The Quality Infrastructure for Sustainable Development (QI4SD) Index

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4 OCTOBER 2023

The Quality Infrastructure for Sustainable Development (QI4SD) Index is a comprehensive tool that measures and evaluates the quality of infrastructure in various countries with respect to sustainable development goals. It provides a framework for assessing the performance of infrastructure systems and their contribution to economic growth, social well-being, and environmental sustainability, it used to evaluate a country's overall progress toward becoming QI-ready to achieve the Sustainable Development Goals (SDGs).

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One of the key objectives of the QI4SD Index is to promote sustainable development by encouraging countries to invest in high-quality infrastructure that supports economic growth while minimizing negative environmental impacts. It helps policymakers identify areas where improvements are needed and prioritize investments accordingly. By providing a standardized measurement framework, it also facilitates comparisons between countries and enables benchmarking against best practices.

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The Quality Infrastructure for Sustainable Development (QI4SD) Index was developed by the United Nations Industrial Development Organization (UNIDO) in collaboration with partner organizations of the International Network on Quality Infrastructure (INetQI). It is a Global Knowledge tool of the Global Quality and Standards Program (GQSP), funded by the Swiss State Secretariat for Economic Affairs (SECO). The QI4SD Index is one of many publicly available quality infrastructure (QI) tools, which can be accessed on the UNIDO Knowledge Hub.

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Quality infrastructure (QI) is a multidimensional concept and comprises several dimensions (Standards, Accreditation, Conformity assessment, Market Surveillance, Metrology and Policy). The QI4SD Index aims to measure QI using indicators for five of these dimensions, which are aggregated into a composite indicator, i.e. a single aggregate score, for each country. Moreover, the QI4SD Index gives scores for each of the three main pillars of sustainable development: People, Planet and Prosperity. These scores aim to measure the contribution and readiness of a country to tackle sustainable development in these specific pillars. Figure 1 illustrates the conceptual framework of the QI4SD Index.
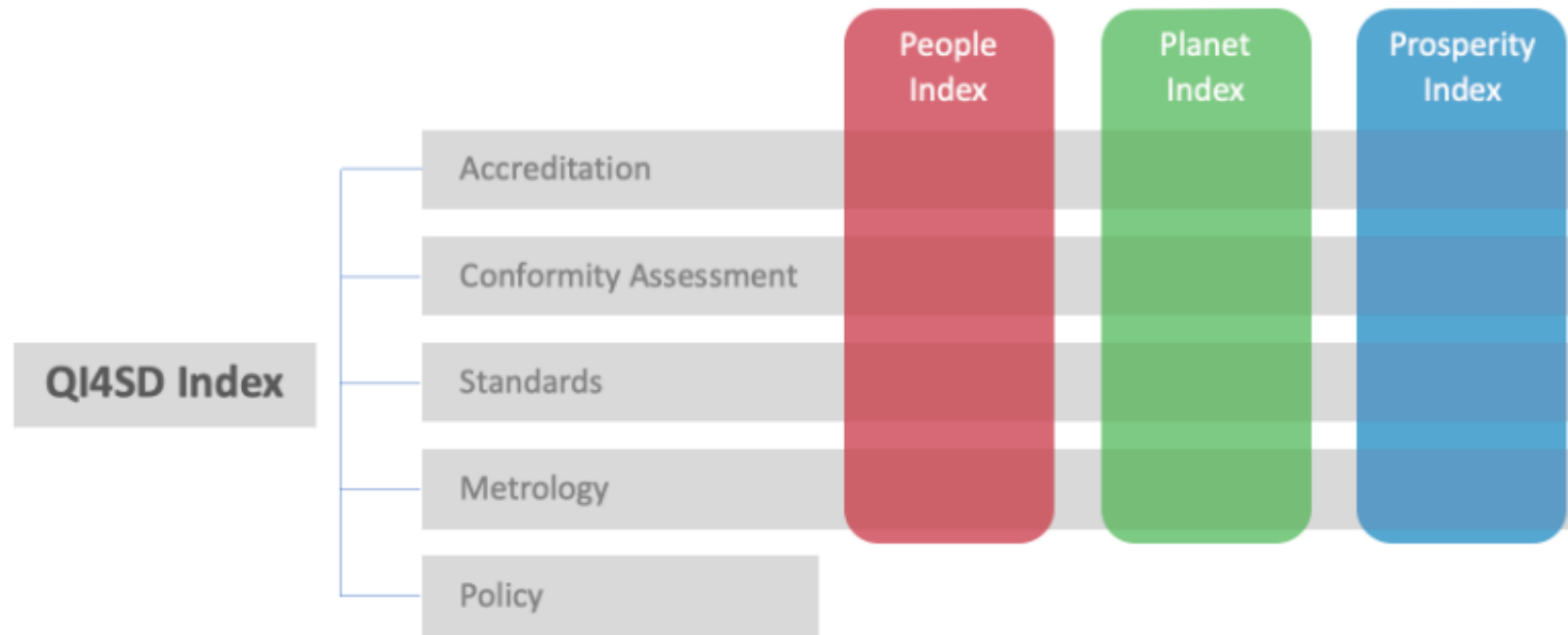
Figure 1. Conceptual framework of the QI4SD Index

https://hub.unido.org/qi4sd/dimensions

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QI: Enabler for Sustainable Development

The index uses a scoring system to rank countries based on their performance in each indicator. The scores are then aggregated to calculate an overall index score for each country. This score allows for easy comparison between countries and provides insights into their relative strengths and weaknesses in terms of infrastructure quality. Indicators were selected for each dimension following a literature review and rounds of discussion with INetQI partner organizations. Data was then collected where possible, typically through INetQI organizations, since no centralized statistics exist on QI. Indicators were further screened based on criteria including relevance, value added, data availability, and others. Data for the Policy dimension was collected using a dedicated survey on Quality Policy that was launched by the International Organization for Standardization (ISO) in 2021.

Table 1. List of indicators in the QI4SD Index. General indicators (G) and 3P indicators (P) in the framework.

Dimension	Name	Description	Unit	Organization	Type	Weight
Accreditation	Scopes of IAF accreditation bodies	Number of scopes for the IAF Multilateral Recognition Arrangement mapped into the 3Ps.	Number	IAF	P	1
	Signatory to the IAF MLA	Existence of an accreditation body that is a signatory to the IAF Multilateral Recognition Arrangement.	Yes/no	IAF	G	1
	Scopes of ILAC accreditation bodies	Number of scopes for the ILAC Mutual Recognition Arrangement mapped into the 3Ps.	Number	ILAC	P	1
	Signatory to the ILAC MRA	Existence of an accreditation body that is a signatory to the ILAC Mutual Recognition Arrangement.	Yes/no	ILAC	G	1
Conformity	Membership of IEC conformity assessment systems	Country membership in the four IEC conformity assessment systems (IECEE, IECEx, IECRE, IECQ), range 0 to 4.	Number	IEC	G	1
	Number of IECEE certificates recognised	Number of IECEE certificates present in country.	Number	IEC	G	1
	Number of recognised certificates (IQNet)	Number of recognised certificates from IQNet database mapped into 3Ps.	Number	IQNet	P	0.5
	Membership of IQNet	Level of involvement in IQNet, location of head, subsidiary offices and origin of Certification Bodies.	Composite score	IQNet	G	1

Metrology is a fundamental pillar of the quality infrastructure system and essential for most SDGs.

Metrology	Participation in CIPM Consultative Committees	Sum of overall participation in ten Consultative Committees, range 0 to 20.	Number	BIPM	G	1
	Participation in key and supplementary comparisons	Sum of the scores for the key and supplementary comparisons.	Number	BIPM	G	1
	Number of CMCs	Total number of Calibration and Measurement Capacities (CMCs) in any area mapped into 3Ps.	Number	BIPM	P	0.5
	Breadth of CMCs	Total breadth of Calibration and Measurement Capacity (CMC) types with at least one capacity mapped into 3Ps	Number of types	BIPM	P	0.5
	Membership of BIPM	Membership of BIPM, range 0 to 2.	Categorical	BIPM	G	1
	Membership of OIML	Membership of OIML, range 0 to 2.	Categorical	OIML	G	1
	OIML-CS - number of services offered	Number of OIML Certification System (CS) services offered.	Number	OIML	G	0.5
	OIML-CS - number of services recognised	Number of OIML Certification System (CS) services recognised.	Number	OIML	G	0.5
	Involvement in OIML project groups	Number of project groups for which each country is a convener (C), participating member (P) and observer (O).	Composite score	OIML	G	1

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Standards						
	Adopted ISO standards	ISO standards that had been adopted into national legislation and mapped into the 3Ps.	Number	ISO	P	1
	Adopted IEC standards	IEC standards that have been adopted and mapped into the 3Ps.	Number	IEC	P	1
	Membership of IEC	Membership of the IEC, range 0 to 3.	Categorical	IEC	G	1
	Participation in IEC technical committees	IEC technical committees (TCs) participation mapped into the 3Ps.	Number	IEC	P	1
	Membership of ISO	Membership of the ISO, range 0 to 3.	Categorical	ISO	G	1
	Participation in ISO technical committees	ISO technical committees (TCs) participation.	Number	ISO	G	1
	Membership of ITU	Composite score of membership of ITU.	Composite score	ITU	G	1

	Participation in capacity building programmes	Participated in capacity building programmes related to QI from BIPM, OIML, ISO, WTO in the last two years, range 0 to 4.	Number of types	UNIDO/ISO	G	1
	Quality Policy in place	National or regional Quality Policy in place, a policy for developing and sustaining effective QI.	Yes/no	UNIDO/ISO	G	1
	Dimensions of QI addressed by Quality Policy	QI dimensions (Metrology, Standards, Accreditation, Conformity Assessment) addressed by the Quality Policy or regulatory framework, range 0 to 4.	Number	UNIDO/ISO	G	1
	Support and funding for Quality Policy	Governmental support, including funding, stipulated in the Quality Policy or in the regulations and directions supporting QI.	Yes/no	UNIDO/ISO	G	1
	Government/political endorsement for Quality Policy	Development and implementation of the Quality Policy being endorsed by the political level or led by the highest level of government.	Yes/no	UNIDO/ISO	G	1
Policy	Government approval of Quality Policy	Quality Policy approved by government or regional country grouping.	Yes/no	UNIDO/ISO	G	1
	Stakeholder involvement of Quality Policy	Involvement of stakeholders from the private and public sectors, consumers, producers in the Quality Policy process.	Yes/no	UNIDO/ISO	G	1
	Consideration of diversity in Quality Policy	Gender balance and other diversity aspects considered in the Quality Policy process.	Yes/no	UNIDO/ISO	G	1
	Implementation plan for Quality Policy	Presence of implementation plan for the national Quality Policy, i.e. a plan that sets out the steps for achieving the policy objectives.	Yes/no	UNIDO/ISO	G	1
	Monitoring and evaluation for Quality Policy	Mechanism(s) for monitoring and/or evaluating the implementation/outcomes of the Quality Policy.	Yes/no	UNIDO/ISO	G	1
	Reviewing and updating for Quality Policy	Mechanism(s) for periodically reviewing and updating the Quality Policy.	Yes/no	UNIDO/ISO	G	1

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The final resulting indicators were aggregated into the QI4SD Index following state of the art composite indicator methodology, including data treatment, normalization and aggregation. The result is a list of 36 indicators covering 137 countries worldwide. The indicators in the framework are listed in Table 1. For each country, apart from indicator data, there are scores for each dimension of QI, as well as an overall aggregate index score. Each country has a score representing the state of QI in the People, Planet and Prosperity pillars, using data relating to social, environmental and economic issues respectively. These scores are calculated using a subset of the indicators in the Standards, Accreditation, Conformity Assessment, and Metrology dimensions, because no sufficiently detailed data was available in the policy dimension.

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A1 | UnitCode

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	UnitCode	UnitName	QI4SD ind	Standards	Conformit	Metrology	Accreditat	Policy	People in	Planet ind	Prosperity	Group_Re	Group_GD	Group_Inc	People St	People Co	People M	People Ac	Planet Sta	Planet Co	Plan
2	DEU	Germany	87.57	82.95	76.52	91.56	96.7	90.1	97.5	95.82	92.14	Europe &	XL	High	93.74	100	100	96.26	90.68	100
3	CHN	China	82.96	84.3	74.23	82.54	91.75	82	90.46	90.07	86.44	East Asia &	XL	Upper mic	82.93	100	100	78.92	75.38	100
4	FRA	France	82.53	81.91	66.17	82.95	90.92	90.72	92.4	90.94	83.58	Europe &	XL	High	91.97	100	91.3	86.34	86.94	100
5	USA	United Sta	79.75	83.56	51.27	84.15	100		79.19	83.15	83.37	North Am	XL	High	61.38	71.69	87.96	95.73	63.17	83.59
6	GBR	United Kir	77.92	88.99	41.21	86.42	95.05		83.21	81.67	80.25	Europe &	XL	High	100	53.42	90.64	88.79	98.59	53.95
7	JPN	Japan	76.45	79.46	56.31	83.25	86.8		81	88.03	74.35	East Asia &	XL	High	62.45	100	93.31	68.25	70.5	100
8	ESP	Spain	73.09	66.89	57.46	61.79	95.05	84.25	73.4	71.76	78.64	Europe &	XL	High	63.46	100	41.33	88.79	52.08	100
9	KOR	South Kor	72.98	74.86	58.71	76.56	72.77	82	71.03	63.21	57.08	East Asia &	XL	High	77.41	52.21	97.32	57.15	76.44	56.71
10	NLD	Netherlar	69.42	71.34	30.64	78.99	96.7		66.32	60.02	60.85	Europe &	L	High	85.56	19.6	63.87	96.26	73.83	22.07
11	CHE	Switzerlar	67.56	67.1	30.69	64.74	85.15	90.1	56.69	55.92	61.03	Europe &	L	High	75	58.94	16.41	76.42	69.16	69.37
12	IND	India	66.6	78.91	41.83	52.24	93.4		65.81	63.29	74.73	South Asia	XL	Lower mic	93.27	78.05	3.13	88.79	85.39	81.29
13	ITA	Italy	66.51	80.32	52.44	60.86	98.35	40.6	77.11	71.28	88.87	Europe &	XL	High	96.22	100	12.24	100	83.37	100
14	AUT	Austria	66.04	69.19	35.86	54.1	86.8	84.25	57.96	52.02	55.73	Europe &	L	High	88.51	29.78	37.13	76.42	66.58	32.57
15	NOR	Norway	62.7	64.87	18.74	38.95	90.92	100	49.47	41.79	46.26	Europe &	L	High	79.76	15.91	19.61	82.6	72.32	15.48
16	CZE	Czechia	62.69	65.97	25.7	64.02	95.05		59.4	65.99	67.53	Europe &	L	High	68.3	44.03	36.49	88.79	67.34	46.61
17	TUR	Turkey	62.28	55.78	36.11	62.16	95.05		65.56	63.93	68.15	Europe &	L	Upper mic	42.8	57.08	73.56	88.79	47.76	60.15
18	AUS	Australia	62.02	61.35	25.23	68.1	93.4		62.73	51.36	51.81	East Asia &	XL	High	62.12	21.18	71.35	96.26	51.71	21.1
19	CAN	Canada	61.85	60.32	16.82	64.44	74.42	93.25	53.9	43.72	37.66	North Am	XL	High	60.71	11.07	84.78	59.02	51.24	12.48
20	ROU	Romania	61.7	64.42	27.84	44.34	87.62	84.25	59.72	66.37	62.17	Europe &	L	Upper mic	64.71	76.73	22.31	75.13	68.79	78.35
21	ZAF	South Afri	60.11	62.87	19.13	69.98	88.45		55.47	49.2	54.75	Sub-Sahar	L	Upper mic	68.43	22.31	51.7	79.45	53.28	19.07

In conclusion, the Quality Infrastructure for Sustainable Development (QI4SD) Index is a valuable tool for assessing and improving infrastructure quality in the context of sustainable development. By providing a comprehensive framework and standardized measurement system, it enables policymakers to make informed decisions, promotes transparency, and encourages sustainable practices. Ultimately, the index aims to contribute to the achievement of sustainable development goals by ensuring that infrastructure investments are aligned with economic social and environmental

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