



# MAKING SENSE OF REGIONAL INTEGRATION INDEXES



A Guide to better Understand and Use the Information contained in Regional Integration Indexes

Indexes are often complex technical tools with an overwhelming amount of explicit and implicit information. The purpose of this guide is to demystify regional integration indexes, making them accessible to and usable by practitioners, researchers and policymakers. Through the acquisition of essential knowledge on different dimensions and indicators pertaining to regional integration, users of this guide are expected to be able to better assess and interpret regional integration performance of countries and regions. Ultimately, the use of the information contained in this guide is meant to help advancing analysis and formulation of reforms in various aspects of regional integration.

# MAKING SENSE OF REGIONAL INTEGRATION INDEXES

A GUIDE TO BETTER UNDERSTAND AND USE THE INFORMATION  
CONTAINED IN REGIONAL INTEGRATION INDEXES

## FOREWORD

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*And regional integration is not only an economic issue: if Africa is to exercise influence in international affairs commensurate with its size and population, it will need more regional coherence.*

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Kofi Annan, *Africa in the Global Outlook: Too Big To Fail*, September 2015

Regional integration is a complex concept that draws its definition from various disciplines. Its measurement is not a simple task and may require sophisticated statistical techniques. It follows that its comprehension and use can be challenging to a non-technical user. This is where this guide comes in as a handy tool for all those interested in understanding regional integration and its multiple components. It builds on the experiences of the 2016 and 2019 versions of the Africa Regional Integration Index (ARII) but is intended to be a universal guide that will enable its readers to be more conversant with regional integration and to use the information contained in available indexes in an effective way.

In our increasingly knowledge-based economy, sound indicators are in high demand. To meet policy objectives that aim at the desired socio-economic outcomes, a process of change is usually required. It starts with identifying targets to ensure these objectives have been met. Progress towards targets can only be monitored and assessed if they are measurable. This is often achieved through the use of statistics and indicators. However, the more complex the concept, the greater the amount of data required. In other words, there is rarely a single measure of a concept; several indicators must often be used to get an accurate measurement of the concept. Consequently, assessment of progress can become a cumbersome process. Indexes that can capture multidimensional concepts are, thus, highly appreciated policy instruments. While they are practical tools that can readily guide policy, they can often mislead if not used and interpreted properly. This guide aims to distill information contained in integration indexes so that it becomes knowledge that can influence and guide policy.

Regional integration is a global phenomenon that gained momentum in the last few decades, thanks, in particular, to the socio-economic benefits it is expected to bring to the concerned nations. Developing countries increasingly see integration arrangements as means to achieve growth and development

through greater industrialisation, diversification and structural transformation. While regional integration is a goal all countries aim to achieve, their priorities may differ. This is because countries are heterogeneous in many ways: they have different resource endowments and, hence, comparative advantages in different areas; their degree of openness may vary due to structural and historical reasons; they have cultural and ethnic specificities that govern the way business is conducted among other things. Analysing the underlying factors behind the dimensions of regional integration is sine qua non to understanding and interpreting regional integration.

## BACKGROUND TO THE GUIDE

This guide is one of the outputs produced under one of the Development Account (DA) Projects<sup>1</sup> whose aim is to “strengthen the capacity of selected developing countries to measure, monitor and improve their performance in regional integration within the Africa, the Arab, and the Asia-Pacific regions”. Regional integration is not a new concept and these regions have in place their own frameworks to address regional integration issues. A non-exhaustive list of such frameworks includes:

- The Abuja Treaty, Minimum Integration Programme (MIP), Programme for Infrastructure Development in Africa (PIDA), Tripartite Free Trade Area (TFTA), African Continental Free Trade Area (AfCFTA) in the Africa region.
- The Agadir Declaration, Greater Arab Free Trade Area (GAFTA), Pan-Arab Free Trade Area (PAFTA), Gulf Cooperation Council (GCC) Customs Union, Arab Customs Union (ACU) in the Arab region.
- The Asia Cooperation Dialogue (ACD), Asia-Pacific Economic Cooperation (APEC), Regional Economic Cooperation and Integration (RECI), Association of Southeast Asian Nations (ASEAN), South Asian Free Trade Area (SAFTA), South Asian Association for Regional Cooperation (SAARC), Eurasian Economic Union (EAEU) and Regional Economic Comprehensive Partnership (RCEP) in the Asia-Pacific region.

Nevertheless, progress to date in regional integration has been uneven and slow in some areas: regional trade remains very low in the African and Arab regions compared to the Asia-Pacific region; growth in the latter region is driven by only a few countries and is concentrated. Thus, there is a need to assess and monitor integration in a more effective way so as to build up capacity to provide effective support and guidance to member States.

Moreover, a number of United Nations’ resolutions commend regional integration as a vehicle for the development of its member States. For example, General Assembly Resolution 70/1 on “Transforming our world: the 2030 Agenda for Sustainable Development” acknowledges “the importance of the regional and sub-regional dimensions, regional economic integration and interconnectivity in sustainable development. Regional and sub regional frameworks can facilitate the effective translation of sustainable development policies into concrete action at the national level”.

Against this backdrop, regional integration indexes have been developed in these regions to allow for the ranking of countries and regional economic communities based on their performances on key defined indicators of economic and social integration. The United Nations Economic Commission for Africa (ECA), jointly with the African Union Commission (AUC) and the African Development Bank (AfDB) published the first edition of the Africa Regional Integration Index (ARII) and are in the process of publishing the

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<sup>1</sup> 11<sup>th</sup> Tranche of the Development Account, Project Code: 1819 and Title: Measuring, monitoring and improving performance in regional integration within ECA, ESCWA and ESCAP regions. In 1997, the General Assembly of the United Nations (UN) established (through resolution 52/12 B) the Development Account (DA) (<https://www.un.org/development/desa/da/>). The DA is a mechanism to fund capacity development projects of the economic and social entities of the UN Secretariat (i.e. DESA, UNCTAD, UNEP, UN-Habitat, UNODC, ECA, ECE, ECLAC, ESCAP and ESCWA). DA projects aim at “enhancing capacities of developing countries in the priority areas of the United Nations Development Agenda” (DA website).

second edition (ARII, 2019). The latest edition is meant to be an improvement over the first edition in terms of methodology and capability to capture current regional progress and efforts in the best possible way. The United Nations Economic and Social Commission for Western Asia (ESCWA) published the Arab Economic Integration System of Indexes (AEISI) in the first edition of Assessing Arab Economic Integration Report (AAEIR). The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) envisages to draw upon the Asia-Pacific Regional Cooperation and Integration Index (ARCII)<sup>2</sup>, recently developed by the Asian Development Bank (ADB).

Reviewing and refining existing methodologies to measure regional integration are valuable efforts to support member States towards better assessing, monitoring and improving their performance in various aspects of regional integration. However, it is important that the indexes produced, and the rich information they contain, are understood and used by practitioners, researchers and policy makers. The present User Guide precisely aims at better equipping member States to assess and monitor their level of integration.

In the context of the DA Project, the User Guide is being used as training material to build up capacity of member States<sup>3</sup>. In addition, an avant-garde web platform<sup>4</sup> has been developed to provide users with the results of the latest index together with the disaggregated data that have been used in computing the index and allow them to make some tailor-made simple analysis such as generating charts, tables and maps. The aim of these initiatives is to make regional integration comprehensible to a wider public but most importantly to make it accessible and usable by policy and decision makers.

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<sup>2</sup> See <https://aric.adb.org/database/arci> for more details

<sup>3</sup> In the African context, two training of trainers workshops were held, one in English and one in French, from 1- 4 July 2019 at the African Institute for Economic Development and Planning (IDEP), Dakar, Senegal entitled the “Africa Regional Integration Index: Its Use for Policy Development and Analysis”.

<sup>4</sup> The ARII web platform is accessible at [www.uneca.org/arri](http://www.uneca.org/arri)

## ACKNOWLEDGMENTS

This User Guide, “Making Sense of Regional Integration Indexes”, has been prepared by the African Trade Policy Centre (ATPC) of the ECA. It was written by Shamnaaz B. Sufrauj, International Consultant and Simon Mevel, Economic Affairs Officer, ATPC, ECA whose expertise in regional integration led to the conceptualisation of this project.

The creation of this User Guide would not have been possible without the overall guidance of David Luke, Coordinator, ATPC. It further benefitted from various workshops and consultations with partner institutions, namely, ESCAP and ESCWA. In particular, the ECA acknowledges the invaluable comments and feedback of participants of the expert group meeting on Methodologies of Regional Integration Indexes held in Addis Ababa on 25-26 September 2018. Moreover, the authors benefitted from their participation at the Joint Research Centre (JRC) week on Composite Indicators and Scoreboards held in November 2018 in Ispra, Italy; the expertise of the JRC-Ispra/European Commission staff is acknowledged.

Special thanks to all the participating colleagues of the Regional Integration & Trade Division (RITD) of the ECA. Our gratitude to Senait Afework, ATPC, who managed the translation and editing. The feedback of participants of the training of trainers workshops, Africa Regional Integration Index: Its Use for Policy Development and Analysis held at the African Institute for Economic Development and Planning (IDEP), Dakar, Senegal from 1 to 4 July 2019 are warmly acknowledged.

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## INTRODUCTION

### What is the purpose of this guide?

The objective of this guide is to make regional integration indexes and, particularly, the 2019 version of the Africa Regional Integration Index (ARII) accessible and usable for policy analysis and policy making. It specifically intends to facilitate interpretation of the results by explaining the underlying factors behind the dimensions of integration and the accompanying indicators. It is meant to broaden the perspective of the user on the issue of regional integration. As such, although it shares experiences and lessons acquired over the making of two publications, ARII (2016) and ARII (2019), it also provides the user with additional information that may not have been used in ARII but that are relevant to contemporary integration endeavours.

It debunks the concept of regional integration by providing a step-by-step guide on: 1) its dimensions and indicators, both existing and potential; 2) the treatment of data; 3) the different methodologies that exist to assign weights and the aggregation method; 4) the rankings at different levels and their interpretations.

This guide does not seek to explain how to construct indexes. The interested user can refer to ARII 2019 report and its Methodological Note for the African context or to more specialised guidelines on the construction of indexes, such as, Handbook on Constructing Composite Indicators (2008) published by the Organisation for Economic Co-operation and Development (OECD). However, good practices on the choice of indicators and methodology are documented so as to better guide the reader. Moreover, this guide does not explain per se the gains or losses that integration bring about. However, it touches on these issues when it explains the theoretical framework behind integration and their dimensions.

### To whom is it addressed?

This guide is geared towards anyone looking for specific information to measure, monitor and improve countries' regional integration performance, particularly in the African context. Practitioners, policymakers, researchers, students and institutions that conduct work related to economic integration will find this guide useful. The practitioner/policymaker will better understand where her/his country stands on regional integration and why it is in such position. She/he will be able to identify the strong and weak dimensions of regional integration for her/his country and the underlying factors that affect each dimension.

### Organisation of this guide

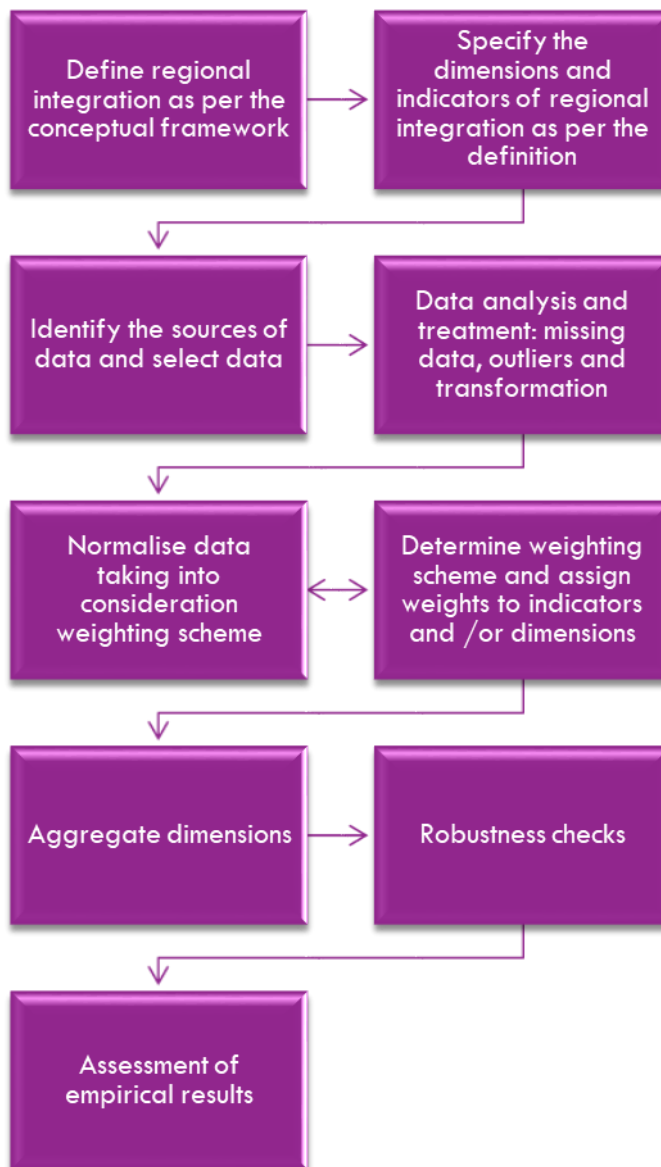
- **Chapter 1** defines the concept of regional integration building on existing academic and organisational literature. It explains the term from its core going through how it evolved over time and how it is perceived now. Its relevance for developing countries is briefly expounded and the Africa Regional Integration Index is introduced. Important terms and concepts are defined and distinguished.
- **Chapter 2** details the aspects and dimensions of regional integration; some common indicators that are used to assess trade integration are presented; the indicators used in ARII 2019 are also outlined.

- First, the most dominant aspect of regional integration, that is, the trade dimension is explained by presenting several potential indicators. A distinction is made between indicators that are based on trade flows and densities and those based on trade costs including trade facilitation indicators.
  - Second, the production dimension is documented. With advances in communication and transportation and the attendant reduction in costs together with opportunity for specialisation and economies of scale, production has become increasingly fragmented and cross-border. This dimension exposes the indicators to capture the cross-border nature of countries productive capacities: trade in intermediate goods and trade complementarity index.
  - Third, because regional integration is premised on the existence of well-functioning and efficient virtual and physical infrastructure, indicators of regional infrastructural integration are proposed. The modern world is characterised by a huge dependence on ICT for conducting day-to-day business activities. Thus, the cost of interregional communication is an important measure of integration and is proposed as an indicator. Additionally, for actual regional business to happen, goods need to be moved from the sources of supply to places of demand via trade routes that are safe, efficient and maintained. Accordingly, indicators of existing cross-border infrastructure together with indicators of investment and expenditure in regional infrastructure are suggested.
  - Fourth, several potential indicators of financial and macroeconomic integration are explained. The importance of financial and macroeconomic convergence is elaborated: the cross-ownership of capital ensures that the risks are spread out and macroeconomic stability attracts foreign capital. The indicators are categorised as: (i) de jure measures: that focus on the restrictions on financial transactions; (ii) de facto measures: that are outcome-based and are quantity and price measures; and (iii) hybrid measures: a combination of the two previous measures.
  - Fifth, the indicators under the free movement of people dimension are documented. A dimension that is meant to facilitate overall integration.
  - Sixth, a dimension regrouping institutional indicators is proposed. It includes all the arrangements and agreements that a region has set up in their effort to achieve common policies whose aim is to directly or indirectly enhance regional integration.
  - Seventh, given that contemporary understanding of regional integration embeds the social, cultural and environmental aspects of the economy, a dimension that represents these concerns is suggested. Labour migration, compliance with regional environmental standards and the ratio of foreign students in total students are the proposed indicators.
- **Chapter 3** is probably the most important and practical part of this user guide as it discusses selected empirical results drawn from ARII 2019. It focuses on the regional economic communities

(RECs) and explains their regional integration rankings by digging into each of the dimensions considered. Thus, strengths and weaknesses of each REC are highlighted thereby providing insights into specific measures that should be taken to improve the strengths and address the weaknesses that have been identified. It intends to facilitate the making of policy.

- Chapter 4 explains the established methodology and steps in constructing indexes: the theoretical framework, data selection and transformation, normalisation, weighting scheme, aggregation and sensitivity analysis.

The chart below summarises the steps of constructing a regional integration index in a logical way. All of these steps are covered in the four chapters of this User Guide although not in the same order.



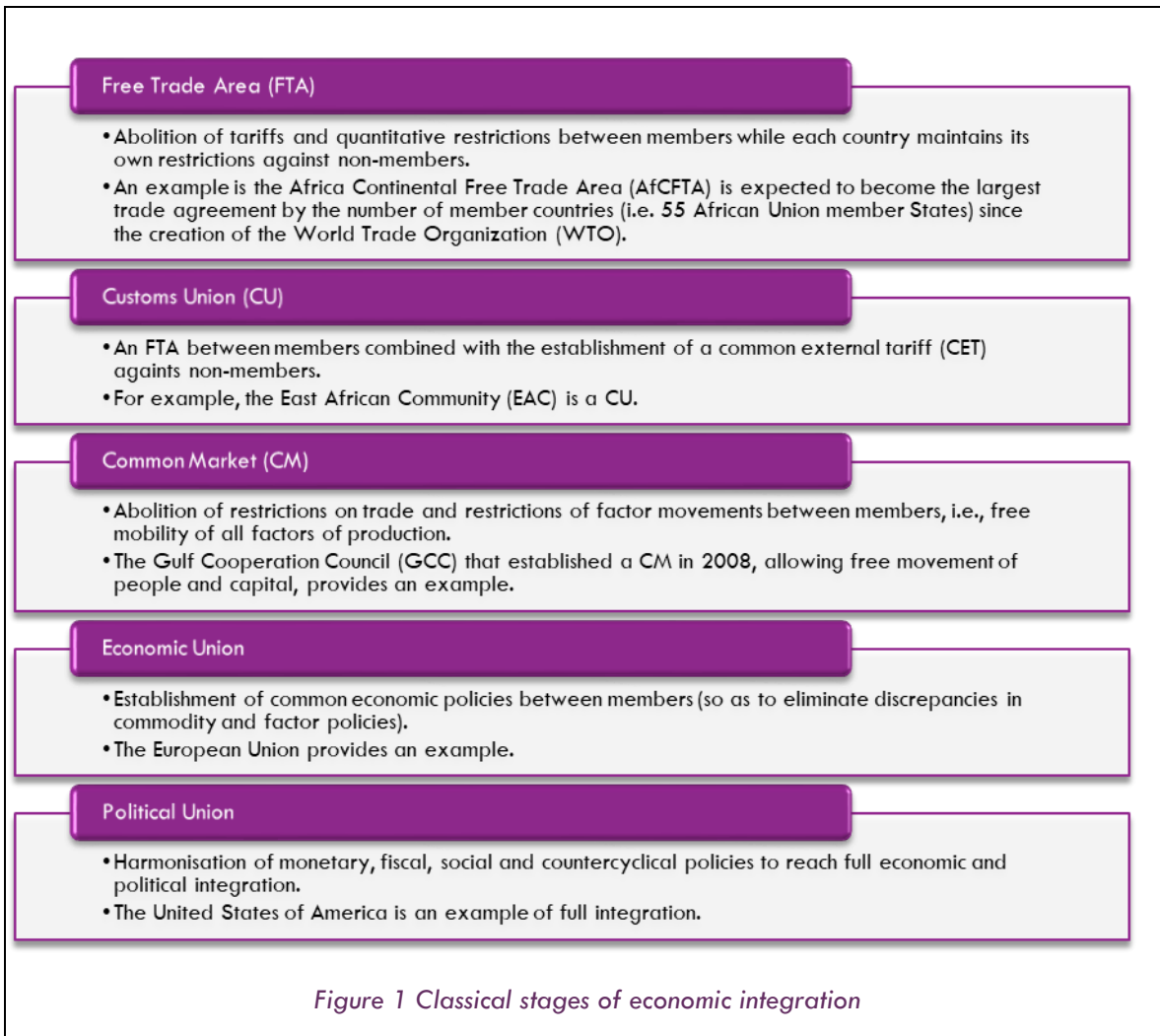
CHAPTER 1: UNDERSTANDING REGIONAL INTEGRATION

Fredrik Söderbaum (2009)

*It is natural to begin with the problem of definition, notwithstanding that such an exercise has often proved problematic, due to the fact that regional integration and regionalism are elusive and evolving concepts.*

**The meaning of regional integration**

Regional integration, in contemporary discourse, refers to the convergence of national policies towards the establishment of regional institutions with the purpose of attaining certain common objectives—socially, economically and environmentally desirable objectives. This definition assumes a larger perspective compared to the stricter concept of **economic integration** from which the former is inspired.



Formally, economic integration is the abolition of discrimination between the economic units of different national states (Balassa, 1961). It takes various forms from less to more integrated and traditionally occurs in the following stages<sup>5</sup>: free trade area, customs union, common market, economic union and ultimately total integration (See Figure 1). In a more general way, it refers to the process of combining separate economies into a larger economic region (Machlup, 1977).

**Glossary: Preferential Trade Agreements (PTAs)**

Also known as regional trade agreements (RTAs), they refer to agreements that grant preferential access to the goods and services of participating countries. They usually entail a reduction in tariffs rather than their abolition as in FTAs.

Viner (1950) developed the first modern theory of economic integration by focusing on the purely economic gains and losses of forming a customs union. Accordingly, when countries enter into economic agreements two effects are likely to emerge: a **trade creation** effect occurs when the arrangement increases trade and efficiency as production shifts from a high-cost producer to a low-cost producer inside the union; a **trade diversion** effect is when production shifts from a low-cost producer outside the arrangement to an internal high-cost producer, thus nurturing inefficiencies. The author argues that trade creation is welfare-increasing for the home country and trade diversion is welfare-reducing.

Many contributions have been made to Viner's analysis, and it has been found that trade diversion may actually be beneficial if welfare gains from reduced prices and tariff elimination are accounted for, that is, the effects on the consumer as explained below (Lipsey, 1960; Pomfret, 2001).

**Welfare**

Whether it takes a general or narrow standpoint, the goal of economic integration is the achievement of greater welfare. The term **welfare** is fraught with subjectivity and much disagreement in the economic and development literature. Traditionally, **economic welfare** is associated with an increase in production. The neoclassical economist, Alfred Marshall, puts the consumer at centre-stage and proposes a measurement of consumer welfare through consumer surplus, that is, the difference between how much someone is willing to pay for a given quantity of goods and how much one actually pays.

**Pareto optimality** is a central concept in welfare economics: an allocation of resources is Pareto optimal when it is impossible to reallocate resources to make any one individual better off without making at least one individual worse off. However, a reallocation of resources more than often produces

**MORE ON BELA BALASSA**

Bela Balassa, a Hungarian economist, is the author of the pioneering book *The Theory of Economic Integration* published in 1961 which has now become a reference in the field. The book presents a unified theory of economic integration that goes beyond a static analysis to include dynamic aspects that address large-scale economies, technological change, as well as the impact of integration on market structure and competition, productivity growth, risk and uncertainty, and investment activity.

<sup>5</sup> Unasur, the Union of South American Nations is a case where political integration has preceded economic one.

undesirable consequences also known as externalities: they are the costs imposed (negative externalities, for example, pollution) or benefits conferred (positive externalities, for example, better infrastructure) on others that are not accounted for by the person who creates these costs or benefits.

Today, much of welfare economics deals with costs-benefits analysis and the internalisation of externalities. Thus, there is growing consensus that welfare goes beyond mere economic welfare to include environmental and social aspects that are prerequisites to achieving prosperity. For example, the 17 UN Sustainable Development Goals (SDGs) balance the social, economic and environmental dimensions of sustainable development. Thus, since the goal of regional integration is an increase in welfare, the common set of objectives established by its participating countries will include non-economic aspects alongside the traditional economic ones. These dimensions of regional integration are often determined by the members of the integration process given the context and period considered. Ideally, each of these objectives should be guided by a theoretical framework. Often, to reach consensus and be acceptable, a broad set of points of view must be accommodated.

### **New developments in regional integration**

Economic concepts tend to evolve over time with our mutable society. Thus, new integration theories have been developed with changes in the economic and social environment. A number of factors, that previously were not necessarily relevant, now play a dominant role in regional integration. These are economies of scale, private sector participation, competition, foreign direct investment, the role of services, productivity and technological transfer among others (Lawrence, 2000). It is expected that changing economic conditions and new developments in economic theory will further shape our understanding of regional integration.

In fact, economic arrangements are dynamic. NAFTA which was established in 1994 has recently been replaced by United States–Mexico–Canada Agreement (USMCA) following renegotiations in 2017-2018. Changes have been brought in the rules of origin for the automobile industry, labour and environmental standards, intellectual property protections, and digital trade provisions. Balassa contended that integration is both a process and a state of affairs. Process means the setting up of measures to abolish discriminatory practices between economic units and state means the absence of such discrimination. In fact, most of integration endeavours around the world are in the “process” category. This is particularly the case among developing countries where many agreements have been signed but yet to be implemented.

### **The case of developing countries**

Among developing countries, economic integration is often regarded as a policy instrument to enhance their economic development and goes beyond customs and trade policies (Balassa & Stoutjesdijk, 1975). This is largely reflected by the United Nations resolution that advocates “the need to promote meaningful regional integration to encompass cooperation among countries in a broader range of areas than just trade and trade facilitation, including investment, research and development and policies aimed at accelerating regional industrial development and regional connectivity, that this approach is aimed at fostering structural change and economic growth in landlocked developing countries as a goal, and also as a means of collectively linking regions to global markets, that this would enhance competitiveness and help to maximize benefits from globalization and that documentation and the

sharing and dissemination of best practices are important to allow cooperating partners to benefit from each other's experience"<sup>6</sup>.

**Glossary: Regional cooperation**

It refers to an open-ended process, whereby individual states or other actors within a given geographical area act together for mutual benefit, and in order to solve common tasks, in certain fields, such as infrastructure, water and energy, notwithstanding conflicting interests in other fields of activity.

*Integration theory* deals with better allocation of resources while *development theory* deals with the long-term benefits of economic growth and the utilisation of under-employed resources. The conceptual framework behind modern regional integration theory tends to be a blend of the two approaches. Thus, rather than focusing on marginal economic change, integration among developing countries emphasises structural transformation and the stimulation of productive capacities. It draws from various interrelated disciplines, namely, economics, sociology, ecology, politics and governance. These are often categorised as dimensions.

Although used interchangeably in the literature, there is an important distinction between **regionalism** and **regionalisation**. The former is policy-induced integration that takes the form of formal economic arrangements and the latter is market-driven integration that occurs from regional growth dynamics, greater cross-border production and transactions. According to Söderbaum (2015), regionalism refers to the corpus of ideas, values and policies that will establish a region and is associated with a regional project. Regionalisation refers to the process of cooperation, integration and cohesion that aims at creating a regional space which involves the deepening of activities (trade, people, ideas) at a regional level.

In the context of developing countries, throughout the years a number of integration projects have seen light and it appears that the goal is regionalism. In fact, regional integration is largely voluntary, induced by policy, and it is accompanied by a formal programme for institution building involving both state and increasingly non-state actors. However, many countries are still at the earliest stage of regionalisation where a lot of efforts are being devoted to achieving greater regional cooperation.

**Regional Integration in Africa**

The first attempt to assess regional integration in Africa dates back to 2004 with the publication of the first edition of the report on *Assessing Regional Integration in Africa* (ARIA I, 2004). It covered various dimensions of regional integration, namely, trade, money and finance, transport, communications, energy, agriculture, manufacturing, and human development and labour markets. No index per se was produced but the exercise laid the foundations for understanding regional integration on the continent.

ARIA relied on costly data collection through questionnaires and the subsequent measurement of regional integration in Africa only occurred with the publication of ARII (2016). The latter was developed following extensive consultations with RECs, member States, experts from Africa as well as from outside the Continent and international organizations. It is a multi-dimensional index with 16 indicators grouped in five equal-weighted dimensions: trade integration, regional infrastructure, productive integration,

<sup>6</sup> General Assembly Resolution 71/239 on "Follow-up to the second United Nations Conference on Landlocked Developing Countries"

financial integration and macroeconomic convergence. The simple and comprehensive index was rather well-received by all stakeholders. However, there were some concerns about its ability to reflect actual integration efforts by some member States. Additionally, the simplistic methodology of giving the same importance to all dimensions and their indicators was the subject of much controversy.

The second and latest version of ARII (i.e. ARII 2019) builds on the first edition, while improving it by addressing several of its limitations. To this end, the dimensions and indicators of ARII (2019) are weighted using a multivariate statistical technique, principal components analysis (PCA). PCA allows for an objective calculation of weights that relies on the structure of the data (see the Methodology section of ARII 2019). Moreover, it includes some new indicators and it removes irrelevant ones. Other recent institutional developments that pertain to integration have been included, namely the African Continental Free Trade Area (AfCFTA).

Another major improvement of the second edition is its increased robustness. This has been ensured through the conduct of sensitivity analyses that assess the relevance of indicators in their dimensions by controlling the impact of their inclusion on the statistical tests among other controls. The results of the sensitivity analysis guided the inclusion and exclusion of indicators. Moreover, the results obtained using PCA weights are compared with those of using equal weights.

In addition to measuring countries' regional integration performance inside their respective RECs, ARII 2019 assesses countries performance at the continental level. Therefore, a country can even gauge its integration progress vis-à-vis the rest of the countries on the continent. This measure is useful in fostering integration beyond the regional communities by encouraging countries to discover and harness their untapped opportunities and complementarities in trade, production and finance.



## CHAPTER 2: DIMENSIONS AND INDICATORS OF REGIONAL INTEGRATION

Given the complexity and changing nature of the concept of regional integration, its measurement usually involves the aggregation of a wide array of indicators that capture different aspects of the concept. These indicators are often grouped into meaningful economic categories that can stand as sub-indexes of their own. They are the **dimensions of regional integration**. The conceptual framework will be the guiding post in defining the dimensions and the indicators. All the indicators in a dimension should help explain the dimensional concept and, in principle, they should be well-correlated. The number of indicators in a dimension will vary depending upon how well they add meaningful information to the dimension.

There are two broad ways of structuring indexes which can be termed as **pre-selection** and **post-selection** structuring methods. The pre-selection method involves the careful selection of indicators a priori by using rigorous economic theory to single out the most relevant indicators that matter for regional integration and discarding those indicators that are less important and highly collinear with selected indicators. This method ensures a neat and simple regional integration index with few but highly expressive indicators. However, such simplicity may be at the expense of comprehensiveness. For instance, although exports and imports are well-correlated measures explaining intensity of trade flows, the use of only one of these indicators may provide an incomplete picture of trade. The post-selection method involves the inclusion of various meaningful indicators that explain the underlying concept without discriminating between those of low and high relevance. This implies a comprehensive index that will capture more aspects of the concept and will often have a greater number of indicators than an index based on the pre-selection method. However, an index based on the post-selection method might lose its simplicity and become difficult to interpret.

While all indicators are important in an index, they may not necessarily be of equal importance. To account for these differences, indicators can be weighted so that those indicators that are more important are given greater weights than those that are less important. The post-selection method usually makes use of weights to distinguish between more and less relevant indicators. Weights are less used in pre-selection methods as all indicators are deemed to be equally important.

This section documents the most common dimensions and indicators used in the assessment of regional integration. The indicators retained in ARII 2019 are listed in boxes at the end of each section.

### **Trade dimension**

Trade is often seen as a key dimension of regional integration. There is widespread consensus that trade is a primary driver of industrialisation and growth and hence, an important, if not the most important, component of regional integration. It is also one of the most widely used proxies for regional integration since there are several indicators that can be used to measure the concept. However, no consensus exists as to which trade indicators are the most significant but the use of more than one single indicator is recommended (Bouët, Cosnard, & Laborde, 2017).

Trade indicators can be divided into two categories: indicators that measure the **intensity of trade flows** and indicators that measure **barriers to trade or trade costs**. Trade flows indicators can be further categorised as classical indicators, network measures, diversification indicators and regional indicators.

**Indicators based on intensity of trade flows**

Classical measures

**i. Trade-to-GDP**

The most common and intuitive indicator of trade openness is trade to GDP (De Lombaerde, 2009; Harrison, 1996). It is the sum of a country’s regional exports and imports divided by its GDP. It is calculated as follows:

$$\frac{X_{r,r}^* + X_{s,r}^*}{Y_r}$$

Let  $X_{r,s}^k$  be the trade flow of product  $k$  from country  $r$  to country  $s$ . The dot represents a summation. Total exports of country  $r$  is represented by  $X_{r,r}^*$  and total imports of country  $r$  is  $X_{s,r}^*$ .  $Y_r$  to GDP of country  $r$ .

While being simple, trade-to-GDP has been highly criticised for being a biased indicator. First, trade is measured in gross terms while GDP is measured in value-added terms. Second, it is misleading to use two variables that include different components. GDP includes services while trade measures often do not. As such, this ratio will underestimate trade flows for a services-oriented economy. Third, trade to GDP ratio does not account for country size. It is well known that countries with a small population tend to trade more.

Variants of this measure include using only exports or imports at the numerator.

**ii. Symmetric Indicator of Relative Openness**

This measure provides a relative symmetric measure that equals zero if the degree of openness of the region equals that of the average of the rest of the world (Iapadre & Luchetti, 2010). It is measured as follows:

$$\frac{\frac{X_{r,r}^*}{Y_r} - \frac{2X_w^* - (X_{r,r}^* + X_{s,r}^*)}{Y_w - Y_r}}{\frac{X_{r,r}^*}{Y_r} + \frac{2X_w^* - (X_{r,r}^* + X_{s,r}^*)}{Y_w - Y_r}}$$

It makes cross-country comparisons easier as it includes a benchmark, the average openness of the world. However, just as trade-to-GDP, it does not account for services and suffers from the same bias.

**iii. Corrected degree of Openness**

This measure aims to account for the influence of country size by correcting for the domestic bias (Arribas, Pérez, & Tortosa-Ausina, 2009). It corrects for GDP at the denominator and is computed as follows:

$$\frac{X_{r,w}}{Y_r - a_r Y_r}$$

where  $a_r$  is the weight of country  $r$  in the world and equals  $\frac{Y_r}{Y}$ . The denominator represents the production destined for exports. This measure only considers exports and, hence, provides a one-sided picture of trade flows.

**Measures based on Network Analysis**

The use of network analysis to measure trade flows has been proposed as a more powerful tool given that it does not lay emphasis on a specific country but rather considers the relationship between country  $r$  and  $s$  in a network. Two simple measures are reported below. For a comprehensive review of network centrality measures, the interested reader can refer to Social and Economic networks, Matthew O. Jackson (2008).

**iv. Degree Centrality**

The number of direct trade links that a country has is called its degree. A distinction can be made between in-degree and out-degree that corresponds to incoming links (the number of import partners) and out-going links (the number of export partners). The intensity of trade links can be accounted for, that is, the number of links can be assigned a weight, such as trade values, and it is called the weighted degree.

**v. Closeness Centrality**

This measure is particularly useful as it not only accounts for direct trade links (x trades with y) but also for indirect trade links (x trades with y through z) which can allow for the analysis of value chains. It is simply a measure of the shortest path between country  $r$  and other countries in the network. It is calculated as the inverse of the average geodesic distance between countries  $r$  and all other country  $s$ :

$$\frac{N - 1}{\sum_s d(r, s)}$$

where  $d(r, s)$  is the number of steps on the shortest paths between  $r$  and  $s$ . In a network of 10 countries, if country  $r$  has a direct link with 8 countries (there are 8 steps) and one indirect link (2 steps), its closeness centrality is  $10 - 1 / 8 + 2$ .

**Diversification Measures**

A measure of the quality of trade integration is the extent to which a country has diversified its trade partners. This ensures resilience to the collapse of some markets.

**vi. Equivalent Markets**

The number of equivalent markets is simply the inverse of the Herfindahl Index (H),  $\frac{1}{H_r}$ . The latter is a popular measure of market concentration and is calculated as follows:

$$H_r = \sum_s \left( \frac{X_{r,s} + X_{s,r}}{X_{r,s} + X_{s,r}} \right)^2$$

However, the number of equivalent markets does not distinguish between the different degrees of importance of trading partners. A variant of the equivalent market measure is the Global Geographic Diversification Index proposed by De Lombaerde and Lapadre (2012) as reported in Bouët et al. (2017). The latter measure uses a benchmark based on the weight of each trading partner.

### **Regional Indicators**

#### **vii. Intra-Regional Trade Intensity Index (ITII)**

The use of the share of intra-regional trade in a region's total trade is widespread but deemed problematic for several reasons. An increase in intra-regional trade share may be due to loss of competitiveness on international markets. Moreover, this share is influenced by geography and size. Intra-regional trade tends to be higher in more fragmented regions. The lack of a proper benchmark is also a serious limitation of this simple indicator.

The ITII corrects for this distortion by setting the shares in world trade as a benchmark (Lapadre & Luchetti, 2010). Simply stated, it is the ratio between the intra-regional trade share and the region's share in world trade. The ITII of region r is calculated as follows:

$$\frac{2 \sum_{r \in R} \sum_{s \in R} X_{r,s}}{\sum_{r \in R} (X_{r,s} + X_{s,r})} \frac{\sum_{r \in R} (X_{r,s} + X_{s,r})}{2X_w}$$

When the ITII equals 1, it is considered as neutral as the region share of regional trade in its total trade equals that of its share of trade in world trade. When the index is greater than 1, it indicates the prominence of regional trade.

The ITII is not free from limitations. A modified version has been proposed along with other indicators such as the Regional Trade Introversion Index. The rationale behind these indicators is well documented in Lapadre & Luchetti, (2010) and Bouët, Cosnard, & Laborde (2017) as they are beyond the scope of this guide.

#### **viii. Trade in services**

The above indicators measure principally trade in goods. However, trade in services is said to be a very vibrant segment of world trade, thus, failure to account for its share would largely underestimate trade integration. Indicators of trade in services are essentially the same as those for trade in goods but account for services trade.

### Indicators based on trade costs

Trade costs include administrative barriers, tariffs and non-tariff measures as well as transaction costs. They tend to have a negative impact on regional integration as they have a trade-restrictive effect.

**ix. Tariffs**

The most obvious indicator of trade costs is tariff rate. A country is considered to be less integrated when it imposes high duties on its imports from the countries in the region. The use of bilateral tariffs provides a more accurate picture of trade costs rather than just using a global average figure.

**x. Non-Tariff Measures (NTMs)**

As tariff levels are declining on a global scale, standing at less than 5 per cent on a trade-weighted basis, NTMs—measures other than customs duties—have become a viable alternative to traditional form of protectionism and they play a central role in international trade (de Melo & Nicita, 2018b). To assess the extent of contemporary economic integration, one has to probe into policy measures that go beyond traditional policies: for instance, the capacity of a country to meet quality standards influences its effective participation in regional trade.

NTMs are essentially policy measures designed to regulate market access and/or ensure that imports are in conformity with public policy objectives aimed at protecting consumers, workers and the environment, for instance. NTMs include a vast array of measures (see figure below) that tend to alter, intentionally or not, the volume, direction and production composition of international trade.

Generally, NTMs tend to have a negative impact on trade and, hence, they are welfare-reducing (Hoekman & Nicita, 2008). However, as income-level in a country increases, consumers demand higher-quality varieties of products that conform to safety and environmental standards. Thus, some NTMs, particularly those related to consumer protection, social and environmental safety, have a welfare-enhancing effect. This is because they reduce information costs, such as labelling costs, ensure quality as products are certified, and promote socially important matters, such as fair-trade schemes and ecological products. Thus, NTMs increasingly serve precautionary motives.

Disentangling the trade-enhancing and trade-reducing effect of NTMs is not an easy task but necessary if one wants to capture the true effect of regional integration. However, there is a lack of information on NTMs and even more so for NTMs that originate from domestic regulations (de Melo & Nicita, 2018a). Consequently, NTMs cannot be properly assessed and measured, and firms that want to access heavily regulated markets are hindered.

Nevertheless, continued efforts are being made by international organisations to fill in this gap. The World Trade Organization (WTO) has set up a notification mechanism and the United Nations Conference on Trade and Development (UNCTAD) has expanded its data collection exercise. The following figure reports the UNCTAD international classification of NTMs.

#### Glossary: Non-tariffs barriers (NTBs)

NTMs refer to any policy measures that distort trade intentionally or unintentionally. When these policy measures explicitly target the restriction of imports, that is, they act as a protectionist measure, they are referred to as NTBs.

A quota on imports is a sheer example of an NTB. However, whether other NTMs are NTBs depend largely on how they are applied. For instance, standards are not NTBs unless they are unreasonable and implicitly favouring domestic producers.

#### xi. Trade Facilitation Indicators

Besides NTMs, there are other trade costs that are less visible but still impede the smooth functioning of trade and have a negative impact on trade integration. They are measures that operate at or behind the border and include among others: administrative formalities, limited access to credit and finance, poor communication infrastructure and high domestic transportation costs.

The [World Bank's Doing Business Index](#) provides quantitative indicators that measures regulations that directly affect business operations and establishment (World Bank, 2019). It is made up of 11 sub-indexes:

1. Starting a business
2. Labour market regulation (not included in computation of index)
3. Dealing with construction permits
4. Getting electricity
5. Registering property
6. Getting credit
7. Protecting minority investors
8. Paying taxes
9. Trading across borders
10. Enforcing contracts
11. Resolving insolvency

Chapter A	Sanitary and phytosanitary measures	<ul style="list-style-type: none"> <li>requirements restricting the use of specific substances, hygienic requirements or other measures for preventing the dissemination of diseases as well as conformity assessment measures related to food safety, such as, certification, testing and inspection, and quarantine.</li> </ul>
Chapter B	Technical measures	<ul style="list-style-type: none"> <li>labelling requirements and conformity assessment measures relating to technical product requirements, including certification, testing and inspection.</li> </ul>
Chapter C	Pre-shipment inspection	<ul style="list-style-type: none"> <li>requirements and formalities to be performed in the exporting country prior to shipment.</li> </ul>
Chapter D	Contingent trade measures	<ul style="list-style-type: none"> <li>measures to counteract adverse effects of imports, including antidumping, countervailing, and safeguards measures.</li> </ul>
Chapter E	Quantitative restrictions	<ul style="list-style-type: none"> <li>licensing requirements, quotas and other quantity control measures, import prohibitions that are not related to sanitary and phytosanitary or technical barriers to trade measures</li> </ul>
Chapter F	Price controls	<ul style="list-style-type: none"> <li>measures to control or affect the prices of imported goods to support or stabilize the domestic price of competing products or raise tax revenue. Includes para-tariff measures.</li> </ul>
Chapter G	Finance measures	<ul style="list-style-type: none"> <li>policies restricting payments for imports, including regulation of access and cost of foreign exchange and terms of payment.</li> </ul>
Chapter H	Measures affecting competition	<ul style="list-style-type: none"> <li>exclusive or special preferences or privileges accorded to one or a limited number of economic operators. Includes state trading monopolies, sole importing agencies and compulsory use of national services or transport</li> </ul>
Chapter I	Trade-related investment measures	<ul style="list-style-type: none"> <li>policies that restrict investment by requiring local content or conditioning investment on balancing of exports and imports.</li> </ul>
Chapter J	Measures affecting distribution of imported products	<ul style="list-style-type: none"> <li>restrictions on distribution of imported goods within the country</li> </ul>
Chapter K	Restrictions on after-sales services	<ul style="list-style-type: none"> <li>measures that limit provision of services that are accessory or ancillary to the sale of a good</li> </ul>
Chapter L	Subsidies	<ul style="list-style-type: none"> <li>measures that relate to subsidies that affect trade.</li> </ul>
Chapter M	Government procurement policies	<ul style="list-style-type: none"> <li>restrictions of foreign bidders for public projects and contracts</li> </ul>
Chapter N	Restrictions related to intellectual property	
Chapter O	Rules of origin	<ul style="list-style-type: none"> <li>measures that pertain to determining the origin of products, or their inputs.</li> </ul>
Chapter P	Export measures	<ul style="list-style-type: none"> <li>measures applied by a country on its exports, includes export taxes, export quotas or export prohibitions.</li> </ul>

Figure 2 UNCTAD classification of NTMs

Some of these indicators are particularly relevant for trade integration. For instance, the sub-index *trading across borders* records the time and cost (excluding tariffs) associated with the logistical process of exporting and importing goods. In particular, three sets of procedures are recorded, namely, documentary compliance, border compliance and domestic transport.

The advantages of these indicators are that they are up-to-date, reflecting the current costs of trading, and accurate as they are country-specific data. In fact, the data are gathered through questionnaires sent to those involved, for example, customs officials.

Indicator	Description
(a) Information availability	Enquiry points; publication of trade information, including on Internet
(b) Involvement of the trade community (Consultations)	Structures for consultations; established guidelines for consultations; publications of drafts; existence of notice-and-comment frameworks
(c) Advance rulings	Prior statements by the administration to requesting traders concerning the classification, origin, valuation method, etc., applied to specific goods at the time of importation; the rules and process applied to such statements
(d) Appeal procedures	The possibility and modalities to appeal administrative decisions by border agencies
(e) Fees and charges	Disciplines on the fees and charges imposed on imports and exports; disciplines on penalties
(f) Formalities – documents	Acceptance of copies, simplification of trade documents; harmonisation in accordance with international standards
(g) Formalities – automation	Electronic exchange of data; use of automated risk management; automated border procedures; electronic payments
(h) Formalities – procedures	Streamlining of border controls; single submission points for all required documentation (single windows); post-clearance audits; authorised operators
(i) Internal co-operation	Control delegation to Customs authorities; co-operation between various border agencies of the country
(j) External co-operation	Co-operation with neighbouring and third countries
(k) Governance and impartiality	Customs structures and functions; accountability; ethics policy

Note: The area of governance and impartiality (indicator (k)) is outside the remit of the TFA.

Figure 3 Trade Facilitation Indicators OECD, 2017

Another set of useful indicators that matters for integration are the **Trade Facilitation Indicators (TFIs)** developed by the OECD (2018). They measure the extent to which countries have introduced and implemented trade facilitation measures in absolute terms and their performance relative to other countries. The TFIs reflect the provisions covered under the WTO Trade Facilitation Agreement that entered into force in February 2017. The 11 indicators and their descriptions are provided in figure 3, taken from OECD 2018 report, *Trade facilitation and the global economy*.

The TFIs are based on a rigorous data collection process. First, publicly available data is collected from relevant border agencies. Second, direct submissions from countries are requested. Third, factual information is gathered from the private sector. Fourth, data validation is performed by the OECD. Fifth, the country datasheets are sent back to countries for validation.



Trade dimension in ARII 2019

The following indicators are included in the Trade dimension of ARII 2019

- **Average tariff on imports**  
A tariff on an import increases the price of the import; it is a direct impediment to trade integration. The lower the level of tariffs on a country's imports, the more integrated it is considered. ARII uses the average applied tariffs an importing country imposes on other countries in the region
- **Share of intra-regional exports in GDP**  
This indicator is calculated as the sum of a country's total exports of goods to the region over its GDP.
- **Share of intra-regional imports in GDP**  
This indicator is calculated as the sum of a country's total imports of goods to the region over its GDP.
- **Share of intra-regional trade in total trade**  
It measures the sum of imports and exports of a country as a proportion of the total trade of the region.
- **Ratification of the Africa Continental Free Trade Area**  
It records whether a country has not signed, signed or ratified the agreement up to the conclusion of the African Union summit, Niamey 2019. It is only included at the continental level.

## Production and value chain integration dimension

While regional trade integration measures the interconnectedness of trade between countries in a region, it does not accurately depict how countries productive capacities complement each other. The productive integration dimension fills this gap by capturing how well countries are involved in the regional value chain. The drastic decline in communication and transportation costs during the last decades accelerated the fragmentation of production across national boundaries where each country specialises in different stages of the production line of a good. Such disintegration of production allows for economies of scale to be reaped across borders which, in turn, fuel production and growth.

### i. Intermediate goods trade

The simplest way to capture the extent of involvement in value-chains is to trace countries' imports and exports of intermediate products. However, this measure relies on the arbitrary classification of intermediate goods. Emphasis should be placed on trade in value-added products and services. Ideally, collecting firm-level data would result in good quality indicators. Alternatively, trade in value added can be measured indirectly through input-output tables. Unfortunately, these data are only sparsely available.

A useful and simple indicator is to measure *vertical specialisation*, that is, the amount of imported inputs used into goods that are exported. This captures the idea of sequential production that should cross-border at least twice. It is calculated as follows (Hummels, Ishii, & Yi, 2001):

$$\text{vertical specialisation} = \left( \frac{\text{intermediate inputs}}{\text{gross output}} \right) \cdot \text{exports}$$

### ii. Trade complementarity index (TCI)

The extent to which one country's exports match the imports of other countries in the region is a useful indicator of the potential for integration and extension of the value-chains. The TCI of a country is the sum of the absolute value of the difference between the import shares and the export shares of the countries or country groups under study, divided by two (Michaely, 1996).

A number of recent endeavours have attempted to trace the extent of value-addition in trade and avoid the issue of double counting in exports. The interested readers can refer to Koopman et al. (2014) for an innovative decomposition of trade in value added.

Productive dimension in ARII 2019

The following indicators measure the productive dimension in ARII 2019:

- **Share of intra-regional intermediates exports**  
It is calculated as the sum of a country's intermediates exports to all other countries in the region over the total regional exports.
- **Share of intra- regional intermediates imports**  
It is calculated as the sum of a country's intermediates imports to all other countries in the region over the total regional imports.
- **Trade Complementarity Index**  
TCI of a country is the sum of the absolute value of the difference between the import shares and the export shares (at 3-digit SITC, Revision 3 level) of the countries or country groups under study, divided by two:

$$S_{e_j m_k} = \frac{\sum_i |E_{ij} - M_{jk}|}{2}$$

- $S_{e_j m_k}$  = the index of trade complementarity of exporter j with importer ;
- i = goods in 3 digit SITC Revision 3;
- j = exporter;
- k = importer;
- $E_{ij}$  = the share of goods i in country j's total exports to the region;
- $M_{ik}$  = the share of goods i in country k's total imports from the region.

## Infrastructural integration dimension

The success of any economic endeavour rests on the existence of proper and functioning infrastructure. For economies to benefit from regional economic integration, they need to possess adequate infrastructural development as the other dimensions of regional integration depends heavily on such foundation. The economic literature has successfully established the importance of investment in infrastructure. Using a large panel dataset of more than 100 countries over the period 1960-2000, Calderon and Servén (2004) finds that the stock of infrastructure assets positively affects growth. Moreover, the study finds that income inequality declines with higher infrastructure quantity and quality.

Infrastructure is often referred to as the **hard dimension of trade facilitation**. Economic infrastructure includes all the network utilities that serve as common inputs in production, namely, energy, transport, and communications (Uppenberg, Strauss, & Wagenvoort, 2011).

A useful distinction is made between **physical infrastructure** and **information and communication technology (ICT)** such as:

- Physical infrastructure refers to the level of development and quality of ports, roads, railways and other tangible utilities;
- ICT refers to the extent to which information and telecommunication technologies are used to improve efficiency and productivity.

Thus, any attempt to measure infrastructural integration should include these utilities. Infrastructure can be accounted for through:

1. Stock of infrastructure;
2. Spending on infrastructure;
3. Quality or efficiency of infrastructure;
4. Use and absorption (particularly relevant for ICT).

One has to be cautious in employing the above measures and make sure that they capture the integrative and regional aspects of these infrastructure. Some possible indicators of infrastructural integration that can easily be gathered are:

**i. Regional telephony and mobile roaming charges**

An interesting measure of established and efficient telecommunication connectivity is the cost of mobile roaming services. The benefits on growth of expanding mobile penetration in sub-Saharan Africa has been empirically established (Lee, Levendis, & Gutierrez, 2012). It can easily be inferred that low cost of roaming will facilitate and increase cross-border business transactions and, subsequently, enhance regional integration. Ideally, this measure should assess the average cost of roaming that a citizen of a certain country incurs when travelling to each of the countries in the region considered and utilising the roaming services. For a comprehensive assessment, all the mobile operators should be considered. This data can be complemented by the costs of international calls.

**ii. Trans-national road, railway, port and airport infrastructure**

In the African context, a major obstacle to effective cross-border transactions is the lack of adequate roads and railway links between neighbouring countries as recently documented by the OECD (OECD/SWAG, 2019). This is particularly damaging for the integration of many landlocked African nations, home to more than 40 per cent of the population, limiting their access to markets, goods and factors of production. An assessment of road and highway linkages between countries would provide a good indication of their infrastructural integration together with an assessment of their quality (whether paved or not). This indicator should be complemented by indicators for port and airport infrastructure for coastal and island countries.

**iii. Cross-border or joint investment in infrastructural development**

The existence of and expenditure on joint development initiatives between countries as regards the creation and upkeep of cross-border infrastructure in energy, sanitation and ICT could be a useful indicator for infrastructural integration. Such information could be retrieved from the relevant divisions at national governmental level.

**Infrastructural dimension in ARII 2019**

The infrastructural dimension in ARII 2019 includes 2 indicators:

- **African Development Bank infrastructure development index**  
This variable is a composite index that assesses the following components: ICT, transport, water and sanitation as well as electricity. This index is calculated by the African Development Bank (2016). A caveat with this variable is that it does not have a regional component.
- **Proportion of intra-regional flight connections**  
The proportion of flights leaving and arriving in a country from all the countries in the region over the total number of flights in the region. The data for computing this variable comes from the African Airlines Association (AFRAA, 2017).

## Financial macroeconomic convergence dimension

Finance is intricately embedded in all economic transactions and this relationship has become even more pronounced and complex with technological advancement. For instance, trade without the establishment of functioning financial markets is not conceivable today. Thus, financial integration forms an inherent part of trade and regional integration. Traditionally, financial integration is defined as the degree of cross-border capital flows. In the context of regional integration, macroeconomic convergence is also of particular relevance: it aims to stabilise budget deficits, limiting exchange rate volatility and controlling inflation in a region. Financial markets are considered integrated when countries face the same set of rules and have equal access to financial products.

It is deep-rooted in the development economics literature that capital accumulation drives growth; for instance, the neo-classical Solow model of growth, explicitly ties the rate of investment to the long-run level of output per worker. The Schumpeterian stance on development and growth emphasises that financial intermediaries positively influence the sources of growth as they reduce market frictions, increase total factor productivity, promote savings and attract foreign capital (Levine, Loayza, & Beck, 2000). While the positive role of country-specific financial development on growth is well-accepted, that of financial integration remains to be firmly established.

Proponents of greater integration claim that agents can better insure macroeconomic risks as those risks are shared via the cross-ownership of both productive and financial assets in capital and credit markets. Relevant to developing countries, financial integration facilitates the flow of capital to capital-scarce countries which positively impacts domestic output and increases growth prospects. Moreover, financial integration allows increased competition in the domestic economy through greater access to foreign capital markets thereby reducing the costs of capital which, ultimately, results in growth (Edison, Levine, Ricci, & Sløk, 2002).

Notwithstanding the presumed gains, quantification through economic models only results in little positive effect of financial integration on output and growth. Indeed, some contend that growth is even retarded primarily because of numerous distortions that exist in domestic financial markets, especially in developing countries (Eichengreen, 2001). Weak institutions and policies can induce capital-flight towards countries that have sound institutions, usually capital-abundant countries. Protection of import-competing countries will also cause capital outflow to sectors that have a comparative advantage and aggravate misallocation of resources. Moreover, large swings of capital inflows may pose critical challenges to the domestic economy if not properly anticipated. It may result in currency appreciation and asset price bubbles and disrupt the financial system as witnessed in the 1980s and 1990s in Latin America and Southeast Asia. Information asymmetry is said to be endemic to the financial system and more so for developing countries, undermining the welfare-improving effect of financial integration (Stiglitz, 2010).

As per the finance literature, financial integration measures can be grouped into 3 categories:

**De jure measure** is based on the extent of restrictions on capital account transactions. In other words, it represents policies that enable/impede such transactions; the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) produced by the IMF is the most commonly used database of de jure indicators. It documents the rules and regulations that countries use to govern current and capital transactions;

- **De facto measure** is usually outcome-based and is often quantified as stocks or flows of capital;
- **Hybrid measure** refers to a blend of the two previous measures.

### De jure measures

#### i. Chinn-Ito index

Chinn-Ito index (or KAOPEN) measures a country's degree of capital account openness using the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) table of the International Monetary Fund (IMF). KAOPEN is calculated using principal component analysis on variables pertaining to regulatory controls over current or capital account transactions, the existence of multiple exchange rates, and the requirements of surrendering export proceeds (Chinn & Ito, 2006). The latest version<sup>7</sup> covers the period 1970-2016 and is available for 182 countries. The main advantage of this measure is its broad coverage in terms of years and countries. The index, however, is not free from measurement error and an improved version has been proposed by Karcher and Steinberg (2013).

#### ii. Heritage Foundation Investment Freedom Index

As part of its Index of Economic Freedom, the Heritage Foundation has a de jure measure of investment freedom. A number of regulatory restrictions are evaluated, such as, foreign investment code (bureaucratic procedures), sectoral investment restrictions and expropriation of investments without fair compensation amongst others.

### De facto measures

Contrarily to de jure measures, de facto measures capture the actual intensity of differences in capital flows due to legal restrictions. For this reason, de facto measures are preferred.

#### iii. Lane and Milesi-Ferretti Index (LM)

One of the most used quantity-based measures is the LM, initially presented in Lane & Milesi-Ferretti (2007). The latest update of the database measures the international investment positions of 212 economies by providing estimates of their external assets and liabilities for the period 1970-2015 (Lane & Milesi-Ferretti, 2018). As more economies report their investment positions to the IMF, the updated dataset covers a larger number of countries over a longer time period. It also distinguishes between portfolio debt instruments and other investment instruments which allows for more detailed analysis. Assets and liabilities are categorised as: foreign direct investment, portfolio equity, portfolio debt, other investment, financial derivatives, and foreign exchange reserves on the asset side.

#### iv. UNCTAD

A useful quantity-based measure is provided by UNCTAD and covers most of the UN countries. The database provides data on inward and outward FDI flows and stock. Data can be normalised by gross domestic product, gross domestic capital formation, merchandise trade and by trade and services.

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<sup>7</sup> [http://web.pdx.edu/~ito/Chinn-Ito\\_website.htm](http://web.pdx.edu/~ito/Chinn-Ito_website.htm)

## Hybrid measures

### v. **Edison & Warnock (2003)**

Edison and Warnock (2003) assess financial liberalisation by providing a monthly measure of capital controls. This measure is developed on the premise that liberalisation comes with different intensity and speed which previous measures - that rely on dummy variables to identify liberalisation - cannot capture. It is computed by using the International Finance Corporation (IFC) global index (G) which reflects the overall market portfolio and the investable index (F) which represents the portfolio available to foreign investors. Hence,  $F/G$ , measures the availability of equities to foreigners and the intensity of capital controls is calculated as  $1 - F/G$ . It is a hybrid measure because the numerator is a legal restriction, whether the equity is open to foreigners or not while the denominator is a quantity.

The authors acknowledge that the measure is narrow given that it only measures restrictions on foreign ownership of a country's equities. Moreover, country coverage is limited to 29 emerging markets thereby limiting its use for specific regions. Nevertheless, it is a powerful measure that can be computed without much effort using the IFC data and it is available on a monthly basis allowing for detailed analysis.

### vi. **KOF globalization index**

An interesting measure of integration is based on the well known KOF globalization index which was introduced by Dreher (2006) and updated in Dreher (2008). These measures not only combine de jure and de facto variables, but they also do not distinguish between trade and financial globalization.

However, the literature does not recommend the combination of de jure and de facto measures as they affect globalisation differently (Quinn, Schindler, & Toyoda, 2011). A recent version of the KOF assesses globalization by making a clear distinction between the two measures (Gygli, Haelg, & Sturm, 2018). Trade is also separated from financial globalisation as they are presented in sub-indexes.



### Macroeconomic dimension in ARII 2019

There are 3 indicators in ARII 2019 to capture macroeconomic and financial integration:

- **Number of bilateral investment treaties in force**

This indicator is the number of bilateral investment treaties that are in force, that is, the total number of bilateral investment treaties net of those that have not been ratified and/or have been terminated within the region. Ideally, an indicator that directly captures foreign direct investment would have been preferred but due to non-exhaustive data the closest proxy has been used.

- **Convertibility of national currencies**

This indicator measures the number of countries of the region with which the country shares a common currency or with which its currency is easily convertible.

**Regional inflation differential**

- The inflation rate differential is the difference between the inflation rate of the country and the target inflation rate of the region, if not available, the minimum positive value of the region is used.

## Free movement of people dimension

The free movement of people is considered a basic human right. Thus, many countries are now cooperating to allow their citizens to move freely. For instance, Article 12 of the *The African Charter on Human and People's Rights* specifies that “Every individual shall have the right to leave any country including his own, and to return to his country. This right may only be subject to restrictions, provided for by law for the protection of national security, law and order, public health or morality”.

The free circulation of people is an essential ingredient of regional integration as, first of all, it allows businesses to access a wider pool of labour, encourages trans-national business activities, increases tourism and, consequently, expands trade. In particular, labour can move from less productive to more productive industries even across borders and reduce the skill-mismatch.

Indicators of free movement of people are often included in the social dimension but given their relevance to the region concerned it can be included as a stand-alone dimension (being able to cross-borders freely is a precursor of integration on other dimensions and, thus, often positioned as a separate dimension). The indicators can take many forms:

**i. Ratio of inbound to outbound tourism**

An effective measure of free movement of people is the number of foreigners that are actually entering the country. This can better be captured by measures that control the inflow of people at borders such as tourists and people with work permit.

**ii. Visa policies**

The extent to which the immigration policies of a country are open is a fair indicator of its willingness to integrate. For instance, the ease with which a citizen of a country can obtain a visa to enter another country or is visa exempt provides relevant information on the movement of people. However, such indicators do not actually reflect effective integration of people as there may exist many other hurdles at borders.

### Free movement of people dimension in ARII 2019

The mobility of people is included as a separate dimension in ARII 2019 to give more weight to the efforts conducted by member States in liberalizing the movement of people and consists of the following variables:

- **Protocol on the free movement of persons (Kigali)**  
This can be considered as an institutional variable as documented in the institutional dimension section below. It measures whether a country has ratified the African Union protocol on the Free Movement of Persons, Right of Residence and Right of Establishment.
- **The number of countries that require a visa**  
This indicator measures the number of countries whose citizens strictly require visas when travelling to each country in the region. The data is obtained from the Africa Visa Openness Index of AfDB (see <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/africa-visa-openness-index>).
- **The number of countries that are granted a visa on arrival**  
This indicator measures the number of countries in the region whose citizens are granted visas on arrival when travelling to each country in the region. The data is obtained from the Africa Visa Openness Index.

## Institutional integration dimension

Institutional integration refers to efforts to adopt common policies towards the achievement of greater integration in one or more dimensions of regional integration. It involves the setting up of institutional arrangements, that is, set of rules or agreements governing the activities of a specific group of countries pursuing a certain objective. These efforts are decisions taken or initiated by governments at regional or supranational level and mostly take the form of agreements, such as the setting up of a free trade area or a common currency.

Dorucci et al. (2004) propose an index of regional institutional integration that relies on the 5 stages of integration proposed by Balassa. In essence, institutional integration within a regional setting is quantified by assigning scores to the level of integration achieved at a given point in time in the development of each of the following stages: FTA and CU; CM; Economic Union; and Total Economic Integration. For instance, in the stage of FTA-CU, each additional reduction of tariffs by at least 20 per cent is assigned one point and the abolition of quotas is assigned 4 points. The appendix of Dorucci et al. (2002) details the scores assigned at each step. Scores are not assigned on the basis of when the decision was taken but when it was implemented so that projects that are never implemented are not scored.

The institutional integration dimension forms part of the measures that assess commitments to increase integration, that is, measures based on inputs. Contrarily, most of the other dimensions measure outputs; for instance, the *trade intensity* variable is an output variable that quantifies the actual intensity of trade based on exports and imports.

#### Institutional variables in ARII 2019

ARII 2019 does not have a separate dimension that assesses institutional integration. Nevertheless, some of the dimensions include variables of institutional integration as follow:

- **AfCFTA in the trade dimension (at the continental level only)**  
This variable obviously measures institutional integration as it solely assesses whether a country has committed to the continental agreement, i.e. signed or ratified the agreement. It focuses on efforts (inputs) and not outcomes.
- **Protocol on the free movement of persons (Kigali) in the free movement dimension**  
Similarly, the protocol does not assess the actual circulation of people but is an institutional agreement reflecting commitment to liberalise movement of people in Africa.
- **The preliminary draft of ARII 2019 included the variable SAATM in the infrastructural dimension**  
Ratification of the Single African Air Transport Market agreement also reflects commitment to implement open skies policies. However, this variable was removed so as to improve the statistical tests in the infrastructural dimension.

## Social and environmental integration dimension

Regional integration has non-negligible effects on society which itself influences integration in several ways. Economic integration leads to increase in trade and cross-border transactions thus contributing to improved standards of living through increased income, better infrastructure and greater varieties of goods and services. Together, these changes often bring about social and cultural modernisation and even transformation. Moreover, integration opens up borders allowing in not only foreign goods and services but also foreign languages and cultures. The free movement of people directly contributes to the importation of foreign values that directly and indirectly impacts the economy.

In the short-term, the benefits of integration may not trickle down to all economic groups in society causing social turmoil. Moreover, increased production and trade may generate negative externalities, particularly, environmental damage and failure to respect human and social rights, such as labour standards and privacy. Thus, it is important to capture the extent to which these positive and negative externalities are accounted for by regional initiatives.

Hence, the social dimension of regional integration assesses the extent to which a country is socially well-integrated by looking at the integration of workers and immigrants in the region, mobility of students, the convergence of social policies, cultural gaps and the respect of rights in general. The environmental dimension of integration is meant to account for regional environmental policies that tackle negative externalities and promote sustainable development. In fact, the new wave of regionalism is meant to be comprehensive englobing both environmental as well as human rights issues (Scholtz & Verschuuren, 2015).

### i. Labour migration

The ratio of foreign employees to the total number of employees both local and international is an effective indicator of the free movement of labour across borders.

### ii. Compliance to regional and international environmental agreements and instruments

In order to assess the extent to which individual countries are cooperating with their neighbours in mitigating the effects of economic and human activities on the environment, it would be useful to identify whether they are complying with existing agreements or whether they are deflecting. One such agreement is the Maputo Convention on the Conservation of Nature and Natural Resources.

### iii. Intra-regional mobility of students

The ratio of foreign students to all students enrolled in tertiary education is a good indicator of socio-cultural regional integration.

No social and environmental integration dimensions or variables have been considered in ARII 2019. The availability of reliable and comprehensive data as well as the conceptual framework were the main hindrances to their inclusion.

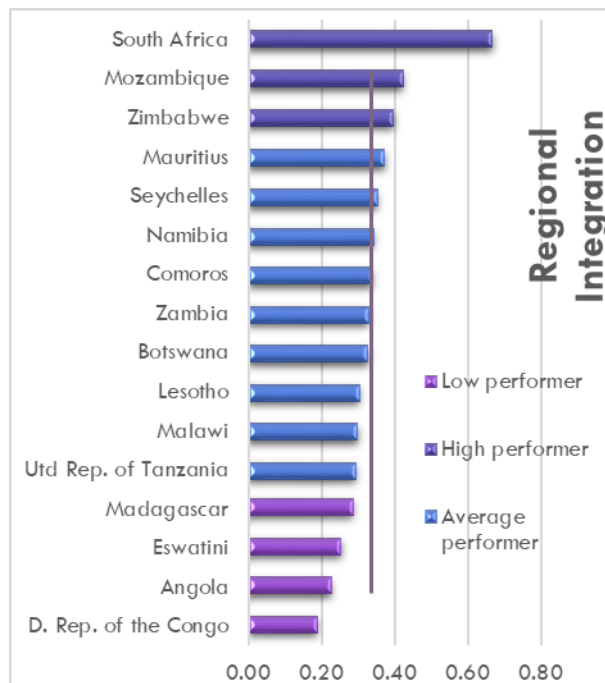
## CHAPTER 3: INTERPRETING AND USING REGIONAL INTEGRATION INDEXES

Regional integration indexes are useful tools for policy makers and practitioners allowing information on the performance of countries to be analysed and possibly compared. They reduce multidimensional and complex issues to one aggregate value that can be easily presented to policy makers to facilitate decision-making. Additionally, they also allow for complex information to be easily communicated to stakeholders and the public, thus increasing transparency and accountability in policy making. In multidimensional indexes, performance across dimensions and across indicators can be compared; this would facilitate selective policy actions on specific issues. Under certain conditions, performance over time can also be assessed.

Despite their many advantages, it often happens that regional integration indexes are misconceived. Therefore, the wrong policy messages are conveyed to decision makers. Aggregate numbers are simple and practical to making prompt assessment of a situation. However, to make well-informed decisions and draft appropriate policies, it is necessary to dig deeper into the parts that make up the aggregate numbers, that is, the overall index. This Guide seeks to inform users about the detailed contents behind indexes so that they avoid misinterpreting the final numbers given by these indexes. This chapter will guide the user into the proper analysis of the rankings obtained in ARII 2019. The scores for the 8 regional economic communities are analysed and briefly interpreted below.

### Interpreting the performance of SADC

Figure 4 Regional integration in SADC, Mean score: 0.337



The Southern African Development Community (SADC) is a 16-member community. It has a low performance on regional integration according to ARII (2019) given its low average score of 0.337 (See Figure 4 reproduced from the ARII (2019) report as are all the subsequent figures). Only three of its members are high performers with a great disparity between the first- and second-best integrated countries while the majority of countries are average performers.

Table 1 SADC scores on the 5 dimensions of regional integration

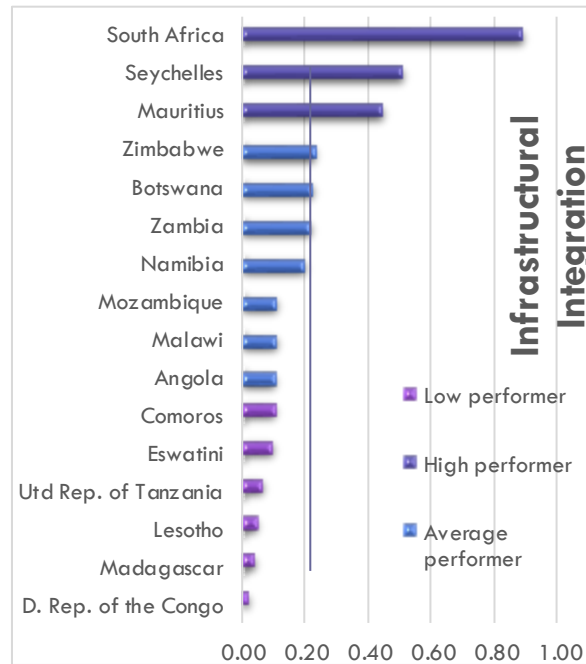
Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.340	0.239	0.422	0.214	0.490

The scores reported in

above show that the infrastructural dimension is the stumbling block for SADC where it has the lowest average score. The productive dimension also appears to be problematic with its low average score. Contrarily, the community fares well on the free movement of people dimension where it has the highest average score. It performs well on the macroeconomic dimension too.

Table 1 SADC scores on the 5 dimensions of regional integration

Figure 5 Infrastructural integration in SADC, Mean score: 0.214





A thorough investigation of the problematic dimensions can provide insights as to where and what the issues are. Figure 5 shows that six SADC countries are low performers on the infrastructural dimension with scores nearing zero. Only six countries have scores above the average as shown by the vertical line in the figure. Much disparity exists between the top performer South Africa and other member countries. There is a gap of almost 0.4 that separates the score of South Africa from that of Seychelles, the second-most integrated country.

Table 2 Scores on indicators of the infrastructural dimension, SADC

Country	AfDB Infrastructure Index	Flight connections
Angola	0.097	0.116
Botswana	0.320	0.125
Comoros	0.163	0.047
D. Rep. of the Congo	0.000	0.043
Lesotho	0.088	0.013
Madagascar	0.003	0.054
Malawi	0.120	0.099
Mauritius	0.769	0.122
Mozambique	0.040	0.181
Namibia	0.241	0.159
Seychelles	1.000	0.023
South Africa	0.785	1.000
Eswatini	0.192	0.000
Utd Rep. of Tanzania	0.044	0.059
Zambia	0.156	0.282
Zimbabwe	0.186	0.282
Average	<b>0.263</b>	<b>0.166</b>
Standard deviation	<b>0.298</b>	<b>0.230</b>

To further understand the performance of single countries on this dimension, its components are analysed. The infrastructural dimension is comprised of two indicators: the AfDB composite infrastructure index and the proportion of intra-regional flight connections. As reported in Table 2, the scores on both indicators show much variability but those on the AfDB infrastructure index are greater given its higher standard deviation. On average, performance of countries on the proportion of flight connections is lower. Countries that are at the bottom of the list on the infrastructural dimension perform poorly on both indicators, for example, Madagascar. It appears that country specific issues on the infrastructural dimension are driving down the community’s overall performance on regional integration.

The scores on the productive dimension are very low as reported in Figure 6: seven countries are classified as low performers. South Africa is the only country that excels on this dimension with a score nearing 1. Just as in the infrastructural dimension, there is a large gap between the top and second-best performing countries. The productive dimension is made of three indicators as shown in Table 3.

The lowest scores are reported on the indicator of intra-regional share of intermediates exports; it has the lowest average of 0.149. There are nine countries with scores nearing zero on this indicator. However, the performance of the community is much more varied on their share of intermediates imports with some countries doing well, such as Botswana scoring 0.913, and others performing badly, such as Seychelles scoring 0.023. It appears also that the islands of the community are not exploiting their trade complementarities within the region. For instance, despite its trade complementarity score of more than 0.2, Comoros' share of intermediate imports and exports are inexistent.

Figure 6 Productive integration in SADC, Mean score: 0.239

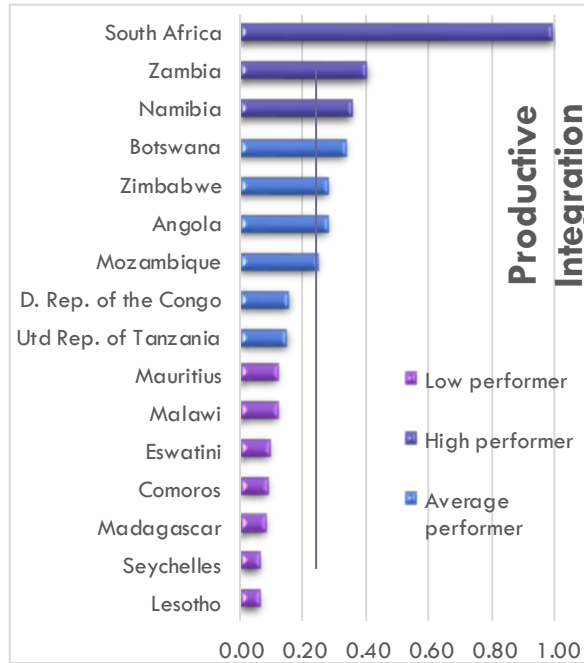


Table 3 Scores on indicators of the productive dimension, SADC

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Angola	0.155	0.169	0.525
Botswana	0.913	0.164	0.127
Comoros	0.000	0.000	0.260
D. Rep. of the Congo	0.098	0.141	0.000
Lesotho	0.195	0.014	0.044
Madagascar	0.067	0.006	0.208
Malawi	0.158	0.017	0.234
Mauritius	0.101	0.019	0.281
Mozambique	0.559	0.086	0.224
Namibia	0.822	0.193	0.222
Seychelles	0.023	0.000	0.205
South Africa	0.972	1.000	1.000

Eswatini	0.000	0.064	0.095
Utd Rep. of Tanzania	0.132	0.092	0.243
Zambia	1.000	0.146	0.294
Zimbabwe	0.550	0.247	0.100
Average	<b>0.375</b>	<b>0.149</b>	<b>0.254</b>
Standard deviation	<b>0.357</b>	<b>0.234</b>	<b>0.225</b>

To sum up, the SADC poor performance is primarily driven by its failings on the infrastructural and productive dimensions although it fares well on the free movement of people dimension. With the exception of some countries, the community suffers particularly from poor infrastructural development in terms of ICT, water and sanitation, electricity and transport as reported by the AfDB infrastructure index. It has still a lot of capacity to increase its flight connections and render integration in the community smoother. Members of SADC are not fully exploiting the benefits that regional value chain might bring: their intermediates exports are low. Only few countries are trading intermediates within the community limiting the opportunities for regional efficiency and growth.

### Interpreting the performance of ECOWAS

Figure 7 Regional integration in ECOWAS, Mean score: 0.425

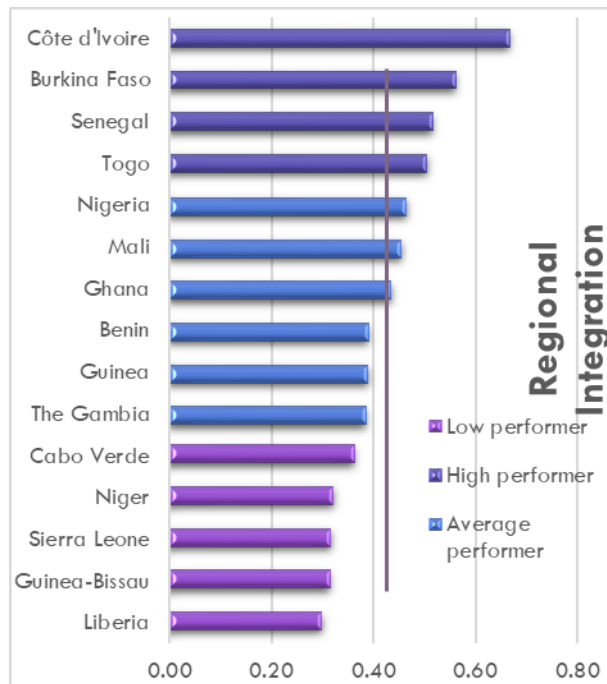


Table 4 ECOWAS scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
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0.438	0.220	0.469	0.298	0.733
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The Economic Community of West African States (ECOWAS) has a moderate performance on regional integration. Only four of its members are high performing countries. It has much potential to improve its overall performance. A closer look at the disaggregated scores by dimensions as reported in Table 4 shows mediocre average scores on the productive and infrastructural dimensions while a high average score on the free movement of people dimension.

Figure 8 Free movement of people in ECOWAS, Mean score: 0.733

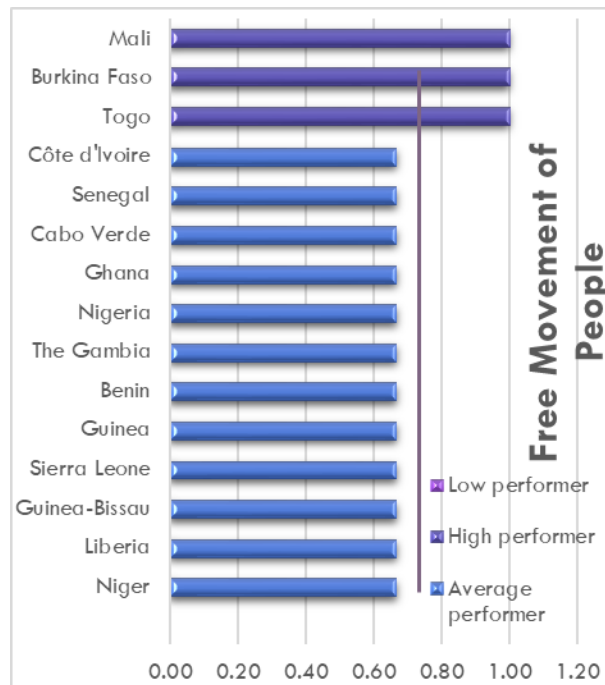


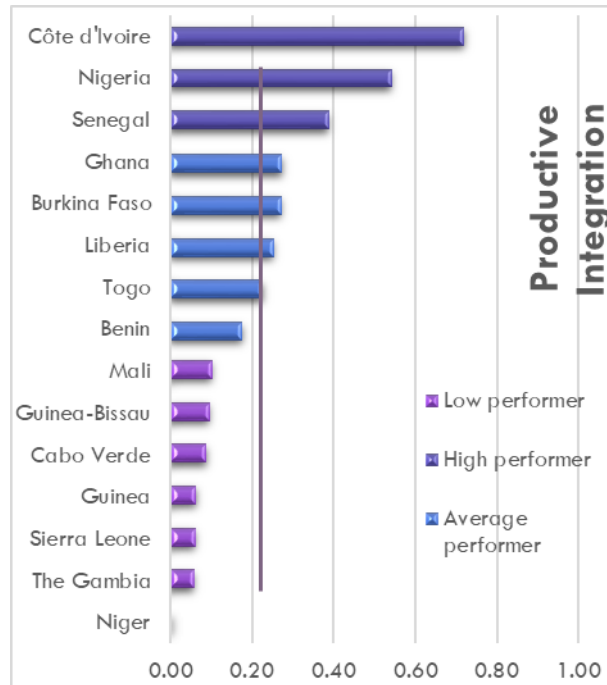
Table 5 Scores on indicators of the free movement of people dimension, ECOWAS

Country	Number of countries obtaining visas on arrival	Number of countries requiring visas	Free movement of persons Protocol
Benin	1	1	0
Burkina Faso	1	1	1
Cabo Verde	1	1	0
Côte d'Ivoire	1	1	0
The Gambia	1	1	0
Ghana	1	1	0
Guinea	1	1	0
Guinea-Bissau	1	1	0
Liberia	1	1	0
Mali	1	1	1
Niger	1	1	0
Nigeria	1	1	0

Senegal	1	1	0
Sierra Leone	1	1	0
Togo	1	1	1
Average	1	1	0
Standard deviation	0	0	0.4

The seemingly moderate performance on the community’s regional integration is driven by its high score of the free movement of people dimension. Digging deeper in the latter dimension reveals interesting facts about the community: there are three countries that excel on the dimension as shown in Figure 8 and those countries have ratified the free movement of persons protocol, see Table 5. It is evident that ECOWAS has achieved a high level of integration as far as its visa policies are concerned, for instance, the use of the ECOWAS passport: all its members have the highest scores on the visa on arrival and visa requirement indicators.

Figure 9 Productive integration in ECOWAS, Mean score: 0.220



An in-depth examination of the productive dimension (see Figure 9) shows large disparities in countries’ scores: Côte d'Ivoire fares well on this dimension with a score of 0.718; Contrarily, Niger seems to be lacking in its productive capacity with a score of 0. Seven countries are considered as low performers and their scores do not exceed 0.1. The low average scores reported in Table 6 reveal the poor performance of the community in both their share of intermediates exports and imports within the region. Some countries like Cabo Verde, for instance, scarcely trade in intermediate goods. The trade complementarities of the members are quite heterogeneous: some countries must urgently improve their productive capacities so as to better engage in this community’s supply chain.

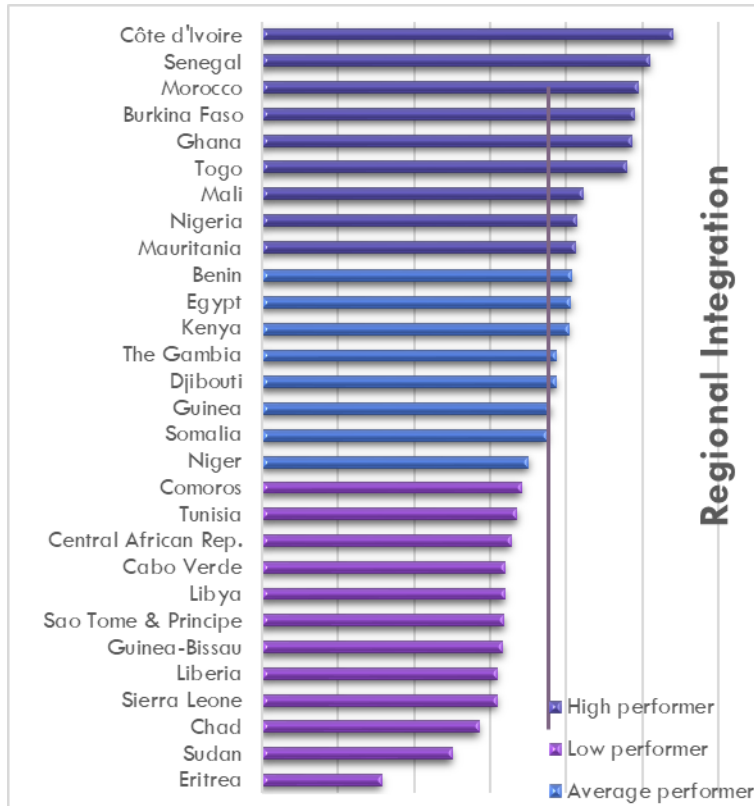
In brief, ECOWAS has, to some extent, embarked on the right path to regional integration showing a moderate performance. Its strength is in the free movement of people dimension vaunting liberal visa policies. It fares relatively well on the macroeconomic dimension. However, it is lacking in the productive dimension showing poor exports of intermediate goods. A few countries are extremely deficient on the dimension suggesting that structural transformation is necessary to revive their economies. As it is, ECOWAS is not benefitting from the possible gains that specialization and trade might bring. It also shows poor performance on the infrastructural dimension.

Table 6 Scores on indicators of the productive dimension, ECOWAS

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Benin	0.113	0.031	0.417
Burkina Faso	0.184	0.059	0.626
Cabo Verde	0.001	0.000	0.283
Côte d'Ivoire	1.000	0.266	1.000
The Gambia	0.005	0.014	0.165
Ghana	0.100	0.223	0.511
Guinea	0.016	0.108	0.049
Guinea-Bissau	0.027	0.003	0.280
Liberia	0.004	0.001	0.818
Mali	0.234	0.044	0.036
Niger	0.000	0.000	0.000
Nigeria	0.059	1.000	0.453
Senegal	0.282	0.195	0.738
Sierra Leone	0.010	0.048	0.125
Togo	0.044	0.081	0.592
Average	<b>0.139</b>	<b>0.138</b>	<b>0.406</b>
Standard deviation	<b>0.246</b>	<b>0.245</b>	<b>0.297</b>

## Interpreting the performance of CENSAD

Figure 10 Regional integration in CENSAD, Mean score: 0.377



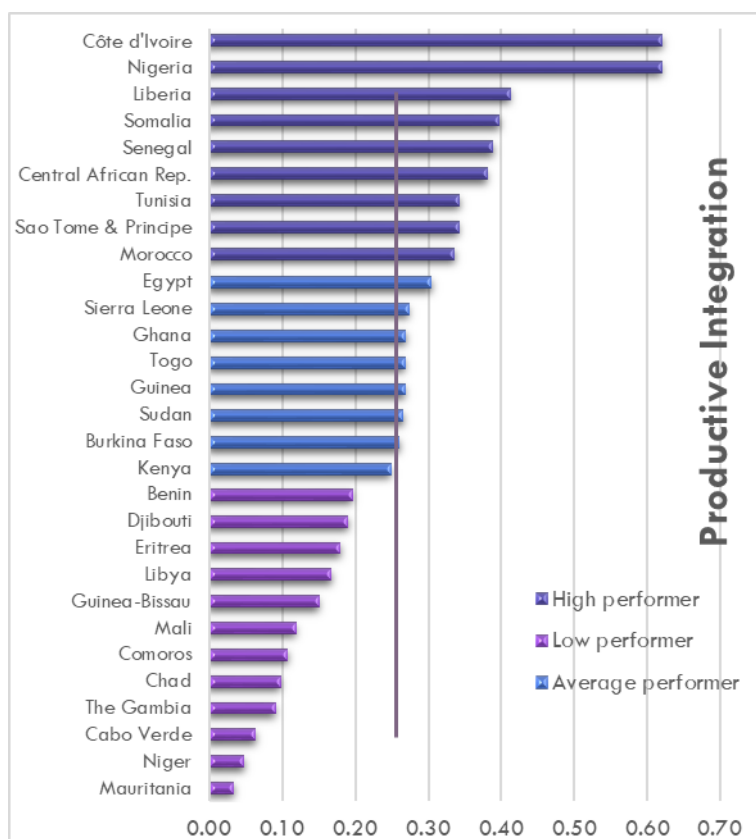
With its low average score, the Community of Sahel-Saharan States (CEN-SAD) is not well integrated regionally. Out of its 29 members, 12 are low performers as shown in Figure 10 with Eritrea, Sudan and Chad scoring less than 0.3. Côte d'Ivoire and Senegal are at the forefront of the race in regional integration. However, the maximum score is only 0.541 suggesting that there exists untapped potential.

Table 7 CEN-SAD scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.377	0.256	0.441	0.302	0.507

Table 7 reports the scores on the five dimensions revealing the poor performance of the community on the productive and infrastructural dimensions. CEN-SAD fares relatively well on the free movement of people dimension. The productive integration rankings are quite disparate as reported in Figure 11; Côte d'Ivoire and Nigeria demarcate themselves with scores above 0.6, while the rest of the community have much lower scores.

Figure 11 Productive integration in CEN-SAD, Mean score: 0.256



Delving into the indicators reveals that the community's intra-regional intermediate goods trade is low as reported in Table 8. For example, a sheer 20 and 17 of the 29 members have scores below 0.1 in the share of intermediate goods exports and imports respectively, within the community. The strength of the best performer Côte d'Ivoire is in its share of intermediates imports while that of Nigeria is in its intermediates exports. CEN-SAD has a moderate average score on the indicator trade complementarity index. However, it is not exploiting its potential to specialize and trade within the community. For example, Liberia has the best trade complementarity, but it is barely engaging in trade in the region.

Table 8 Scores on indicators of the productive dimension, CEN-SAD

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Benin	0.119	0.039	0.363
Burkina Faso	0.191	0.057	0.453
Cabo Verde	0.002	0.000	0.153
Central African Rep.	0.003	0.000	0.928
Chad	0.008	0.001	0.229
Comoros	0.002	0.000	0.260
Côte d'Ivoire	1.000	0.262	0.590
Djibouti	0.008	0.001	0.455

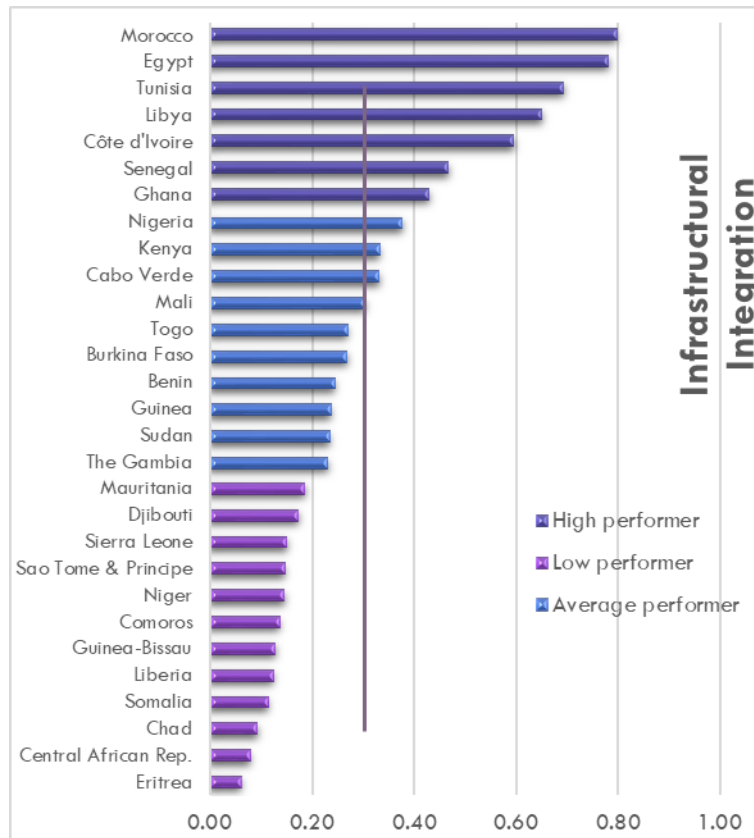


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**MAKING SENSE OF REGIONAL INTEGRATION INDEXES**

<b>Egypt</b>	0.121	0.262	0.469
<b>Eritrea</b>	0.010	0.000	0.430
<b>The Gambia</b>	0.006	0.013	0.206
<b>Ghana</b>	0.127	0.219	0.408
<b>Guinea</b>	0.038	0.105	0.552
<b>Guinea-Bissau</b>	0.026	0.003	0.345
<b>Kenya</b>	0.100	0.033	0.510
<b>Liberia</b>	0.007	0.001	1.000
<b>Libya</b>	0.219	0.226	0.087
<b>Mali</b>	0.269	0.048	0.056
<b>Mauritania</b>	0.066	0.046	0.000
<b>Morocco</b>	0.199	0.204	0.529
<b>Niger</b>	0.000	0.000	0.114
<b>Nigeria</b>	0.196	1.000	0.665
<b>Sao Tome &amp; Principe</b>	0.000	0.000	0.834
<b>Senegal</b>	0.310	0.207	0.573
<b>Sierra Leone</b>	0.013	0.046	0.624
<b>Somalia</b>	0.042	0.001	0.938
<b>Sudan</b>	0.213	0.016	0.480
<b>Togo</b>	0.059	0.079	0.556
<b>Tunisia</b>	0.110	0.206	0.610
<b>Average</b>	<b>0.119</b>	<b>0.106</b>	<b>0.463</b>
<b>Standard deviation</b>	<b>0.190</b>	<b>0.192</b>	<b>0.258</b>

Figure 12 Infrastructural integration in CEN-SAD, Mean score: 0.302



While there are four countries with scores greater than 0.6 on the infrastructural dimension, Figure 12 Infrastructural integration in CEN-SAD, Mean score: 0.302

shows that there are 18 countries with below average scores. Morocco and Egypt are top performers. Morocco fares well on both the indicators of this dimension as reported in Table 9. The strength of Egypt is in its infrastructural development as given by the AfDB index. The low average score on the latter indicator suggests that the community has to invest in and upgrade its infrastructure. However, the standard deviation indicates much heterogeneity in the performance of countries. For instance, Tunisia enjoys a good level of infrastructural development as reported by its high score on both the AfDB index and flight connections. Contrarily, Chad scores poorly on both indicators.

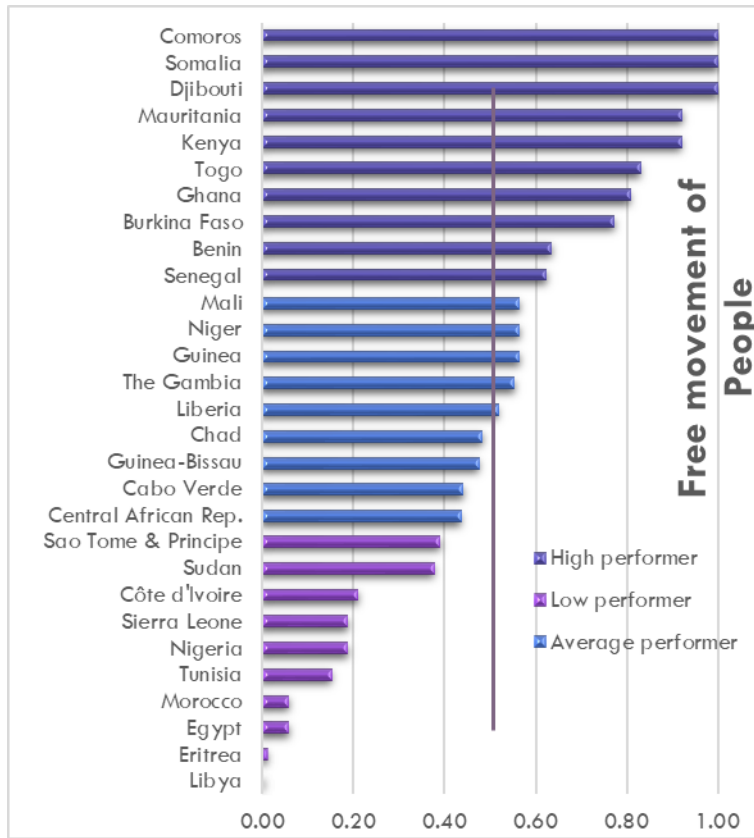
Table 9 Scores on indicators of the infrastructural dimension, CEN-SAD

Country	AfDB Infrastructure Index	Flight connections
Benin	0.151	0.337
Burkina Faso	0.160	0.377
Cabo Verde	0.560	0.102
Central African Rep.	0.103	0.055
Chad	0.040	0.144
Comoros	0.228	0.046
Côte d'Ivoire	0.191	1.000
Djibouti	0.250	0.096
Egypt	1.000	0.562
Eritrea	0.060	0.061
Ghana	0.276	0.581
Guinea	0.132	0.340
Guinea-Bissau	0.122	0.134
Kenya	0.255	0.409
Liberia	0.110	0.137
Libya	0.904	0.397
Mali	0.142	0.464
Mauritania	0.156	0.214
Morocco	0.717	0.877
Niger	0.024	0.266
Nigeria	0.210	0.543
Sao Tome & Principe	0.292	0.000
Senegal	0.259	0.675
Sierra Leone	0.073	0.228
Somalia	0.000	0.228
Sudan	0.137	0.331
The Gambia	0.295	0.166
Togo	0.107	0.432
Tunisia	0.764	0.622
<b>Average</b>	<b>0.266</b>	<b>0.339</b>
<b>Standard deviation</b>	<b>0.259</b>	<b>0.247</b>

The best performance of CEN-SAD is in the free movement of people dimension. However, a closer look at the rankings as depicted in Figure 13 reveals the mediocre performance of many of its countries, such as, Eritrea and Libya. Even Morocco and Côte d'Ivoire, the third and first best integrated countries in CEN-SAD regional integration respectively, post poor performances. Conversely, Comoros, Somalia and Djibouti have achieved a high level of integration on this dimension boasting the maximum score of 1. As shown in Table 10, these three countries have the best scores on the indicators of this dimension: they have liberalised visa policies in terms of both visa requirements and visa on arrival. Moreover, they ratified the Kigali protocol on the free movement of persons in Africa. Other countries that join the

protocol also perform well on this dimension. CEN-SAD's lowest average score within the free movement of people dimension concerns the indicator on the number of countries which are granted visas on arrival. Many countries can significantly improve their scores if they adopt a more flexible visa policy, at least in terms of visas on arrival.

Figure 13 Free movement of people integration in CEN-SAD, Mean score: 0.508



In sum, CEN-SAD does not perform well on regional integration. Its greatest weakness is in the productive dimension. The community barely trades in intermediate products limiting the opportunities to increase efficiency through specialisation and trade. Although they have some trade complementarities, members of the community have failed to develop successful value chains in the region, thus limiting their industrialisation. The latter result may be due partly to the community's deficit in infrastructural integration. Many of its members suffer from poor infrastructural development as revealed by the indicator AfDB infrastructure index. On the positive side, the community is well-integrated on the free movement of people dimension, despite the strict visa policies of a few of its members.

Table 10 Scores on indicators of the free movement of people dimension, CEN-SAD

Country	Number of countries obtaining visas on arrival	Number of countries requiring visas	Free movement of person Protocol
Benin	0.000	1.000	0.000
Burkina Faso	0.357	0.926	1.000
Cabo Verde	0.429	0.963	0.000
Central African Rep.	0.000	0.222	1.000
Chad	0.036	0.333	1.000
Comoros	1.000	1.000	1.000
Côte d'Ivoire	0.000	0.667	0.000
Djibouti	1.000	1.000	1.000
Egypt	0.107	0.074	0.000
Eritrea	0.036	0.000	0.000
The Gambia	0.000	0.593	1.000
Ghana	0.429	0.963	1.000
Guinea	0.000	0.630	1.000
Guinea-Bissau	0.500	1.000	0.000
Kenya	0.821	0.926	1.000
Liberia	0.000	0.481	1.000
Libya	0.000	0.000	0.000
Mali	0.000	0.630	1.000
Mauritania	0.750	1.000	1.000
Morocco	0.000	0.185	0.000
Niger	0.000	0.630	1.000
Nigeria	0.036	0.556	0.000
Sao Tome & Principe	0.000	0.074	1.000
Senegal	0.000	0.815	1.000
Sierra Leone	0.036	0.556	0.000
Somalia	1.000	1.000	1.000
Sudan	0.036	0.000	1.000
Togo	0.464	1.000	1.000
Tunisia	0.000	0.481	0.000
<b>Average</b>	<b>0.243</b>	<b>0.610</b>	<b>0.621</b>
<b>Standard deviation</b>	<b>0.348</b>	<b>0.357</b>	<b>0.485</b>

## Interpreting the performance of COMESA

The Common Market for Eastern and Southern Africa (COMESA) has a low level of integration with an average score of 0.367. Its top two performing countries, Kenya and Rwanda, do not score more than 0.6 and 8 out of its 21 members are low performers as depicted in Figure 14. Eritrea and Eswatini are the least performing with scores lower than 0.3. The disaggregated scores in Table 11 show that the REC has deficiencies on the infrastructural and productive dimensions. Unlike other RECs, the best performance of COMESA is in the trade dimension. The worst and best dimensions are further examined below.

Figure 14 Regional integration in COMESA, Mean score: 0.367

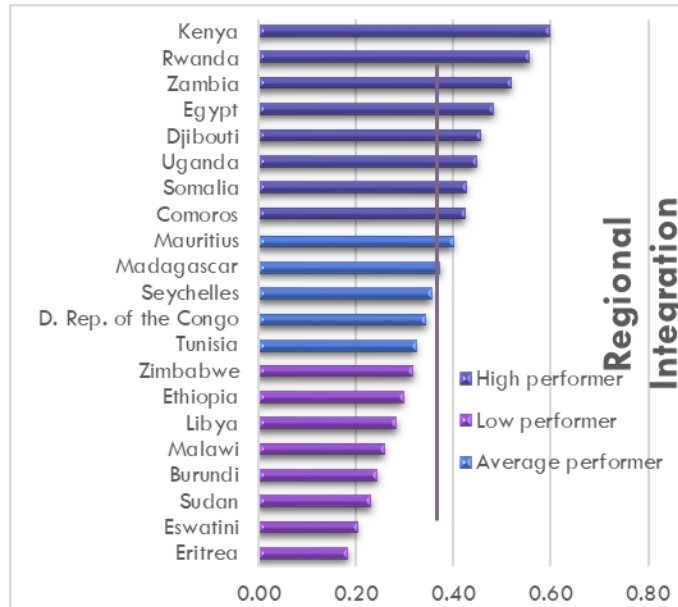


Table 11 COMESA scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.445	0.328	0.365	0.317	0.385

As shown in Figure 15, scores are quite disparate on the infrastructural dimension. There are 9 low performing countries having scores of 0.2 or less and Eritrea and Eswatini are the worst performers. On the upper rungs of the score ladder, Egypt and Kenya are ahead with scores greater than 0.6. Few countries classify as average performers.

The disaggregated infrastructural dimension scores in Table 12 reveal that the community performs poorly on the AfDB infrastructure index where its scores are more variable as given by its higher standard deviation. Five countries have scores close to zero. Scores on the indicator for proportion of flight connections are less varied. However, Eritrea and Eswatini have very low scores explaining their poor performance on this dimension and overall.

Figure 15 Infrastructural integration in COMESA, Mean score: 0.317

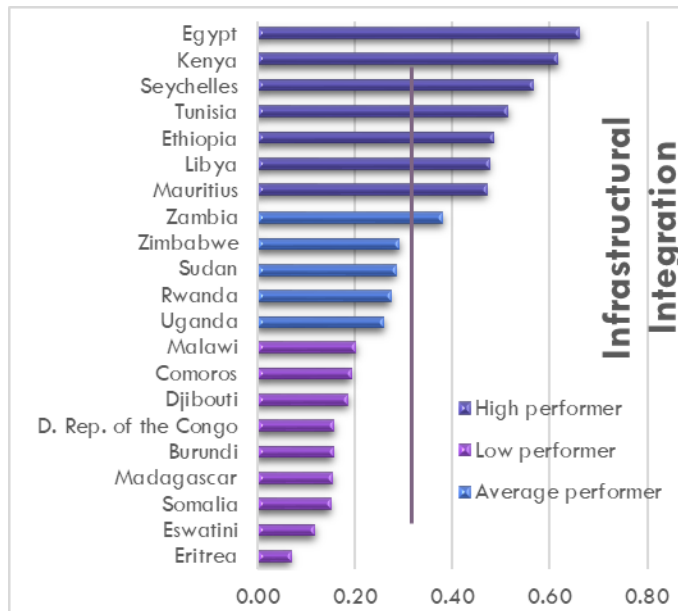
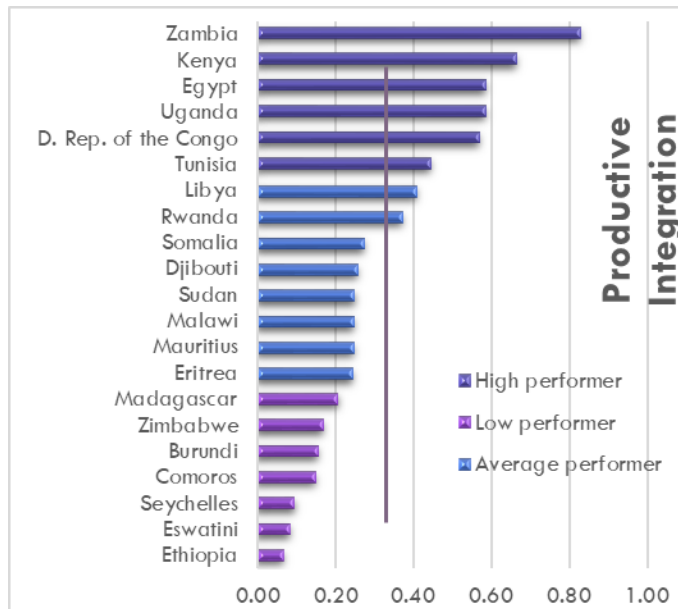


Table 12 Scores on indicators of the infrastructural dimension, COMESA

Country	AfDB Infrastructure Index	Flight connections
Burundi	0.124	0.186
Comoros	0.207	0.178
D. Rep. of the Congo	0.053	0.259
Djibouti	0.227	0.144
Egypt	0.909	0.413
Eritrea	0.054	0.083
Eswatini	0.235	0.000
Ethiopia	0.046	0.922
Kenya	0.232	1.000
Libya	0.822	0.130
Madagascar	0.056	0.251
Malawi	0.167	0.235
Mauritius	0.781	0.160
Rwanda	0.189	0.357
Seychelles	1.000	0.130
Somalia	0.000	0.299
Sudan	0.125	0.443
Tunisia	0.695	0.333
Uganda	0.184	0.334
Zambia	0.201	0.558
Zimbabwe	0.230	0.352
<b>Average</b>	<b>0.311</b>	<b>0.322</b>
<b>Standard deviation</b>	<b>0.308</b>	<b>0.244</b>

Figure 16 Productive integration in COMESA, Mean score: 0.328



The rankings on the productive dimension show much disparity with 13 countries having a score below the average and the least performing countries, Ethiopia, Eswatini and Seychelles, have scores close to zero as shown in Figure 16. The top integrated country, Zambia, has a score above 0.8, much ahead of the second-best integrated country, Kenya. Rwanda, the second-best country on regional integration in COMESA is only an average performer productively.

The average scores on the broken-down indicators show that the region has a low share of intra-regional intermediates imports. In fact, 10 countries have scores below 0.1. Its members' shares of intermediate goods exports are slightly more disparate as reported by its higher standard deviation in Table 13: while Comoros, Eritrea, Seychelles and Somalia have scores nearing zero, Zambia and Kenya enjoy scores above 0.6. Except for Ethiopia and Eswatini, the countries of COMESA have good trade complementarities, but they are not exploiting this potential resulting in their poor performance on the productive aspect of integration.

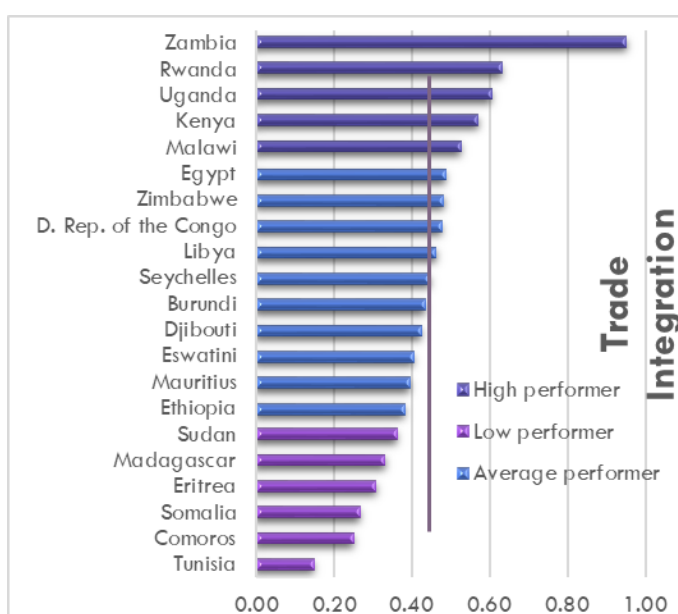
With an average score of 0.445, COMESA performs best on the trade dimension. The rankings depicted in Figure 17 show the exceptional performance of Zambia with a score close to 1, whereas the second-best integrated country, Rwanda, is much behind with a score slightly above 0.6. There are 10 countries classified as average performers. Surprisingly, the least integrated country in trade is Tunisia. It is worth looking at the scores on the different indicators that make up the trade dimension as reported in Table 14. COMESA has largely liberalised its trade as shown by its good performance on the indicator average import tariffs. The weakness of the region lies in its poor share of regional imports. Zambia's good performance on the dimension is accounted for by its top position in the share of trade and exports in the community. The unfavourable import tariff rate of Tunisia and its low import share contribute to its poor performance.



Table 13 Scores on indicators of the productive dimension, COMESA

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Burundi	0.034	0.017	0.378
Comoros	0.000	0.000	0.403
D. Rep. of the Congo	0.592	1.000	0.179
Djibouti	0.015	0.002	0.686
Egypt	0.212	0.611	0.888
Eritrea	0.015	0.001	0.648
Eswatini	0.014	0.179	0.059
Ethiopia	0.157	0.053	0.000
Kenya	0.313	0.624	1.000
Libya	0.323	0.626	0.293
Madagascar	0.097	0.027	0.451
Malawi	0.122	0.106	0.475
Mauritius	0.077	0.133	0.490
Rwanda	0.211	0.119	0.726
Seychelles	0.027	0.002	0.228
Somalia	0.064	0.002	0.686
Sudan	0.374	0.040	0.318
Tunisia	0.092	0.393	0.792
Uganda	0.319	0.476	0.911
Zambia	1.000	0.661	0.824
Zimbabwe	0.188	0.099	0.211
<b>Average</b>	<b>0.202</b>	<b>0.246</b>	<b>0.507</b>
<b>Standard deviation</b>	<b>0.232</b>	<b>0.292</b>	<b>0.285</b>

Figure 17 Trade integration in COMESA, Mean score: 0.445



To sum up, COMESA is poorly integrated on the infrastructural and productive dimensions resulting in its low overall integration. A handful of its members have very inadequate infrastructural development dampening the average score on this indicator. Its members also are not importing enough intermediate goods from within the region, although they have good trade complementarities. Unlike other communities, it performs well on the trade dimension thanks to its liberal tariff policies. However, its share of imports in GDP is still low. It appears that COMESA countries are not fully taking advantage of their favourable tariffs as seen by their poor imports of finished and intermediate goods. The latter deficiencies may largely be a consequence of the lack of infrastructure and productive capacity in the region that deter regional investments. Policies should urgently address these shortcomings.

Table 14 Scores on indicators of the trade dimension, COMESA

Country	Share of intra-regional trade	Average import tariffs	Share of exports in GDP	Share of imports in GDP
Burundi	0.057	0.948	0.158	0.562
Comoros	0.000	0.833	0.000	0.148
D. Rep. of the Congo	0.529	0.796	0.383	0.179
Djibouti	0.022	0.967	0.568	0.163
Egypt	0.816	0.965	0.097	0.000
Eritrea	0.034	0.966	0.018	0.184
Eswatini	0.044	1.000	0.555	0.044
Ethiopia	0.352	0.925	0.190	0.032
Kenya	0.768	0.957	0.435	0.088
Libya	0.444	1.000	0.140	0.220
Madagascar	0.080	0.975	0.098	0.147
Malawi	0.139	0.936	0.614	0.441
Mauritius	0.126	1.000	0.336	0.117
Rwanda	0.292	0.948	0.519	0.771
Seychelles	0.021	1.000	0.446	0.328
Somalia	0.038	0.020	0.005	1.000
Sudan	0.432	0.820	0.054	0.099
Tunisia	0.294	0.000	0.276	0.030
Uganda	0.548	0.948	0.631	0.288
Zambia	1.000	0.965	1.000	0.839
Zimbabwe	0.281	1.000	0.239	0.382
<b>Average</b>	<b>0.301</b>	<b>0.856</b>	<b>0.322</b>	<b>0.289</b>
<b>Standard deviation</b>	<b>0.288</b>	<b>0.280</b>	<b>0.257</b>	<b>0.277</b>

### Interpreting the performance of ECCAS

The Economic Community of Central African States (ECCAS) displays a moderate level of integration with an average score of 0.442. Its four top performing countries have very similar scores circa 0.6. Burundi and Angola are the least performing countries with scores not below 0.2. The dimensional scores as reported in Table 15 reveal the peculiarity of this 11-member community. Unlike other RECs, the best performance of this region is on the macroeconomic dimension. However, it has the same deficiencies as observed for other RECs, that is, it is poorly integrated on the productive dimension.

Figure 18 Regional integration in ECCAS, Mean score: 0.442

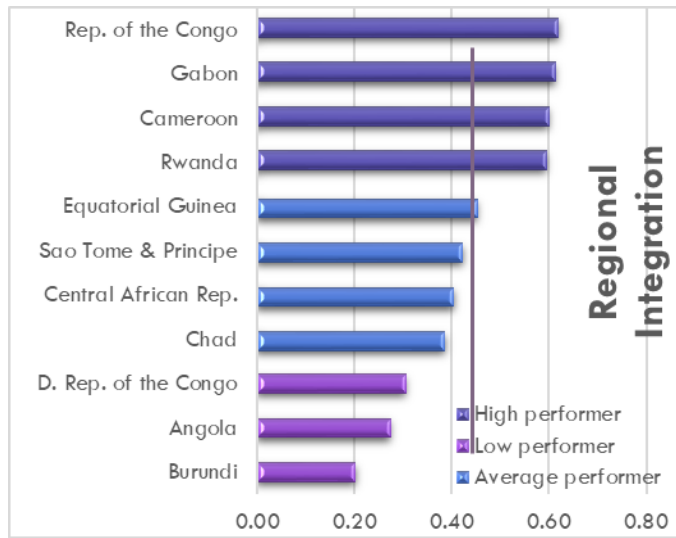


Table 15 ECCAS scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.357	0.323	0.684	0.373	0.469

Figure 19 shows that Rwanda is the most integrated country on the macroeconomic dimension with a high score close to 1 in contrast with Angola that scores 0. The majority of countries fare well on this dimension with scores above the average. However, the disaggregated scores reported in Table 16 shed light on the unexpected performance of the community: none of its members have bilateral investment treaties in force, therefore, the community is not assessed on this indicator. Members of ECCAS have a better performance on their regional inflation differential than on the convertibility of their currencies.

Figure 19 Macroeconomic integration in ECCAS, Mean score: 0.684

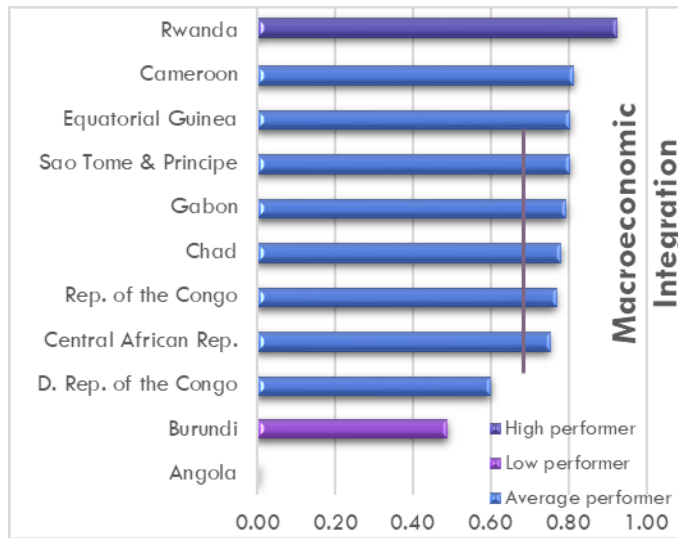


Table 16 Scores on indicators of the macroeconomic dimension, ECCAS

Country	Currency convertibility	Inflation differential	Bilateral investment treaties
Angola	0.000	0.000	0.000
Burundi	0.125	0.852	0.000
Cameroon	0.625	1.000	0.000
Central African Rep.	0.625	0.881	0.000
Chad	0.625	0.937	0.000
Rep. of the Congo	0.625	0.914	0.000
D. Rep. of the Congo	0.750	0.450	0.000
Equatorial Guinea	0.625	0.983	0.000
Gabon	0.625	0.961	0.000
Rwanda	1.000	0.846	0.000
Sao Tome & Principe	0.750	0.855	0.000
<b>Average</b>	<b>0.580</b>	<b>0.789</b>	<b>0.000</b>
<b>Standard deviation</b>	<b>0.268</b>	<b>0.287</b>	<b>0.000</b>

While ECCAS has a low score on its productive dimension, the rankings depicted in Figure 20 show that Cameroon, the top performing country, has a score close to 0.9, much ahead of the second-best integrated country that has a score slightly above 0.4. Most countries are average performers on the productive dimension. However, the low performers have scores below 0.2. Table 17 reports the scores on the various indicators that make up the dimension. ECCAS performs poorly on its share of intermediates imports with seven countries having scores very close to zero; Chad, Equatorial Guinea and Gabon score a sheer 0. Members of ECCAS have enough trade complementarities as evidenced by the average score on the indicator trade complementarity index. But to their detriment, they are not

taking advantage of their complementarities. For example, the shares of intermediates imports and exports of Chad are inexistent despite its sufficient trade complementarity.

Figure 20 Productive integration in ECCAS, Mean score: 0.327

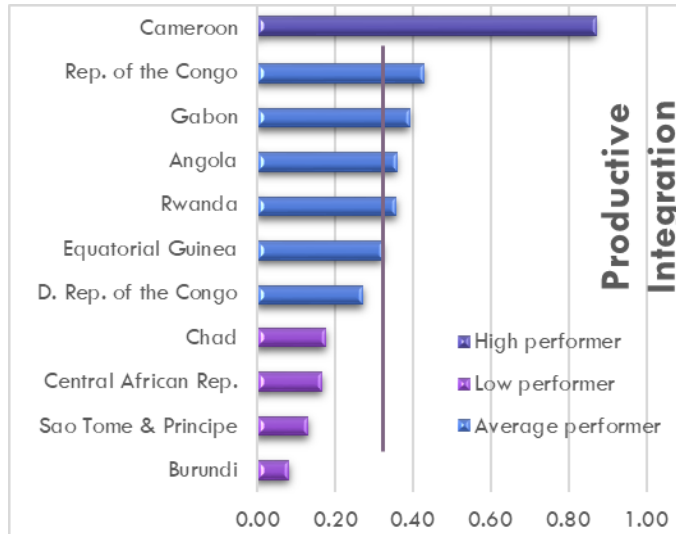


Table 17 Scores on indicators of the productive dimension, ECCAS

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Angola	0.092	0.285	0.662
Burundi	0.044	0.154	0.045
Cameroon	1.000	0.888	0.742
Central African Rep.	0.116	0.012	0.349
Chad	0.000	0.009	0.483
D. Rep. of the Congo	0.402	0.205	0.212
Equatorial Guinea	0.000	1.000	0.000
Gabon	0.000	0.102	1.000
Rep. of the Congo	0.330	0.739	0.237
Rwanda	0.066	0.521	0.467
Sao Tome & Principe	0.007	0.000	0.357
<b>Average</b>	<b>0.187</b>	<b>0.356</b>	<b>0.414</b>
<b>Standard deviation</b>	<b>0.288</b>	<b>0.353</b>	<b>0.287</b>

To conclude, the moderate performance of ECCAS on regional integration is largely driven by its good macroeconomic performance. However, this overall performance on macroeconomic dimension hides the fact that none of its members have engaged in bilateral investment treaties. The weakness of the community is in the productive dimension. In particular, its intermediates imports are low despite the fact

that it enjoys sufficient trade complementarities. This suggests that ECCAS is not engaging in intra-regional value chains.

### Interpreting the performance of IGAD

The Intergovernmental Authority on Development (IGAD) made up 8-members, has a moderate level of integration with an average score of 0.438. Uganda and Kenya are the best performers but they do not score more than 0.7 as shown in Figure 21. A breakdown of the scores by dimension shows that the community’s strength is on the free movement of people dimension and its weakness is on the productive dimension of integration as reported in Table 18.

Figure 21 Regional integration in IGAD, Mean score: 0.438

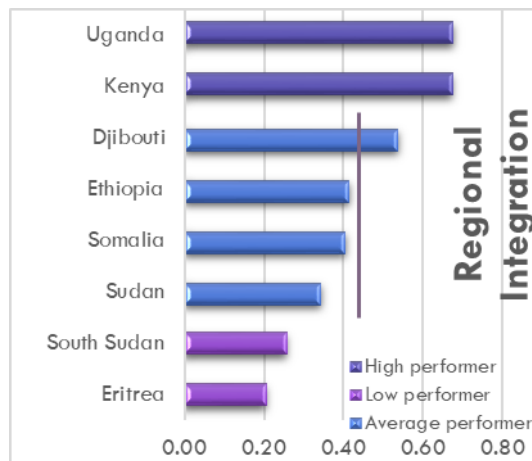


Table 18 IGAD scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.444	0.321	0.423	0.480	0.540

IGAD’s rankings on the productive dimension are depicted in Figure 22 and expose the poor performance of six of its members that score less than 0.2. By contrast, Uganda and Kenya report good levels of productive integration. Apart from the latter two, all the members of this community fare badly on their share of intermediate goods exports with scores less than 0.1. However, they enjoy good trade complementarities with an average score of 0.467 on the indicator trade complementarity index. Despite their good trade complementarities in the region, Djibouti and Eritrea perform badly on their shares of both intermediates imports and exports. The region is not harnessing the possibility of developing its regional value chain.

Figure 22 Productive integration in IGAD, Mean score: 0.321

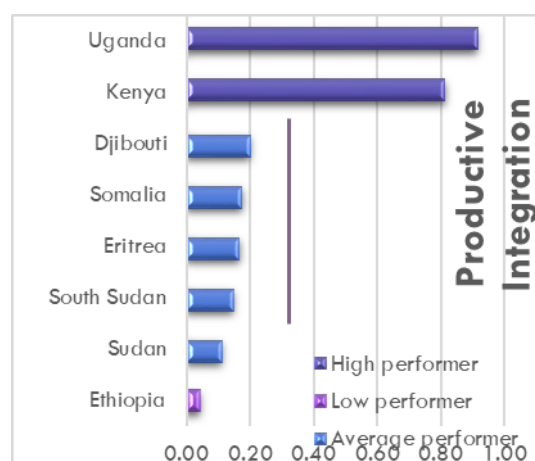


Table 19 Scores on indicators of the productive dimension, IGAD

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Djibouti	0.014	0.000	0.684
Eritrea	0.000	0.000	0.580
Ethiopia	0.047	0.070	0.000
Kenya	0.388	1.000	1.000
Somalia	0.185	0.001	0.411
South Sudan	0.321	0.002	0.170
Sudan	0.236	0.031	0.090
Uganda	1.000	0.931	0.801
<b>Average</b>	<b>0.274</b>	<b>0.254</b>	<b>0.467</b>
<b>Standard deviation</b>	<b>0.305</b>	<b>0.412</b>	<b>0.337</b>

Although IGAD has achieved a good level of integration on the free movement of people dimension, there is much variation in the level of integration of its members as shown in Figure 23. On the one hand, Djibouti and Somalia vault the highest score of 1. On the other hand, Ethiopia and Eritrea have scores of less than 0.2. The disaggregated scores reported in Table 20 show that the best performance of the community is on the indicator free movement of persons protocol. There can still be improvement on this dimension if members grant visas on arrival to more members of this community.

Figure 23 Free movement of people in IGAD, Mean score: 0.540

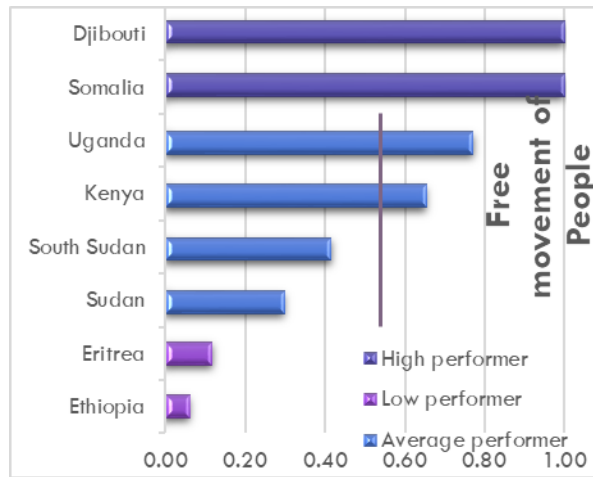


Table 20 Scores on indicators of the free movement of people dimension, IGAD

Country	Number of countries obtaining visas on arrival	Number of countries requiring visas	Free movement of person Protocol
Djibouti	1.000	1.000	1.000
Eritrea	0.143	0.167	0.000
Ethiopia	0.000	0.167	0.000
Kenya	0.429	0.667	1.000
Somalia	1.000	1.000	1.000
South Sudan	0.286	0.167	1.000
Sudan	0.143	0.000	1.000
Uganda	0.571	0.833	1.000
<b>Average</b>	<b>0.446</b>	<b>0.500</b>	<b>0.750</b>
<b>Standard deviation</b>	<b>0.360</b>	<b>0.391</b>	<b>0.433</b>

The moderate level of integration in IGAD can be improved if corrective measures are taken to uplift the productive dimension where its performance is the lowest. Exports of intermediate goods should be encouraged so as to develop the region's value chain. In fact, IGAD countries have good trade complementarities that are not being exploited. The best performance of the community is on the free movement of people dimension given that most of its members have ratified the protocol on the free movement of persons.

### Interpreting the performance of EAC

The East African Community (EAC) has a good level of integration with an average score of 0.537. Kenya is the top integrated country followed by Uganda, while South Sudan is the least integrated as



shown in Figure 24. The community performs best on the free movement of people and macroeconomic dimensions with good scores of 0.664 and 0.660, respectively, as reported in Table 21. Similar to other RECs, its weakness is on the productive dimension.

Figure 24 Regional integration in EAC, Mean score: 0.537

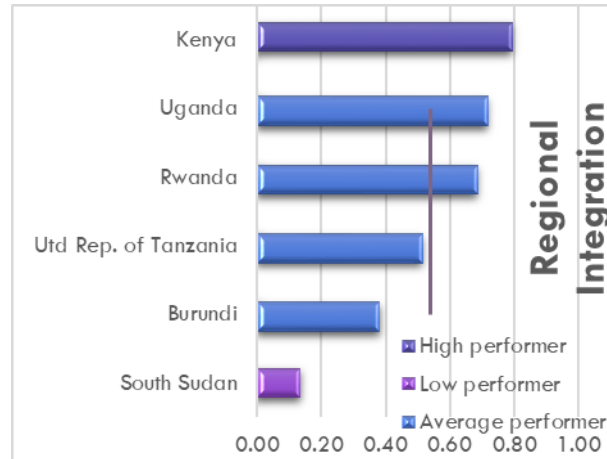
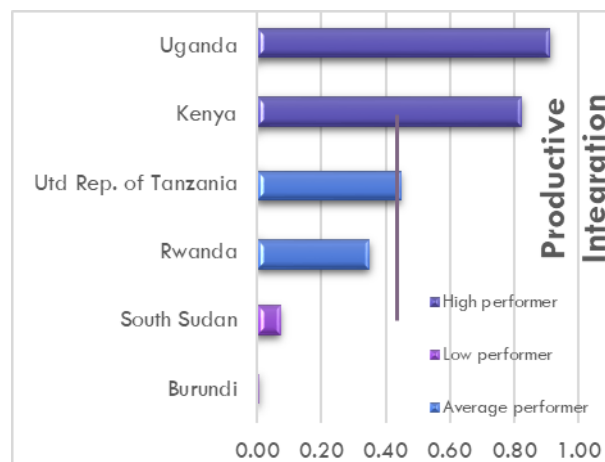


Table 21 EAC scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.440	0.434	0.660	0.555	0.664

Figure 25 Productive integration in EAC, Mean score: 0.434



The rankings on the productive dimension reveal much disparity in performances as depicted in Figure 25. Uganda and Kenya are well-integrated with scores greater than 0.8. Conversely, Burundi scores 0. Table 22 reports the disaggregated scores and EAC has the lowest average score on the indicator trade complementarity index. Its members' shares of intermediates exports display more variability. The best performing country, Uganda, has the best share on intermediates imports and high intermediates exports too, and it appears to be successfully exploiting the regional value chain.

Table 22 Scores on indicators of the productive dimension, EAC

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Burundi	0.000	0.008	0.000
Kenya	0.475	1.000	1.000
Rwanda	0.737	0.197	0.103
South Sudan	0.189	0.000	0.025
Utd Rep. of Tanzania	0.491	0.627	0.219
Uganda	1.000	0.913	0.814
<b>Average</b>	<b>0.482</b>	<b>0.458</b>	<b>0.360</b>
<b>Standard deviation</b>	<b>0.329</b>	<b>0.410</b>	<b>0.396</b>

The rankings on the free movement of people dimension show that 4 out of the 6 members have scores greater than 0.5, thus contributing to make this dimension the best in terms of performance for EAC as a whole. Rwanda is fully integrated on this dimension boasting the maximum score. Kenya and Uganda have scores close to 0.8. The scores on the individual indicators (see Table 23) show that EAC is best performing on the indicator that measures visa requirements. Only South Sudan has a weak score on this indicator. Whereas they enjoy a good score on the indicator free movement of persons protocol, Burundi and the United Republic of Tanzania are yet to join the protocol.

Figure 26 Free movement of people in EAC, Mean score: 0.664

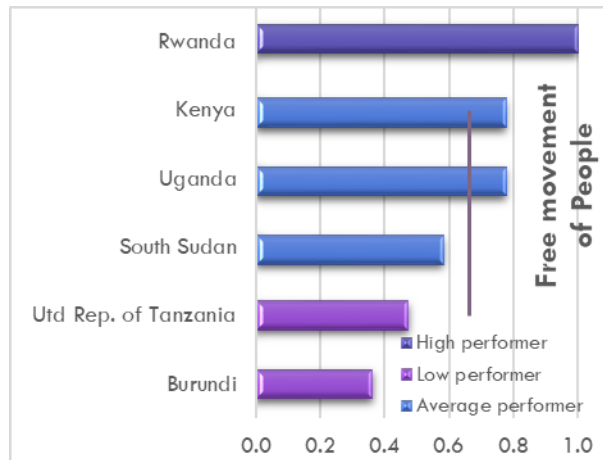


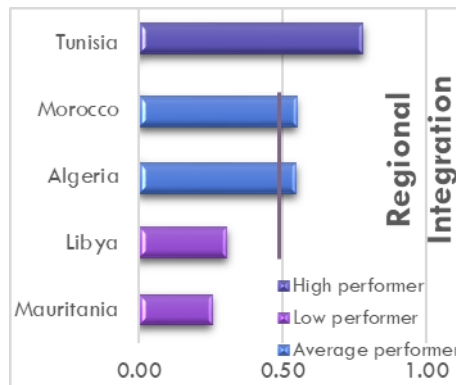
Table 23 Scores on indicators of the free movement of people dimension, EAC

Country	Number of countries obtaining visas on arrival	Number of countries requiring visas	Free movement of person Protocol
Burundi	1.000	1.000	0.000
Kenya	0.000	1.000	1.000
Rwanda	1.000	1.000	1.000
South Sudan	0.750	0.000	1.000
Utd Rep. of Tanzania	0.250	1.000	0.000
Uganda	0.000	1.000	1.000
<b>Average</b>	<b>0.500</b>	<b>0.833</b>	<b>0.667</b>
<b>Standard deviation</b>	<b>0.433</b>	<b>0.373</b>	<b>0.471</b>

In sum, the free movement of people dimension together with the macroeconomic dimension are the strengths of EAC. The community has greatly liberalised the movement of its people. Regional integration can be greatly enhanced in this community if the weaknesses of some countries on the productive dimension are addressed.

### Interpreting the performance of AMU

Figure 27 Regional integration in AMU, Mean score: 0.488



The Arab Maghreb Union (AMU) has a moderate performance on regional integration. Tunisia is the top performing country of this REC with a score of 0.780, while Mauritania is the least performing as shown in Figure 27. The performance of this community is unlike most other communities: as shown in Table 24 it performs best on the macroeconomic dimension followed by the infrastructural dimension, though its worst performance is on the free movement of people dimension.

Table 24 AMU scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.481	0.449	0.571	0.509	0.438

Morocco is the most integrated country on the macroeconomic dimension with a high score close to 1 as depicted in Figure 28. Performances of countries are quite different with the least performing country, Libya, scoring below 0.2. The disaggregated scores in Table 25 reveal that the community has perfect currency convertibility. Except for Libya, inflation differential in this community is quite favourable. Members of the union have some bilateral investment treaties, except for Algeria.

Figure 28 Macroeconomic integration in AMU, Mean score: 0.571

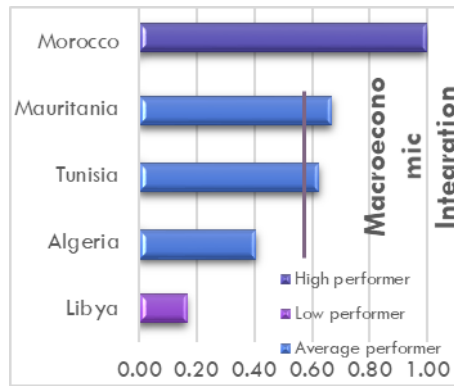


Table 25 Scores on indicators of the macroeconomic dimension, AMU

Country	Currency convertibility	Inflation differential	Bilateral investment treaties
Algeria	1.000	0.808	0.000
Libya	1.000	0.000	0.333
Mauritania	1.000	1.000	0.333
Morocco	1.000	0.995	1.000
Tunisia	1.000	0.912	0.333
<b>Average</b>	<b>1.000</b>	<b>0.743</b>	<b>0.400</b>
<b>Standard deviation</b>	<b>0.000</b>	<b>0.378</b>	<b>0.327</b>

The dimensional scores in Table 24 also show that AMU has a good performance on the infrastructural dimension. However, as depicted in Figure 29, the rankings expose the huge disparity between the top performing country, Tunisia, and the least performing country, Mauritania. The community performs very well on the AfDB infrastructure index where it has a high average score as shown in Table 26. The deficiencies of Mauritania on both indicators, namely AfDB infrastructure index and proportion of flight connections, explain its poor performance. Tunisia excels on both indicators, whereas Libya’s second position on this dimension is due to its top score on the AfDB infrastructure index.

Figure 29 Infrastructural integration in AMU, Mean score: 0.509

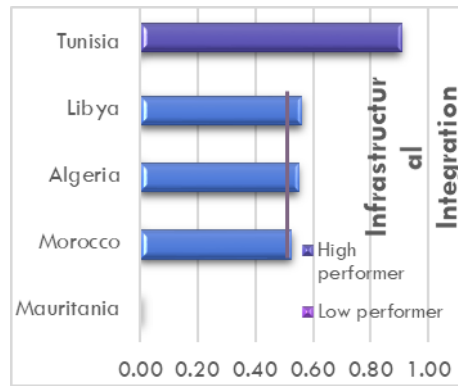
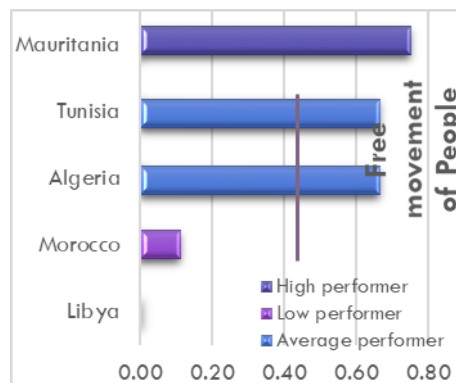


Table 26 Scores on indicators of the infrastructural dimension, AMU

Country	AfDB Infrastructure Index	Flight connections
Algeria	0.604	0.496
Libya	1.000	0.122
Mauritania	0.000	0.000
Morocco	0.750	0.301
Tunisia	0.813	1.000
<b>Average</b>	<b>0.633</b>	<b>0.384</b>
<b>Standard deviation</b>	<b>0.341</b>	<b>0.351</b>

Figure 30 Free movement of people in AMU, Mean score: 0.438



Mauritania has achieved a reasonable level of integration on the movement of people, while Libya is lagging behind as depicted in Figure 30. Tunisia and Algeria are well-integrated too. The scores on the indicators reported in Table 27 reveal that Mauritania is the only country that has a non-zero score on the indicators that measure the free movement of persons protocol making it the best integrated country

on this dimension. Algeria and Tunisia perform well on the indicators of visas on arrival and visa requirements. Libya has restrictive movement of people policies scoring zero on all three indicators of this dimension.

Table 27 Scores on indicators of the free movement of people dimension, AMU

Country	Number of countries obtaining visas on arrival	Number of countries requiring visas	Free movement of person Protocol
Algeria	1.000	1.000	0.000
Libya	0.000	0.000	0.000
Mauritania	0.250	1.000	1.000
Morocco	0.000	0.333	0.000
Tunisia	1.000	1.000	0.000
<b>Average</b>	<b>0.450</b>	<b>0.667</b>	<b>0.200</b>
<b>Standard deviation</b>	<b>0.458</b>	<b>0.422</b>	<b>0.400</b>

To sum up, AMU's performance on regional integration has different determinants as compared to other RECs in Africa. It is best performing on the macroeconomic dimension and its members' currencies are well-convertible. It also has a good level of infrastructural integration boosted by the top scores of most of its countries on the AfDB infrastructure index. On the other hand, some countries of the Union have potential to further liberalise the movement of their people within the region and to take advantage of the regional value chain.

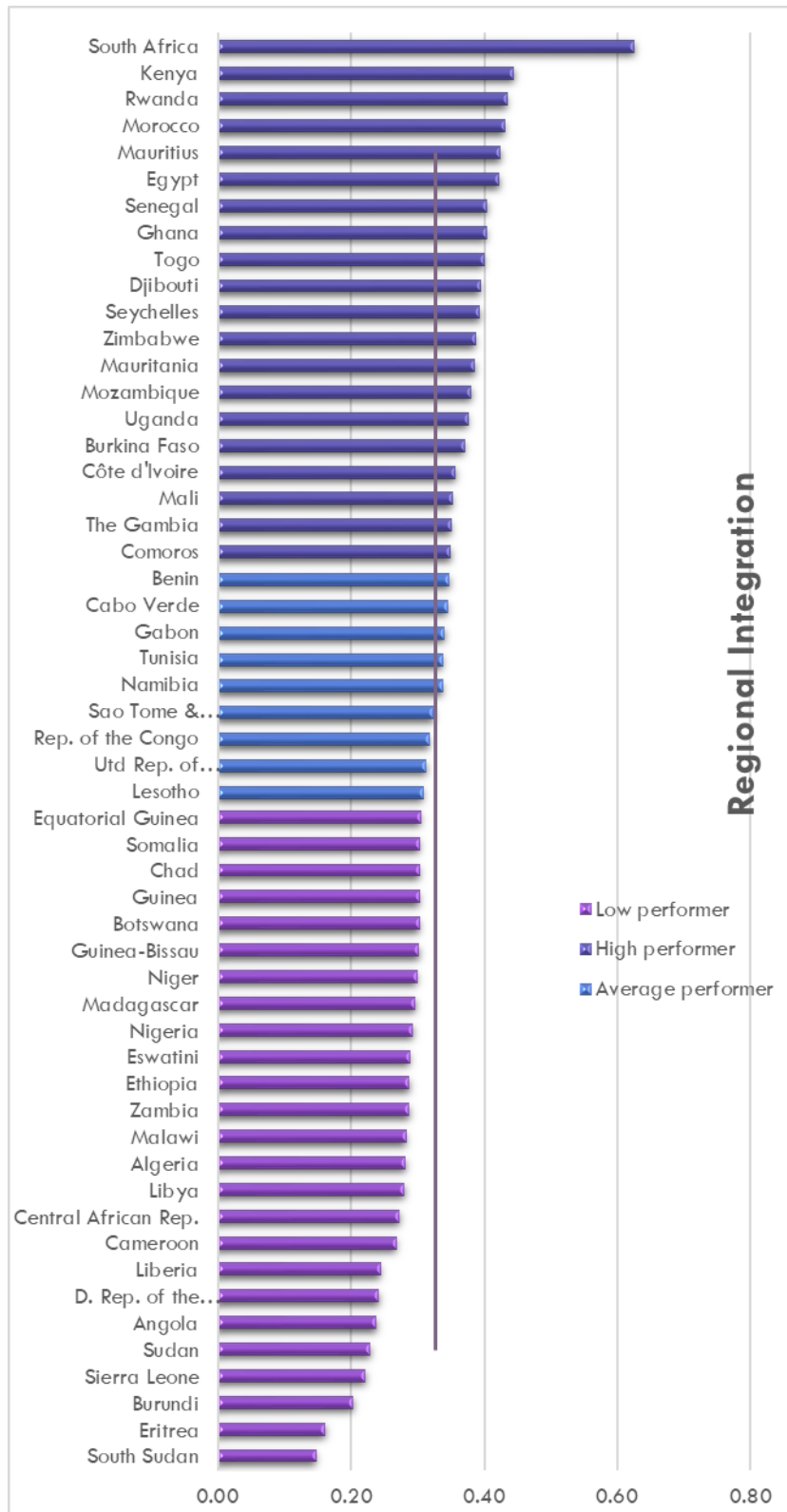
### Interpreting the performance within the Continent

Africa's integration is low with an average score of 0.327. South Africa is the most integrated country followed by Kenya and Rwanda. South Sudan is the least integrated country behind Eritrea and Burundi as shown in Figure 31. The best performance of the continent is on the free movement of people dimension. It is lacking on the productive and infrastructural dimensions as reported in Table 28.

Table 28 Africa scores on the 5 dimensions of regional integration

Trade integration	Productive integration	Macroeconomic integration	Infrastructural integration	Free movement of people
0.383	0.201	0.399	0.220	0.441

Figure 31 Regional integration in Africa, Mean score: 0.327





As is evident from on the productive dimension of regional integration. While South Africa is the inevitable leader with the maximum score of 1, the second-best country Nigeria has a score below 0.4. Moreover, a sheer 32 countries have a score below 0.2. The least performing countries are the Republic of Congo, Lesotho and Ethiopia.

A look at the disaggregated scores in Table 29 reveals the weakness of the continent: its lowest average score is on its regional share of intermediates exports over GDP with 21 countries having a score less than 0.01. Besides South Africa and Nigeria, intermediates exports of African countries are really low. However, the potential for the continent to trade more is evident as revealed by the average score on the trade complementarity index. For instance, countries such as Djibouti, Liberia and Sao Tome and Principe boast scores above 0.5 on the latter index, but they are not taking advantage of this trade potential as given by their scores on their share of intermediates exports and imports. Contrarily, the poor performance of the Republic of Congo and Lesotho is due to their relatively poor complementarities added to their low share of intermediates exports.

Figure 32 Productive integration in Africa, Mean score: 0.201

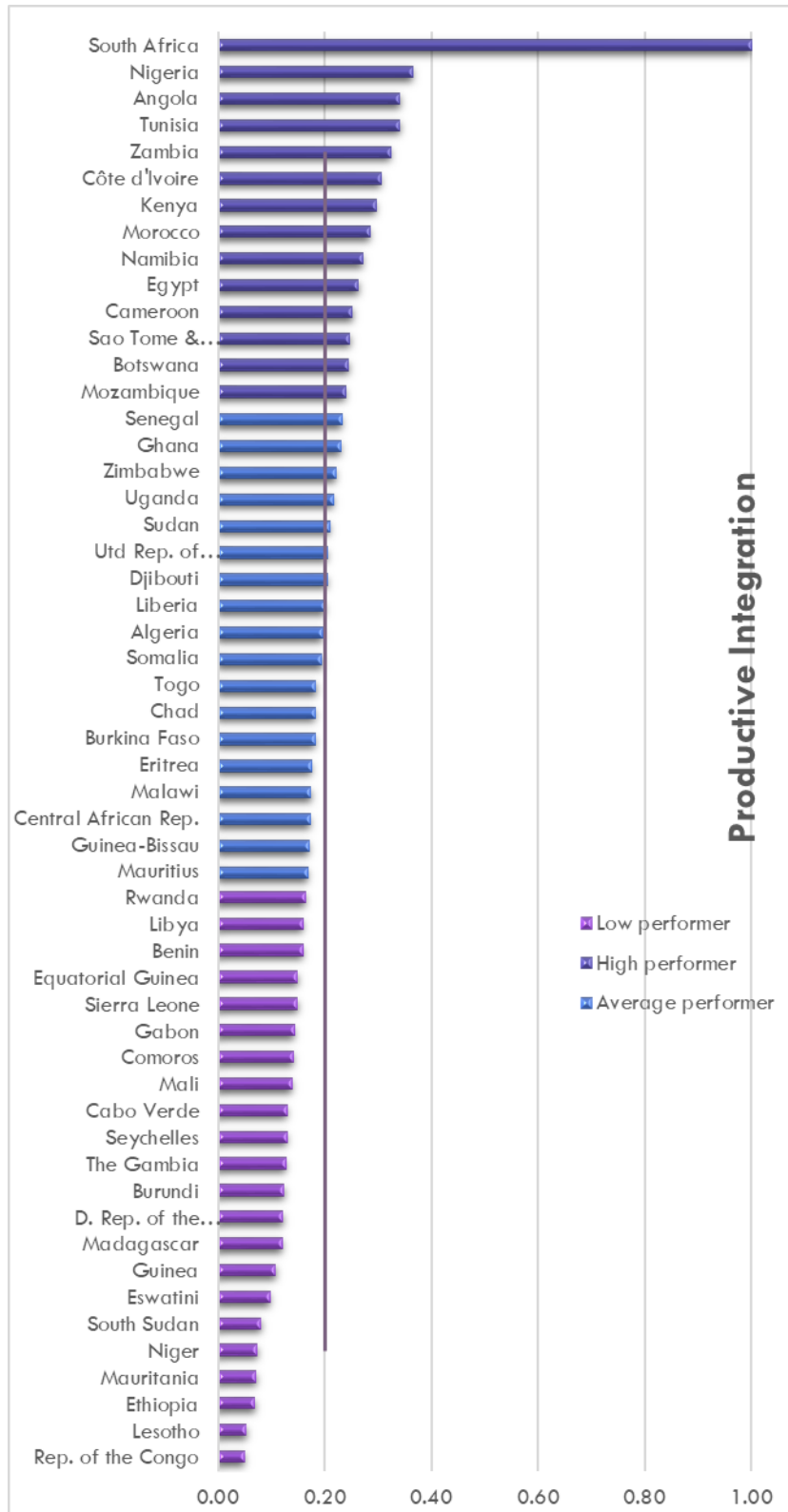


Table 29 Scores on indicators of the productive dimension, Africa

Country	Share of intermediates imports on GDP	Share of intermediates exports on GDP	Trade complementarity index
Algeria	0.138	0.196	0.246
Angola	0.094	0.147	0.728
Benin	0.044	0.014	0.387
Botswana	0.458	0.140	0.148
Burkina Faso	0.070	0.026	0.415
Burundi	0.015	0.002	0.325
Cabo Verde	0.001	0.000	0.356
Cameroon	0.199	0.018	0.503
Central African Rep.	0.003	0.000	0.475
Chad	0.012	0.000	0.492
Comoros	0.012	0.000	0.377
Côte d'Ivoire	0.354	0.122	0.423
D. Rep. of the Congo	0.253	0.126	0.000
Djibouti	0.008	0.000	0.557
Egypt	0.108	0.131	0.516
Equatorial Guinea	0.007	0.033	0.377
Eritrea	0.006	0.000	0.477
Eswatini	0.110	0.073	0.107
Ethiopia	0.039	0.007	0.150
Gabon	0.023	0.010	0.366
Ghana	0.067	0.101	0.489
Guinea	0.015	0.034	0.253
Guinea-Bissau	0.008	0.001	0.463
Kenya	0.162	0.091	0.593
Lesotho	0.098	0.012	0.048
Liberia	0.008	0.000	0.544
Libya	0.077	0.072	0.309
Madagascar	0.040	0.007	0.289
Malawi	0.082	0.023	0.388
Mali	0.099	0.132	0.180
Mauritania	0.025	0.016	0.161
Mauritius	0.059	0.019	0.397
Morocco	0.203	0.103	0.516
Mozambique	0.281	0.075	0.344
Namibia	0.414	0.167	0.236
Niger	0.037	0.003	0.167
Nigeria	0.161	0.702	0.248
Rep. of the Congo	0.018	0.008	0.113
Rwanda	0.063	0.017	0.383
Sao Tome & Principe	0.000	0.000	0.681
Senegal	0.119	0.072	0.473
Seychelles	0.013	0.000	0.343
Sierra Leone	0.006	0.005	0.401
Somalia	0.016	0.000	0.521
South Africa	1.000	1.000	1.000
South Sudan	0.023	0.001	0.202
Sudan	0.084	0.006	0.497
The Gambia	0.002	0.004	0.345
Togo	0.025	0.026	0.460
Tunisia	0.195	0.110	0.670
Uganda	0.101	0.069	0.447
Utd Rep. of Tanzania	0.111	0.128	0.356
Zambia	0.510	0.129	0.330
Zimbabwe	0.279	0.212	0.178
<b>Average</b>	<b>0.118</b>	<b>0.081</b>	<b>0.379</b>
<b>Standard deviation</b>	<b>0.170</b>	<b>0.164</b>	<b>0.180</b>

, there exists much disparity in the performance of African countries on the productive dimension of regional integration. While South Africa is the inevitable leader with the maximum score of 1, the second-best country Nigeria has a score below 0.4. Moreover, a sheer 32 countries have a score below 0.2. The least performing countries are the Republic of Congo, Lesotho and Ethiopia.

A look at the disaggregated scores in Table 29 reveals the weakness of the continent: its lowest average score is on its regional share of intermediates exports over GDP with 21 countries having a score less than 0.01. Besides South Africa and Nigeria, intermediates exports of African countries are really low. However, the potential for the continent to trade more is evident as revealed by the average score on the trade complementarity index. For instance, countries such as Djibouti, Liberia and Sao Tome and Principe boast scores above 0.5 on the latter index, but they are not taking advantage of this trade potential as given by their scores on their share of intermediates exports and imports. Contrarily, the poor performance of the Republic of Congo and Lesotho is due to their relatively poor complementarities added to their low share of intermediates exports.

Figure 32 Productive integration in Africa, Mean score: 0.201

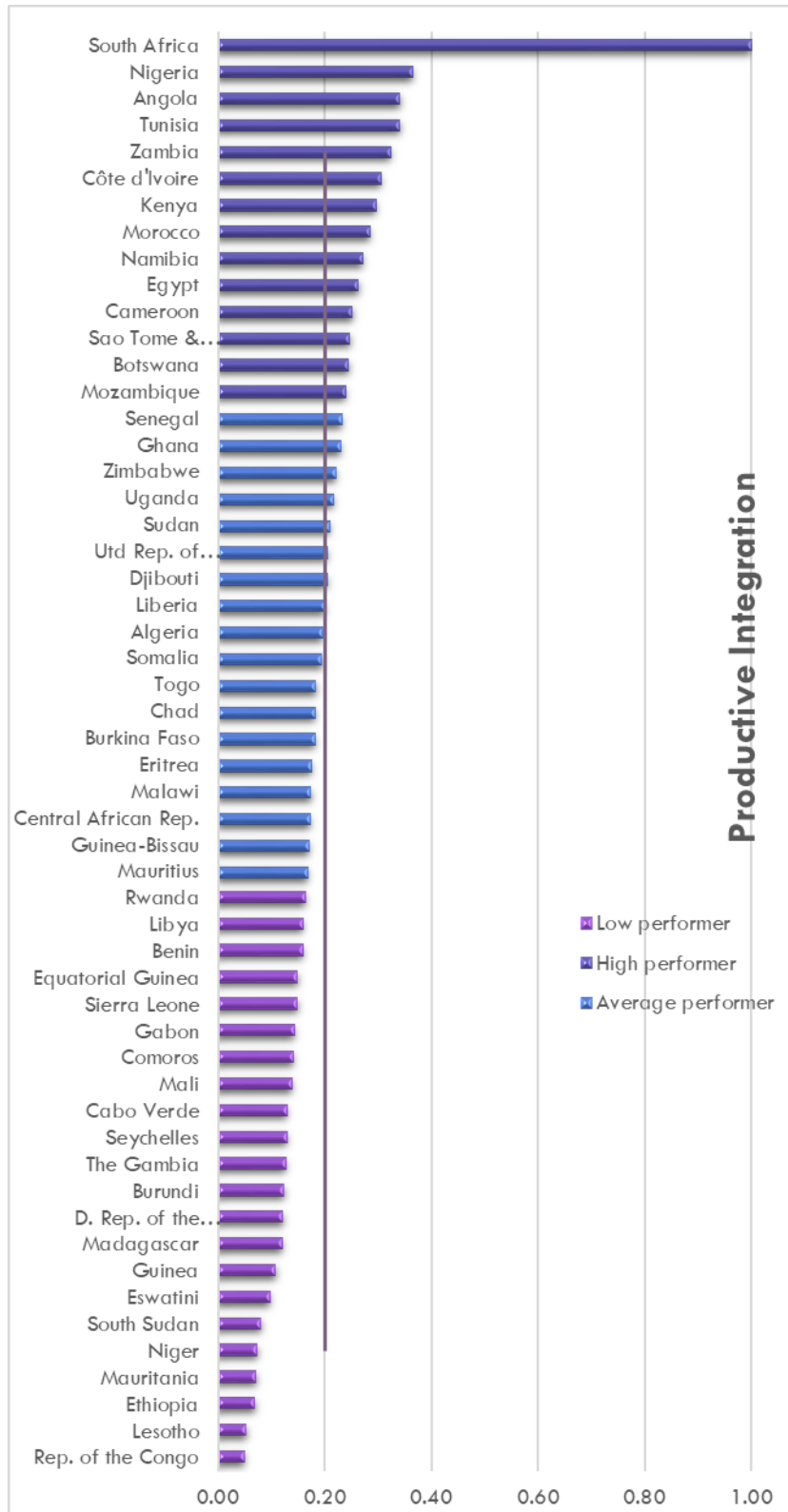


Table 29 Scores on indicators of the productive dimension, Africa

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Cabo Verde	0.001	0.000	0.356
Cameroon	0.199	0.018	0.503
Central African Rep.	0.003	0.000	0.475
Chad	0.012	0.000	0.492
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Gabon	0.023	0.010	0.366
Ghana	0.067	0.101	0.489
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Sierra Leone	0.006	0.005	0.401
Somalia	0.016	0.000	0.521
South Africa	1.000	1.000	1.000
South Sudan	0.023	0.001	0.202
Sudan	0.084	0.006	0.497
The Gambia	0.002	0.004	0.345
Togo	0.025	0.026	0.460
Tunisia	0.195	0.110	0.670
Uganda	0.101	0.069	0.447
Utd Rep. of Tanzania	0.111	0.128	0.356
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<b>Standard deviation</b>	<b>0.170</b>	<b>0.164</b>	<b>0.180</b>

The African continent has made enormous progress in the last few years as regards the ease with which its citizens can move from one country to another and, no doubt, its best performance is on the free movement of people dimension. But as is evident in Figure 33, not all countries have adopted liberal policies to enhance mobility. While Comoros, Djibouti and Somali vaunt the highest scores, Libya, Eritrea and Ethiopia perform poorly with scores close to 0.

The disaggregated scores show that the top performing countries have signed the Kigali protocol on the free movement of people in the continent and have liberal visa policies as per Table 30. The countries at the bottom of the ladder have low scores on the indicator *the Number of countries that may obtain a visa on arrival*. The latter is also the least performing indicator for the continent.

To sum up, the poor performance of Africa is driven by its poor performance on the productive and infrastructural dimensions of regional integration. Except for a few countries, Africa is not taking advantage of the trade complementarities that exist between the countries and are, therefore, not fully developing regional value chains that would not only boost its performance on the productive dimension but also on the trade dimension. This untapped potential may exist because of the poor infrastructural conditions on the continent that hamper production and the smooth transition of goods from one country to another.

On the other hand, the continent has a relatively good performance on the free movement of people dimension, albeit with enormous disparities between individual countries. It would benefit regional integration if countries that signed the free movement of people protocol effectively put in place measures to facilitate mobility of people that would in turn set the grounds for enhanced cooperation at both the economic and sociocultural levels.

Figure 33 Free movement of people in Africa, Mean score: 0.441

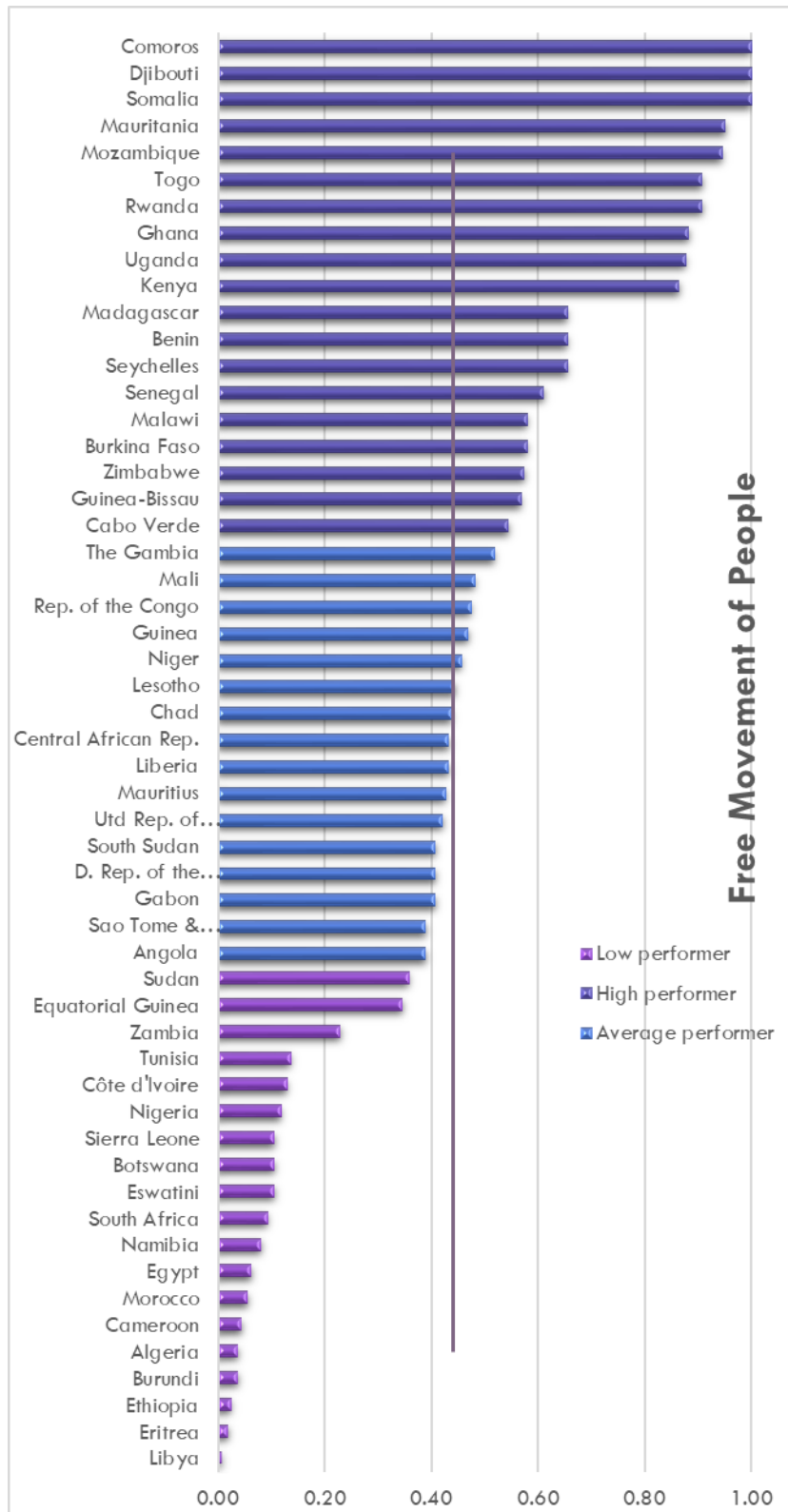


Table 30 Scores on indicators of the free movement of people dimension, Africa



MAKING SENSE OF REGIONAL INTEGRATION INDEXES

Country	Number of countries that require a visa	Number of countries that may obtain a visa on arrival	Free Movement of Persons Protocol -Kigali
Algeria	0.113	0.000	0
Angola	0.132	0.000	1
Benin	1.000	1.000	0
Botswana	0.321	0.000	0
Burkina Faso	0.509	0.208	1
Burundi	0.113	0.000	0
Cabo Verde	0.981	0.679	0
Cameroon	0.132	0.000	0
Central African Rep.	0.264	0.000	1
Chad	0.264	0.019	1
Comoros	1.000	1.000	1
Côte d'Ivoire	0.396	0.000	0
D. Rep. of the Congo	0.132	0.057	1
Djibouti	1.000	1.000	1
Egypt	0.094	0.094	0
Equatorial Guinea	0.000	0.000	1
Eritrea	0.038	0.019	0
Eswatini	0.321	0.000	0
Ethiopia	0.057	0.019	0
Gabon	0.170	0.019	1
Ghana	0.981	0.660	1
Guinea	0.377	0.000	1
Guinea-Bissau	1.000	0.736	0
Kenya	0.962	0.623	1
Lesotho	0.302	0.000	1
Liberia	0.264	0.000	1
Libya	0.019	0.000	0
Madagascar	1.000	1.000	0
Malawi	0.491	0.226	1
Mali	0.396	0.019	1
Mauritania	1.000	0.849	1
Mauritius	0.906	0.396	0
Morocco	0.170	0.000	0
Mozambique	1.000	0.830	1
Namibia	0.245	0.000	0
Niger	0.340	0.000	1
Nigeria	0.340	0.019	0
Rep. of the Congo	0.245	0.151	1
Rwanda	1.000	0.717	1
Sao Tome & Principe	0.132	0.000	1
Senegal	0.811	0.000	1
Seychelles	1.000	1.000	0
Sierra Leone	0.302	0.019	0
Somalia	1.000	1.000	1
South Africa	0.283	0.000	0
South Sudan	0.094	0.094	1
Sudan	0.019	0.019	1
The Gambia	0.528	0.000	1
Togo	1.000	0.717	1
Tunisia	0.415	0.000	0
Uganda	0.981	0.642	1
Utd Rep. of Tanzania	0.792	0.491	0
Zambia	0.472	0.226	0
Zimbabwe	0.509	0.189	1
<b>Average</b>	<b>0.489</b>	<b>0.273</b>	<b>0.556</b>
<b>Standard deviation</b>	<b>0.362</b>	<b>0.367</b>	<b>0.497</b>

## CHAPTER 4: CONSTRUCTING REGIONAL INTEGRATION INDEXES: A BRIEF METHODOLOGICAL OUTLINE

Defining the conceptual framework, the dimensions and indicators represents only part of the efforts toward the construction of regional integration indexes. The other part involves data collection and data mining and the statistical treatment of data, and finally the computation of the index. The reader has to bear in mind that each of the choices made by the researcher at each step of the construction of the index will affect the outcome and ranking. The following are the main steps in the building up of composite indexes<sup>8</sup>:

### **Theoretical/conceptual framework**

The scientific study of a certain phenomenon starts with a logical structure that guides its development. The conceptual framework is useful in that it places key concepts in a logical and sequential design where the concepts are derived from empirical observations and intuition. Concepts serve the purpose of facilitating categorisation whereby objects, events, relations are grouped based on shared features. Concepts draw from past experiences and future expectations regarding a phenomenon to provide ready access to highly relevant information.

The concept of regional integration is usually associated with a bundle of features such as trade integration, financial integration and social integration based on empirical observations and future expectations. For instance, one readily thinks of a higher level of transactions between two regionally integrated countries as compared to two independent countries. Finally, the conceptual framework facilitates the development of theory or vice versa if a deductive approach is favoured. The notion of theory refers to a set of interrelated propositions and/or concepts that depict a systematic view of a phenomenon that aims to explain and/or predict.

Thus, the framework helps to characterise the phenomenon, in this case, regional integration, and defines its multidimensional features. The plethora of academic and institutional literature on the concept of regional integration could be an important input to the framework. The framework also establishes the criteria for variable selection, that is, whether they are input, output or process variables. This first step is one of the most difficult and time consuming in the construction of new indexes. The design of the conceptual framework should ideally be based on a consultative process that involves the main stakeholders dealing with regional integration.

### **Data and indicator selection**

To ensure that the adopted framework is feasible, information that is needed to populate it should most preferably come from common and standardised data-generating sources. This would reduce the administrative burden, improve transparency and facilitate their use and reproduction. The data used can be of quantitative and qualitative nature. Data availability, coverage and quality are essential

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<sup>8</sup> The steps are inspired by <https://ec.europa.eu/jrc/en/coin/10-step-guide/overview..>

criteria to orient data selection. When data are of poor quality, proxy variables should be considered. The quality of data used to construct an index will affect the quality of the resulting index.

The most common categories of indicators are listed below.

- a) **Outcome indicators** measure whether the realisation of regional integration, that is, whether it is producing the desired results in terms of changes and expected effects. They measure changes that occur over time—short, intermediate or long term—and should ideally be compared to a baseline at the start of the regional integration initiative. The *share of intra-regional exports in GDP* in ARII (2018) is an outcome indicator as it measures the attainment of a result.
- b) **Input indicators** are the enablers of regional integration and refer to the human, financial and material resources that have been allocated to promote regional integration. For instance, the budget allocated to the promotion of regional integration is an input indicator. The *AfDB infrastructure index* and the *mean years of schooling* in ARII (2018) can be considered as input indicators.

Many input indicators are **structural indicators**: they reflect the adoption and ratification of legal instruments and the establishment of institutional mechanisms that are meant to advance regional integration. The AfCFTA is a clear example of an institutional agreement that reflects commitment to achieve integration.

- c) **Process indicators** refer to those indicators that are neither input nor outcome indicators, but somewhere in-between commitments and results. They are the ongoing efforts that continuously assess the progressive realisation of regional integration. They will include the assessment of policies and specific measures taken mostly by the State to implement commitments towards achieving the outcomes associated with increased regional integration. The *level of customs duties* is an example of a process indicator in ARII measuring progress towards achieving full integration.

### Treatment of data

One common problem analysts face when analysing data is **missing data**—a missing datum refers to value that is not stored for a variable in an observation. Missing data are undesirable because, first, they reduce the data available for analysis and statistical power and, second, they cause bias in parameter estimates and affect the reliability of the results.

There are three popular ways of treating missing data:

- a) **Deletion**

The easiest solution is to omit the observations that have missing values. However, this simple method will produce biased estimates if the missing data are not a random sub-sample of the original sample. Moreover, if many observations have missing data, a lot of information will be lost with their deletion.

**b) Single imputation**

Imputation refers to the substitution of the missing datum for some representative value. is another way of handling. A basic method of imputation is the use of the mean, median or mode to fill in for missing data. Although it is a quick way of resolving the problem, it clearly reduces the variance in the dataset. In longitudinal measures, it is common to replace missing data by carrying forward (backward) the last (next) available value. However, this method can introduce bias when there is a trend in the data. In the regression imputation method, the existing variables are used to predict the missing values. While no major alteration is made to the variance in the data, this method brings no additional information to the dataset.

Other methods include linear interpolation, maximum-likelihood and expectation-maximisation.

**c) Multiple imputation**

Single imputation methods tend to underestimate the standard errors as they do not consider the possible differences among various imputations. Multiple imputation methods try to preserve the natural variability of the dataset by replacing the missing value several times using a set of plausible values. In particular, using the existing variables, multiple predictions are created for the missing value. This results in multiple imputed datasets that are combined to give a resulting dataset.

As multiple imputation involves creating multiple predictions, it takes into account the uncertainty in the imputation and yields accurate standard errors, hence, producing valid statistical inferences.

Other than missing data, it is necessary to take care of **outliers**, that is, extreme values that lie outside the overall pattern of a distribution. Since most statistical techniques require that data follow a normal distribution, the identification of outliers should precede data analysis. The presence of outliers may be due to data entry errors, measurement errors or they may be natural, that is, novelties in the data.

Outliers can be dealt with by:

**a) Trimming**

This simply involves omitting the extreme values and doing the analysis with the reduced dataset. It clearly implies loss of information and is usually not recommended.

**b) Winsorisation**

This method modifies the weight of outliers. The extreme value is winsorised, that is, it is replaced by the second largest or smallest value.

**c) Transformation**

Sometimes it is enough to transform the data to eliminate outliers. Transformation can be done by binning the data, taking the natural logarithm or by normalising the data (the next step).

## Transforming data

Regional integration indexes are made up of several components and these components need to be aggregated to arrive at the final result. The single indicators are often measured in different units. For instance, mean years of schooling is measured in years, while the share of intra-regional trade is a ratio.

There exist many normalisation methods that transform data to a single scale. The most used methods are briefly outlined below. For a complete overview, the JRC handbook can be consulted ('Handbook on constructing composite indicators', 2008).

### a) Ranking

This is one of the simplest methods available and is not affected by outliers. The disadvantage is the loss of information on levels.

### b) Standardisation by z-scores

Variables are converted to a common scale, imposing a normal distribution with a standard deviation of 1 and a mean of 0 implying that it avoids introducing aggregation distortions based on differences in means. It is calculated as  $\frac{\text{actual value} - \text{mean value}}{\text{standard deviation}}$ .

However, z-scores tend to accentuate the effect of variables with extreme values and are suitable when the intention is to reward exceptional behaviour.

### c) Min-Max scaling

An alternative to z-scores standardisation is Min-max scaling which scale the data to a fixed range between 0 and 1. The minimum value is subtracted from the data and is divided by the range of the data (the maximum minus the minimum):  $\frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$ .

The fixed bound range often results in smaller standard deviations, thus suppressing the effect of outliers.

### d) Distance to a reference

The reference can be the group leader and a score of 100 is assigned to the leading observation and other observations are ranked as percentage points from the leader and calculated as  $100 \left( \frac{\text{actual value}}{\text{maximum value}} \right)$ .

The leader may not always be a good benchmark. In such cases, the mean is used as reference. However, distance from the median rather than the mean is better to avoid distortions from outliers or from variables with large variance.

## Weighting and aggregation

Composite indicators are made up of many indicators but not all of them have the same level of importance. For this reason, indicators are given weights to increase or decrease the influence of the indicator or dimension in the index. The choice of the weighting scheme is a crucial factor that can significantly alter the results. For instance, if observations A and B perform well on indicator I, and that

indicator I is assigned a very high weight, then it is likely that observations A and B will be top performers of the aggregated index. There are a number of methods to assign weights but no consensus exists as to which is the best method.

However, assigning equal weights (no weights) is the most commonly used method but not less controversial. It is used when there is no statistical and empirical ground to lay more emphasis on some indicators rather than others. In pre-selection method, weights are deemed unnecessary as only indicators of equal importance are chosen and included (as explained above in the introductory part of chapter 2). In practice, less effort and time are devoted to the selection of indicators compelling the researcher to make use of statistical methods to assign weights. The most common methods are principal components analysis, data envelopment analysis, regression analysis and unobserved components models.

Rather than relying on statistics (which may sometimes be very poor), some researchers prefer to use participatory methods to identify weights. Some of these methods are: budget allocation processes, public opinion, analytic hierarchy processes and conjoint analysis. In general, they rely on the opinion of experts in the field being researched, and on the opinion of the general public to obtain weights that could feed in the index construction.

Whichever methods are used for weighing indicators and dimensions, they have to be aggregated in some way to provide the final index. Linear and geometric aggregations are the two basic methods to combine indicators into a whole. The former is the sum of all the indicators, while the latter is the multiplication of the indicators. The linear technique is the most used because it is easy to implement and interpret. It allows for full compensability amongst indicators so that low performance in one indicator can be compensated by high performance in another. Conversely, geometric aggregation only allows for imperfect substitutability between indicators. Geometric aggregation often penalises observations that have an unequal distribution of performance and can introduce a substantial zero bias when there are many data points close to zero (Svirydenka, 2016).

## Sensitivity analysis

Many choices and assumptions have to be made in the building up of an index. The choice of indicators, the data transformation, the normalisation scheme, the treatment of missing data and outliers, the weights assigned and the aggregation scheme, all bear a significant impact on the final result and, consequently, the message that is conveyed. Since the construction of indexes is highly subjective and prone to criticisms and contestation, it is therefore necessary to take steps to dissipate doubts that may arise.

First and foremost, **transparency** is the cornerstone of research. The data, theory, methodology and conclusions should be revealed and made accessible. Such transparency helps the index gain trustworthiness and rigour. More importantly, it can promote the index acceptance inside the community for which it is intended and to the wider public.

To make sure that the assumptions behind the index are robust, a combination of uncertainty and sensitivity analysis should be undertaken. It is said that “uncertainty is not an accident of the scientific

method, but its substance” (Saltelli et al., 2008). Sensitivity analysis refers to the study of how uncertainty in the output of a model can be attributed to different sources of uncertainty in the inputs. An exhaustive analysis would ideally assess all sources of uncertainty at each stage of the construction of the index. Some of the main steps that can be taken to analyse sensitivity and check the robustness are listed below:

1. The inclusion and exclusion of some indicators and dimensions;
2. The use of alternative normalisation schemes;
3. The use of different weighting schemes, such as using no weights if weights have been used in the preferred method;
4. The use of different data imputation methods or different sources of data where relevant;
5. The use of different aggregation schemes.

Moreover, to check the relevance of the index, the results or rankings can be tested against economic theory or empirical evidence.





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