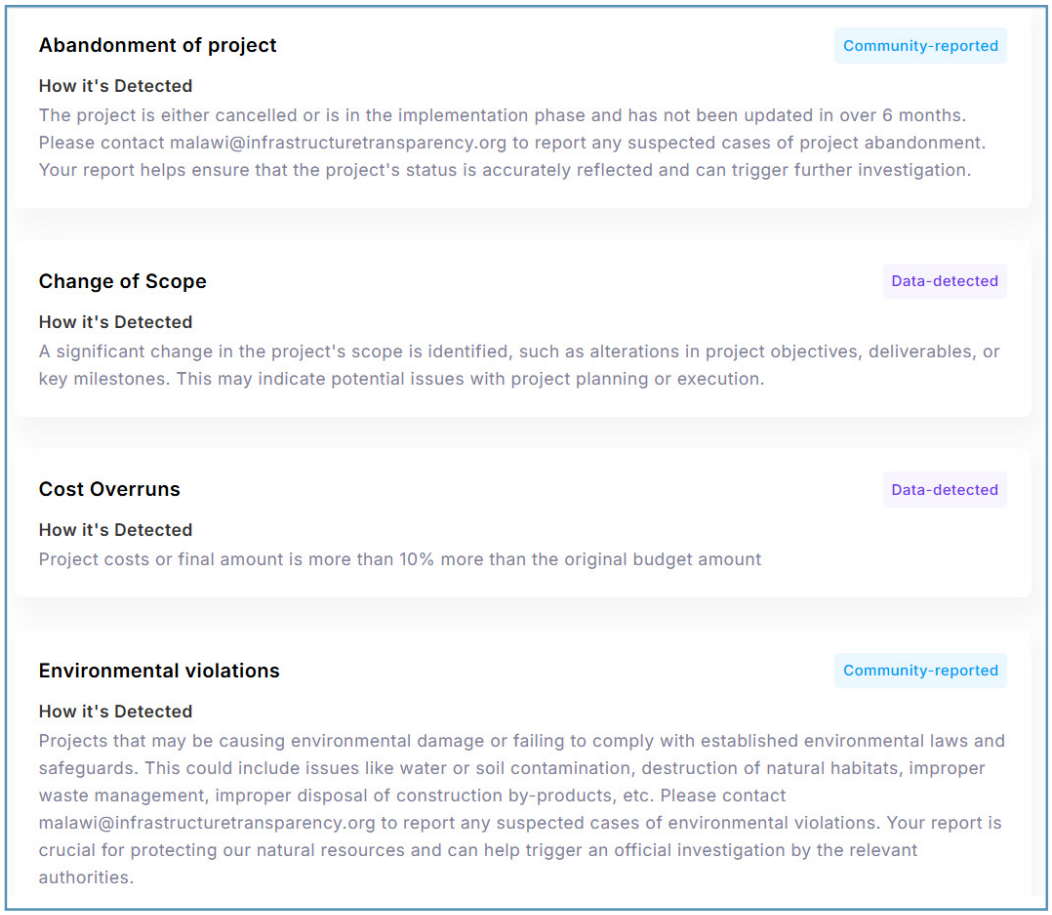


Figure 11. Examples of red flags – IPPI

The risk system combines two complementary methodologies to identify potential project risks: data-detected signals and community-reported risks. Data-driven risks are identified automatically from patterns in published infrastructure data. Examples include missing feasibility studies, lack of cost-benefit or environmental impact analyses, lack of maintenance plans, cost overruns and limited competition. Community-reported risks, on the other hand, are based on input from citizens, civil society, and other stakeholders who observe issues on the ground and report them, as well as from other stakeholders who observe them and report them to the Construction Industry Regulatory Authority (CIRA). These include reports of project abandonment, environmental violations, political interference, under-utilisation of completed infrastructure, use of substandard materials, and worker welfare or social violations.

This hybrid method allows both automated analysis of project data and real-world observations to be considered in the red-flag analysis. Large datasets from public records help identify patterns and anomalies that match the risk indicators. groups.

To help users interpret these risks, a traffic-light system was also included. A green flag indicates no red flags, a yellow flag indicates 1 to 5 risks, an orange flag indicates 6 to 10 risks, and a red flag indicates more than 10 risks present. The traffic-light system allows projects to be filtered by flag category, bringing immediate visibility to higher-risk projects.

By making risks visible and comparable across the portfolio, the red-flag system strengthens proactive oversight, enables targeted follow-up by authorities, and helps prioritise corrective action before issues escalate into more serious governance or delivery failures. The system also embeds accountability and community voice by providing a direct reporting mechanism for citizens and civil society.

4.9 ADVANCED RISK INDICATORS

OC4IDS data can be used to develop more advanced risk indicators by combining patterns or composing different risks. Composite risk indicators bring together different types of risks, which, when observed together, provide stronger and more reliable predictors of governance, delivery, or integrity problems. By doing so, OC4IDS publishers can benefit from far stronger predictors of risk than single signals alone. Examples of composite risk indicators include:

- Single-bid procurement **and** high amendment value: by combining a signal of weak competition at award and significant changes in contract value post-award, this indicator points to the need to strengthen oversight of tender methods, award criteria, and contract management.
- Late amendments **and** significant delays: late contract amendments combined with significant delays point to potential weaknesses in project planning and contract management, and may reflect attempts to regularise problems after implementation has begun.
- Repeated amendments **and** missing justifications: when repeated contract amendments occur without adequate justification, this indicator highlights potential weaknesses in internal controls and elevated integrity risks.
- Low competition **and** supplier concentration: low levels of competition combined with high supplier concentration highlight potential market health issues, barriers to entry and the need to review the effectiveness of competition policy.

4.10 SECTOR-SPECIFIC RISK INDICATORS

OC4IDS also enables the development of sector-specific risk indicators. One example relates to the water sector. In collaboration with the Water Integrity Network (WIN), CoST identified and developed a set of 35 water-specific data points designed to strengthen transparency during the planning and decision-making stages of water infrastructure projects. These data points are explained in detail in the Data Publication Manual. They can be applied alongside the core data standard to enable deeper analysis of how water projects are selected and prioritised. **Annex 7** provides examples of use cases that illustrate how water data points can be combined to provide insights into integrity risks in decision-making dynamics.

5 How data use relates to other CoST pillars and functions

The use of infrastructure data is a cornerstone of the CoST approach. While data availability is important, its value lies in its active application to strengthen transparency, participation, and accountability throughout the infrastructure project cycle. Data use does not operate in isolation; it is closely linked to other key CoST features that together enhance decision-making, oversight, and the impact of infrastructure investments. These features include:

INDEPENDENT REVIEW

Effective data use is fundamental to the independent review process. The review:

- analyses existing data and documentation to evaluate its completeness, consistency, and reliability
- identifies gaps and requests additional information where needed
- interprets data across the project lifecycle to diagnose systemic issues
- uses evidence to highlight risks, inefficiencies, and areas of concern

By transforming data into actionable insights, the independent review strengthens transparency and provides an evidence base for accountability.

MULTI-STAKEHOLDER WORKING

Multi-stakeholder groups play a central role in promoting and enabling the use of data. They:

- validate and interpret findings from the CoST Infrastructure Transparency Index (ITI), independent reviews, and analytical tools
- facilitate dialogue between government, civil society, and the private sector
- support the translation of data insights into practical reforms and improved practices

This collaborative process enhances participation, ensuring that data is not only available but actively used to inform decisions and drive improvements.

SOCIAL ACCOUNTABILITY

Data use is critical to strengthening social accountability. Stakeholders, including citizens' groups, media, academia, and the private sector, are encouraged and supported to:

- access and interpret infrastructure data and analytical dashboards
- use ITI results and independent review findings to monitor projects
- raise concerns, advocate for improvements, and engage with public authorities

This process reinforces accountability, as evidence generated through data use informs both public scrutiny and formal oversight mechanisms within government.

INTEGRATED COST APPROACH

Coordination across CoST pillars maximises the value of data. By combining data use with independent review, multi-stakeholder engagement, and social accountability, data can become a practical tool for transparency, accountability, and continuous learning, ultimately improving the quality, efficiency, and impact of infrastructure investments.

6 Annexes

Annex 1. Overview of available tools and other resources

Annex 2. Key Performance Indicators

Annex 3. Trend analysis

Annex 4. Guide to develop use cases

Annex 5. Examples of OC4IDS use cases

Annex 6. Risk indicators

Annex 7. Water sector use cases

ANNEX 1. OVERVIEW OF AVAILABLE TOOLS AND RESOURCES

A: Tools described in this manual.

These include the tools and resources referenced in the text. Some of them, as illustrated in **Annexes 2, 3, 4, 5** and **6**, are available in Excel or Word format. Others are available only online, and their links are provided in this manual.

B: Associated guidance notes

Prepared in parallel with this manual, the updated Guidance Note provides a concise summary of the CoST data publication and data use. Another useful Guidance Note addresses Climate Finance infrastructure data. As such, they are an appropriate resource for providing a general overview to stakeholders who need a high-level introduction to the subject without going into detail.

C: Resources developed by individual OC4IDS publishers

Recently developed tools that can serve as resources or specific examples for implementing similar tools include the following.

- Sekondi Takoradi: Transparent Infrastructure IAD is available here.
- **Malawi:** IPPI analytics and "red flag system" are available here.
- **Kaduna State:** KADPPA IAD is available here.
- **Mozambique:** Road Fund IAD is available here.
- **Bogota:** City's portal and IAD are available here.

ANNEX 2. KEY PERFORMANCE INDICATORS

This resource presents a list of indicators classified by project phase:

- Identification
- Preparation
- Tender Management
- Implementation
- Completion
- Operations and Maintenance
- Decommissioning

The indicators are also listed per category, including:

- Cost and financial performance
- Time performance and delivery
- Procurement efficiency and competition
- Contract management
- Financial management and payments
- Transparency and data completeness
- Environmental sustainability and climate resilience
- Social sustainability
- Institutional sustainability
- Economic and financial sustainability
- Climate finance

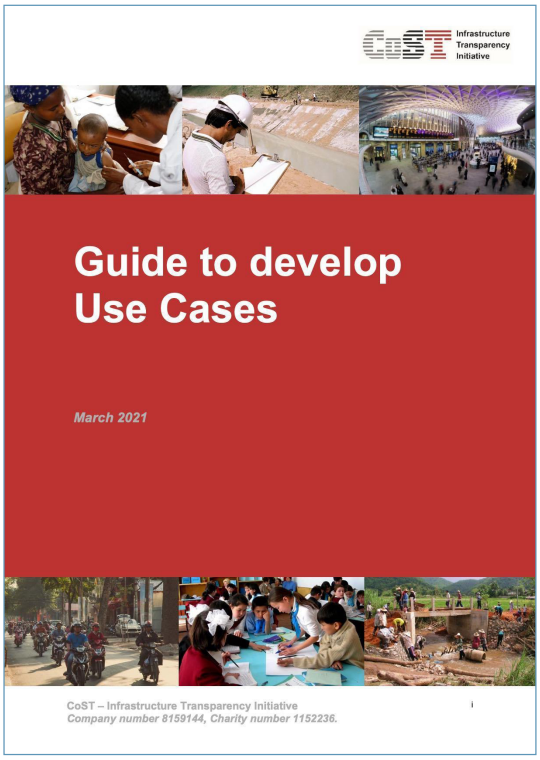
Click here to download the resource

ANNEX 3. TRENDS ANALYSIS

This resource presents a list of trends classified by areas of interest, such as:

- Investments trends
- Budgeting and funding trends
- Social impact trends
- Beneficial ownership transparency trends
- Procurement trends
- Time and delivery trends
- Transparency trends

Click here to download the resource



ANNEX 4. GUIDE TO DEVELOP USE CASES.

This guide is intended to help CoST members, their partners, and information technology teams develop and document use cases to support the design and implementation of online data platforms or the development of IADs. Click here to download the tool.

ANNEX 5. EXAMPLES OF OC4IDS USE CASES

This resoure provides examples of indicators for different use cases, collected by the Open Contracting Partnership. The use cases underpinning this document are derived from the practical ways in which infrastructure data, structured through the OC4IDS, is used to improve the governance, performance, and impact of infrastructure investments.

Across the indicators, five core **use case categories** emerge: value for money, internal efficiency, market opportunity, public integrity, and service delivery.

1. Value for Money

A primary case is the use of infrastructure data to assess whether public investments deliver optimal economic value. By analysing data throughout the project lifecycle, including costs, timelines, procurement methods, and contract variations, stakeholders can identify inefficiencies, cost overruns, and delays.

In practice, this use case allows governments and development partners to improve budgeting, project selection, and contract management, ultimately enhancing the efficiency of infrastructure spending.

2. Internal Efficiency

Public institutions also use infrastructure data to improve the efficiency of internal processes and systems. This includes analysing timelines, approval processes, procurement cycles, and implementation performance.

Through this use case, data supports the identification of bottlenecks and administrative inefficiencies, improves coordination between procuring entities and streamlines project delivery processes

3. Market Opportunity

This use case concerns how the private sector uses data to identify and respond to market opportunities. Data on planned investments, procurement pipelines, contract awards, and competition levels allows firms to assess market size and demand, identify bidding opportunities and evaluate levels of competition.

By improving access to reliable data, this use case contributes to more competitive procurement processes and better outcomes for public investment.

4. Public Integrity

Infrastructure data plays a critical role in identifying and mitigating integrity risks, including corruption, collusion, and conflicts of interest. By analysing patterns in procurement, contract awards, and project implementation, stakeholders can detect anomalies and high-risk behaviours.

It also strengthens fiduciary risk management for governments and development partners, contributing to more credible and trustworthy infrastructure systems.

5. Service Delivery

Another key use case focuses on how infrastructure data is used to assess and improve service delivery outcomes. By linking project data to outputs and outcomes, such as road quality, water access, or resilience to climate risks, stakeholders can evaluate whether infrastructure investments are meeting their intended objectives.

This use case ensures that infrastructure data is used not only to monitor processes but also to assess the impact of investments on people's lives.

Click here to download the resource.

ANNEX 6. RISK INDICATORS

This resource presents a list of risk indicators classified by thematic areas, such as:

- Budgeting and planning risks
- Procurement and competition risks
- Financial management and payment risks
- Time and delivery risks
- Transparency and data quality risks

Click here to download the resource.

ANNEX 7. WATER SECTOR USE CASES

Data use 1: Project location and biases in water investment prioritisation

Information on the location of projects can help assess whether decision-making was objective and needs-oriented. The concentration of investment in regions that do not align with the population's urgent needs can indicate potential weaknesses and biases in water investment prioritisation.

Procurement officers are advised to consider the characteristics of the project location to allocate resources more effectively, based on where they are most needed. Citizens and civil society can use the same information to assess the objectivity of the decision-making process, and to question it when inconsistencies arise.

Stakeholders can use the following data points from the water module as objective metrics to guide and/or evaluate decision-making processes:

- **Multidimensional poverty:** a measure of poverty that goes beyond income alone and includes health, education, and standards of living. Countries typically have regional-level statistics on multidimensional poverty, which can be used to assess the socio-economic conditions at the project location.
- **Water stress level:** refers to the ratio of total water demand to available renewable surface and groundwater supplies, as measured by the Aqueduct Water Risk Atlas. Higher values indicate greater competition among users.
- **Drought risk:** refers to the likelihood of drought occurrence, the population and assets exposed, and the vulnerability of those populations and assets to adverse impacts, as measured by the Aqueduct Water Risk Atlas. Higher values indicate a higher risk of drought.
- **Risk of no drinking water:** reflects the percentage of the population collecting drinking water from an unprotected dug well or spring, or directly from a river, dam, lake, pond, stream, canal, or irrigation canal, as measured by the Aqueduct Water Risk Atlas. Higher values indicate areas where people have limited access to safe drinking water supplies

These are publicly available datasets. By using the characteristics of the project location, these combined data points can help guide stakeholders in assessing water decision-making processes.

Data use 2: Project timing and biases in water decision-making

Project timing can reveal potential biases in decision-making, helping assess whether projects have been rushed or delayed due to external events (such as elections).

A focus on the time elapsed between the date the project funding was approved, the date the project was authorised (the 'go-ahead' order), and the actual start of construction can flag potential timing manipulation in the approval and authorisation processes if, for example, an urgent approval is followed by a significantly delayed project start.

Project timing can also provide insights to assess whether emergency procurement was employed without reasonable grounds, for example, when delays in the procurement process contradict the nature of the alleged water emergency.

The following data can help assess the risk of potential project timing manipulation:

- **Funding approval date:** the date the project's funding was approved, and resources were assigned or reserved.
- **Project authorisation date:** the date the project received a go-ahead order authorising its initiation.
- **Non-compliance with stipulated tender periods:** instances of non-compliance with the procurement law in relation to bid submission, bid evaluation and contract award.
- **Construction start date:** the date on which the construction works started.

Project procurement information can provide insights into whether approvals, authorisations, and implementation timelines were reasonable and consistent, or whether they may have been unduly manipulated to accommodate external events. Although not specific only to the water sector, these data points are of particular importance for water infrastructure, given the common allegation of emergencies related to water shortages.

Data use 3: Feasibility analysis and the impartiality of water decision-making

The degree of rigour and technical completeness of the project feasibility analysis can provide indicators for assessing the objectivity and impartiality of the decision-making and planning processes. A lack of adequate project appraisal can flag decisions made without sufficient technical justification.

The timing of the feasibility assessment also merits attention. When a comprehensive feasibility analysis is deferred until after the approval process, projects may receive funding before a thorough assessment of costs, benefits, and viable alternatives has been conducted, increasing the risk that decision-making is not fully grounded in technical evidence.

When climate impact analyses are postponed or not conducted, the risk of maladaptation increases, as preliminary designs for long-lived infrastructure assets, typically intended to operate over several decades, may already be locked in by the time the climate analysis is undertaken.

The following data can help assess how thorough the feasibility analysis of water infrastructure was and the risks of a decision-making process not fully grounded in technical evidence:

- **Environmental and social impact assessment:** whether and when the procuring entity conducted an environmental and social impact assessment.
- **Climate-adapted design:** whether the project design considered the impact of climate change.
- **Project brief or feasibility study:** whether and when the procuring entity conducted a Project brief or feasibility study, which includes documentation on the net benefits or costs of the proposed goods, works or services.
- **Alternative analysis:** whether and when the procuring entity conducted an Alternative project analysis, which is a technical examination to assess and compare various solutions to meet the project objectives, normally including comparison of locations and engineering designs, providing a copy of the analysis.
- **Cost-benefit analysis:** whether and when the procuring entity conducted a Cost-benefit analysis, which is a technical assessment of the project's economic, environmental and social benefits, technical feasibility, and social and economic costs.
- **External appraisal:** clarify whether and when the procuring entity conducted an External appraisal, which is a complete assurance review of the project by a technical body that is different from the proposing body, normally including analysis of site selection and project design.
- **Needs assessment:** whether and when the procuring entity conducted a Needs assessment, which is a technical study to identify the need for a project that has been proposed.
- **Asset lifetime:** expected lifetime of the asset.