08

Comparison with other green growth indices

8.1 Frameworks and design

The objective of this analysis is to understand similarities and differences between major global and regional green growth concepts. The focus of the analysis refers to the frameworks and design process for green growth concepts (Table 11). Below offers a brief description of the focus of the analysis.

Table 11 Focus of analysis of global green growth concepts

Thematic focus	Focus of analysis	Guidance for analysis	Relevant literature
Frameworks	Conceptual	Build a framework that clearly defines the phenomenon and its sub-components; and weighs subcomponents according to their relative importance	Nardo et al., 2005
	Institutional	Adopt the UN principles as guiding framework	United Nations, 2012
Design processes	Internal or in-house	Select indicators based on the principle of fitness for purpose	Nardo et al., 2005
	Consultative	Involve other stakeholders to identify relevant issues on the indicators; develop a sound analytical design for policy-relevant indicators	UNEP, 2014b

Frameworks:

Two types of frameworks are relevant for the comparative assessment of green growth concepts – theoretical and institutional.

The structure of the indicators needs to be selected carefully according to a given theoretical framework. The OECD and JRC Handbook (2008: p.22) emphasizes that "[t]he framework should clearly define the phenomenon to be measured and its sub-components, selecting individual indicators and weights that reflect their relative importance and the dimensions of the overall composite. This process should ideally be based on what is desirable to measure and not on which indicators are available." It also suggests further dividing multiple dimensions into several subgroups, which should not be independent of each other, and that existing linkages should be described theoretically or empirically to the greatest extent possible. GGKP (2013) emphasizes the relevance of a theoretical framework that enables the measurement of substitutability among dimensions and indicators, reflecting how strong the necessary balance is among the social, economic, and environmental pillars of green growth. The comparative assessment involved looking, on the one hand, at the categories of the indicators and their linkages to the indicators and dimensions, and, on the other hand, at the weights assigned to the indicators and thus the degree of substitutability among them.

The policy relevance of green growth frameworks will be enhanced by benchmarking the indicators to specific global institutional agreements. Article 57 of the declaration "The Future We Want!" proposes the adoption of the U.N. principles as guiding framework by stating (UNEP, 2014b: p.10), "We affirm that policies for green economy in the context of sustainable development and poverty eradication should be guided by and in accordance with all the Rio Principles, Agenda 21 and the Johannesburg Plan of Implementation and contribute towards achieving relevant internationally agreed development goals, including the Millennium Development Goals." Many international organizations built their concept using SDG indicators, with the aim of targeting to achieve the same goals and enhancing comparability among the measures. The comparative assessment identified the linkages of the indicators to the SDGs and other green growth-related international agreements, such as the Aichi targets for biodiversity, the Paris Agreement for climate action, and the Sendai framework for disaster reduction.

Design processes:

The design processes focus on steps undertaken to develop and apply the framework, such as in the form of an index and/or dashboards, and the range of institutions included in the development process. There are two general processes for designing green growth conceptual frameworks: based on the fit-for-purpose principle and on stakeholder consultations. The OECD and JRC Handbook (2008) suggests the adoption of a fit-for-purpose principle when selecting indicators that aim to target end users' needs. Because it entails a process that is entirely internal to organizations, developing the framework depends on a strong theoretical foundation, a well-defined narrative, and a scientifically driven set of indicators. UNEP proposes the involvement of a broad set of stakeholders to support the design and implementation of a coherent and inclusive green economy strategy (UNEP, 2014b). This is particularly relevant for conceptual frameworks that use cross-sectoral indicators and are based on policy-driven sets of indicators. The comparative assessment identified the process that was ultimately followed in developing the frameworks for green growth indices.

The criteria for selecting green growth frameworks for the above-mentioned comparative assessments are related to their practical application, such as being global in scope, developed/updated recently, and composite indices and dashboards (Galotto & Acosta, 2019). Only four of them met the criteria: ADB's Inclusive Green Growth Index (Jha et al., 2018), AfDB's African Green Growth Index (AfDB, 2014), UNEP's Green Economy Progress Index (PAGE, 2017a, 2017b), and DC's Global Green Economy Index (Tamanini, Bassi, Hoffman, & Valenciano, 2014).

8.1.1 Overlaps in and diversities on concepts

The green growth frameworks of ADB, AfDB, UNEP, and DC were considered for the comparative assessments with the Green Growth Index. ADB's concept was designed to develop a regional green growth index and measure green growth performance of developing countries in the Asia-Pacific region, but it can be applied to all countries and regional settings and for all levels of development. AfDB's concept of green growth was piloted to support its 2013-2022 strategy, which focuses on inclusive growth and the transition to green growth across Africa. DC's concept of green economy was also applied in a global index that is updated every two years. UNEP's concept was also developed to measure green economy progress at the global level, using both an index and a dashboard of sustainability indicators. Finally, the OECD concept of green growth was designed only using dashboards and without a composite index.

Conceptual framework

The indicators in the frameworks of ADB and UNEP are mainly grouped according to a three-pillar structure representing economic development, environmental sustainability, and social inclusion. In addition to the three pillars of sustainability, the frameworks of GGGI and AfDB include indicators related to institutions. DC's framework has indicators for the environment, the economy, and institutions, but none address social considerations.

GGGI's framework is structured into four dimensions, where two out of four represent the environmental pillar, namely efficient and sustainable resource use and natural capital protection. These two separate dimensions on the environment emphasize the different pathways to achieve green growth — efficiency and protection, which require different policy strategies. The "green" aspects of growth are also reflected in the economic dimension, specifically green economic opportunities, with indicator categories referring to green investment, green trade, green employment, and green innovation. The green economic opportunities are expected to not only support resource efficiency and natural capital protection but also enhance social inclusion. The choice and structure of the indicators clearly reflect GGGI's definition of green growth as presented in Chapter 4.1 of this report. The GGGI framework has a total of 36 indicators that capture the multiple dimensions of green growth.

UNEP's Green Economy Progress Measurement framework includes 13 indicators that are linked to the three challenges given in its definition of green growth: "An Inclusive Green Economy is a pathway designed to address three main global challenges, namely: (a) persistent poverty; (b) overstepped planetary boundaries; and (c) inequitable sharing of

growing prosperity" (PAGE, 2017b: p.3). The narrative proposed by UNEP suggests that progress achieved in the social, environmental, and economic indicators promotes the creation of a new generation of capital — natural, physical, human, and social, which will serve as input in the production of environment-friendly goods and services — through consumption, investment, trade, and public spending. The indicators are intended to capture the multidimensionality of green growth. Unlike GGGI's framework, however, the indicators are not grouped into dimensions or subcategories. Similar to GGGI's framework, the economic pillar of UNEP's also includes green indicators, such as green trade and environmental patents. Although many of UNEP's indicators are included in GGGI's framework, the concepts behind UNEP's framework are different: UNEP deals with progress, while GGGI deals with performance.

ADB's framework has a total of 28 indicators that are organized into three pillars: seven for environmental sustainability, 14 for social equity, and seven for economic growth. ADB's definition of green growth is more straightforward than the definitions GGGI and UNEP: The Inclusive Green Growth Indicator (IGGI) "was designed to measure progress on inclusive and environmentally sustainable growth at the national level" (Jha et al., 2018: p.20). The three pillars are assumed to be supportive of green growth independently as there are no defined interlinkages between them. There are few overlaps in the environmental and social indicators in the frameworks of GGGI and ADB, but none in terms of economic indicators. ADB's economic indicators are mainly related to overall economic growth. Thus, unlike those by GGGI and UNEP, the economic pillar in ADB's framework does not strongly emphasize "green" aspects of growth.

AfDB's framework includes five dimensions: socio-economic context and characteristics of growth; environmental and resource productivity; monitoring the natural asset base; gender; and governance. There are 48 indicators, which are grouped unequally among the dimensions, with socio-economic context and characteristics of growth having the largest number of indicators. Because economic and social considerations are integrated into one dimension, it was not intended to include "green" aspects of economic growth. The choice of the dimensions or structure of the indicators do not reflect AfDB's definition of green growth: "the promotion and maximization of opportunities from economic growth through building resilience, managing natural assets efficiently and sustainably, including enhancing agricultural productivity, and promoting sustainable infrastructure" (AfDB, 2014: p.1). AfDB's framework has a dimension related to institutions which focuses on governance issues that hinder green growth in Africa.

Finally, DC's framework is structured into four dimensions: leadership and climate change; efficiency sectors; market and investment; and environment. It has a structure that departs from the classic green growth narratives, in particular, by excluding social inclusion indicators. When DC first published its Global Green Economy Index in 2010, it did not explicitly offer a definition of green growth or any concept to inform about the choices of indicators. Only in its report in 2014, an explanation was provided on what guides the DC framework: "We first published the Global Green Economy Index in 2010 guided by a belief that the environment, climate change and green, low carbon growth would rapidly become defining issues for national policy makers and the global reputation of countries." (Tamanini et al., 2014: p.5). The latter part of this definition somehow reflects the indicators chosen for the dimension on leadership and climate change, for example, media coverage and climate change performance. Similar to the frameworks of GGGI and UNEP, the economic dimension of DC's framework considers the "green" aspects of economic growth.

Institutional framework

GGGI, UNEP, and ADB explicitly considered the links of their frameworks' indicators to the SDGs. AfDB and DC have not specifically linked their indicators to the SDGs.

GGGI's index was designed to address the SDGs. Supporting the GGGI member governments to achieve the commitments expressed in their nationally determined contributions (NDCs) and SDGs is one of the main goals of the GGGI Refreshed Strategic Plan 2015-2020 (GGGI 2017). In the index structure, this intention is reflected in the choice of indicators, which cover 16 of the 17 SDGs. UNEP developed its measurement framework with the specific goal of monitoring the SDGs and supporting the measurement and implementation of the 2030 Sustainable Development Agenda. The 13 variables included in the UNEP's index cover 14 SDGs. Similarly, ADB considered measuring the SDGs as one of its foremost goals: "The [index] can track country performances on many SDGs. Most countries have calibrated their development priorities to SDG targets. ... The IGGI can be used to track country performances on many SDGs at the national level." (Jha et al., 2018: p.xii). ADB's 28 indicators, however, only cover 12 of the 17 SDGs.

Finally, GGGI and UNEP are using scientific evidence to support the narrative of their institutional frameworks, referring to internationally recognized sources to define the thresholds or targets for the indicators. Unlike the other indices considered in the comparative assessments, the indices of GGGI and UNEP measure not only country performance toward the intended direction of growth but also the indicators' distance from a target, for instance, the SDGs. This gives both the Green Growth Index and the GEP Index the opportunity to increase their policy relevance by including the SDGs or other preferred frameworks at the country level explicitly within their methodologies. While GGGI applied a simple benchmarking normalization method, UNEP used a complex method that weights the indicators differently according to the initial distance from the critical threshold (PAGE, 2017b).

8.1.2 Design processes

The design processes used by the international organizations in building green growth concepts and their application are relatively diverse, with ADB and DC using in-house processes, AfDB using consultative processes, and GGGI and UNEP using a combination of processes (Figure 28).

Figure 28 Design process used by international organizations
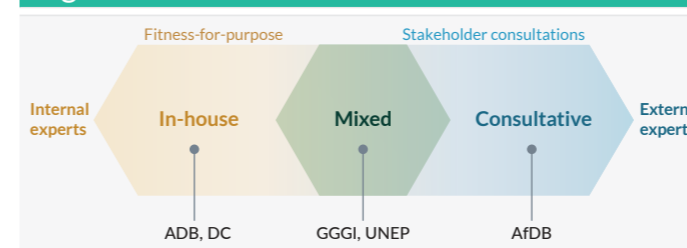
Although both GGGI and UNEP adopted a mixed process, the former placed greater emphasis on the consultative process and the latter on the definition of the principles of green economy. As mentioned in the introduction of this paper, GGGI followed two complementary strategies to enhance policy relevance of the Green Growth Index: a stepwise scientific approach and a consultative process with experts. GGGI's index is a result of a long consultation process that started in the development of a pilot version in 2016. The consultation process aimed to validate the choice of indicators, which were initially identified from a systematic literature review of green growth-related theories and case studies. In particular, the involvement of external experts in designing GGGI's green growth framework was significantly expanded in 2018 and 2019, with the participation of more than 300 experts from international organizations as well as government agencies, non-government organizations, and academic institutes. Moreover, by forming an international expert group for the Green Growth Index, GGGI made collaboration with other international organizations in developing green growth concepts as an integral part of its design process. These international organizations include UNEP, OECD, the World Bank (WB), the International Labour Organization (ILO), the United Nations Industrial Development Organization (UNIDO), the United Nations Development Programme (UNDP), the United Nations Conference on Trade and Development (UNCTAD), the Food and Agriculture Organization of the United Nations (FAO), and the International Fund for Agricultural Development (IFAD).

In a different yet comparable way to that of GGGI, UNEP's framework and its applications followed an intense theoretical and methodological effort from experts within UNEP and from academia which resulted in a relatively complex index design. The selection of indicators and methods for aggregation are based on analytical assumptions. Before finalizing the index, however, UNEP did conduct some consultations. The report itself is published as part of the U.N. Partnership for Action on Green Economy (PAGE), a joint initiative by UNEP, ILO, UNDP, UNIDO, and the United Nations Institute for Training and Research. Moreover, a wide group of experts, including representatives from the GGKP Metrics and Indicators Working Group, the Organization for Economic Co-operation and Development, and other non-governmental organizations, were invited to propose comments and suggestions during two workshops. Those were taken into account and, where appropriate, translated into structural modification and addition of indicators (PAGE, 2017a, 2017b).

AfDB followed a consultative process as shown in the publication of the pilot version of its index. "Although simplicity is a key attribute in the development of green growth indicators, it must also be able to capture the imagination of users/stakeholders, in this case the African governments, development agencies (including banks), industry, labour and many others" (Kararach et al., 2018: p.433). AfDB's choice of indicators and weights for the indicators were very much dependent on the suggestions of a group of qualified experts and panelists (AfDB, 2015). The weights were also intended to be further refined through consultations with various stakeholders "to capture the diverse context and priorities among member states" (Kararach et al., 2018).

ADB's index followed an in-house process, where indicators were chosen by internal expert economists. The methods were very rigorous and constructed based on a well-defined narrative. The

ADB report states clearly the principle followed for each step of the design process (Jha et al., 2018). The included variables were selected according to policy relevance, data availability, country coverage, and access to data. Equal weighting was chosen for its simplicity, transparency, and broad acceptance. More importantly, each procedural step was supported by a careful reporting of the scientific literature used to select the indicators.

Similar to ADB's index, the DC index has followed an entirely in-house process. A group of internal experts built the version proposed in the first edition which was then regularly revised by adding new indicators without involving external experts. But unlike ADB, DC does not provide a detailed description on the background of its methods, which may imply the use of expert judgement without scientific support from the literature.

8.2 Correlation of indices

Table 12 presents the results of the correlation analysis of the Green Growth Index and other green growth indices, namely ADB's Inclusive Green Growth Index, AfDB's African Green Growth Index, UNEP's Green Economy Progress Index, and DC's Global Green Economy Index. Three correlation statistics were employed to increase the robustness of the results and offer a wider interpretation. The Pearson's correlation coefficients measure the degree of similarity between the scores, while the Kendall's tau and Spearman's rho are rank correlation coefficients, which measure association on the order of the country rankings.

The results reveal statistically significant and positive correlation of the Green Growth Index with the indices of DC and AfDB, and no significant correlation with those of UNEP and ADB. The level of correlation is slightly higher with AfDB's as compared to the DC's index. A possible reason for the correlation between GGGI's Green Growth Index and AfDB's African Green Growth Index is the wider range of indicators in the AfDB index, which encompasses indicators correlated to indicators included in the Green Growth Index. This induces a higher possibility of partial alignment between the indices of AfDB and GGI. The correlation between the Green Growth Index and DC's Global Green Economy Index could be attributed to the similarity in indicators for some green growth dimensions, particularly for natural capital and green markets and investments.

International Organizations	Coverage	Number of countries	Correlation Coefficients		
			Pearson	Kendall's tau_b	Spearman's rho
UNEP	Global	95	0.138	0.048	0.094
			(0.20)	(0.52)	(0.38)
DC	Global	77	0.513**	0.327**	0.459**
			(0.00)	(0.00)	(0.00)
AfDB	Africa	17	0.656*	0.644**	0.818**
			(0.04)	(0.01)	(0.01)
ADB	Asia-Pacific	22	0.484*	0.127	0.226
			(0.03)	(0.44)	(0.22)

Table 12 Correlation of Green Growth Index to other related indices

Notes: Values in parentheses are level of significance where ** correlation is significant at the 0.01 level (2-tailed) and * correlation is significant at the 0.05 level (2-tailed).

ADB's Inclusive Green Growth Index has a different focus than that of GGGI's Green Growth Index, hence the lack of or low correlation between the two. ADB's index does not take into account green growth and only takes into account global economic growth, contrasting with GGGI's Green Growth Index. Finally, the lack of significant correlation with the values and ranking of UNEP's Green Economy Progress Index is not surprising given some of the methodological differences between both frameworks. In fact, while the Global Green Growth Index measures the countries' current performance in green growth — as it is for the DC, AfDB, and ADB indices — the UNEP Index calculates them in in terms of 10-year changes, capturing progress toward achieving a greener economy. In addition, it is important to consider that the low correlation could also be due to the differences in indicators across indices, although both frameworks have some common indicators.