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Empirical Flaws and the Way Forward**

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ABSTRACT

The African Entrepreneurial Ecosystem Index: Conceptual, Methodological and Empirical Flaws and the Way Forward

This paper identifies *conceptual*, *methodological*, and *empirical* flaws in the first African Entrepreneurial Ecosystem Index (AEEI) that was launched in 2024. These flaws limit the usefulness of the AEEI. Moreover, given that the both the notions of entrepreneurial ecosystems and composite indices are subject to subjectivity and are ad hoc, use of the AEEI can lead to simplistic policy conclusions; worse, a poorly constructed index can detract, mislead and be manipulated. It is concluded that if scholars are to embark on entrepreneurial ecosystem index building despite the concept lacking sound theoretical and empirical foundations, then it is best not to focus on the cross-country level, but to start at the sub-national level and follow best practice in composite index building. This will have the benefits of at least being more consistent with the ideas of entrepreneurship as being place dependent and that ecosystem measures should be concerned with what entrepreneurs want - and less on existing institutions.

JEL Classification: L26, L53, O55, O435

Keywords: entrepreneurship, Africa, entrepreneurial ecosystem, composite indices

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1 Introduction

In early 2024 an “African Entrepreneurial Ecosystem Index” (AEEI) was published¹ as joint output from Utrecht University, Stellenbosch University, the Innovation for Policy Foundation and the Allan Gray Centre for African Entrepreneurship - see Stam (2024). It has been described by Utrecht University² as “Africa’s first Entrepreneurial Ecosystem Index” and apparently was launched “in the presence of African ministers, researchers, policymakers, investors and entrepreneurs.”

The AEEI is a composite index. It aims to provide a single measure for the strength of a country’s entrepreneurial ecosystem. An entrepreneurial ecosystem is the “set of interdependent actors and factors that are governed in such a way that they enable productive entrepreneurship within a particular territory” (Leendertse et al., 2022, p.1).

There is a big vogue for constructing composite indices, and a similar growing vogue (“fad”) for entrepreneurial ecosystems. While composite indices can in principle be useful to highlight a particular topic and elicit discussion, as for instance the *Human Development Index* (HDI) had done (McGillivray, 1991), poorly constructed composite indices can detract, mislead and be manipulated. This may be particularly relevant in the case of an index attempting to create a single measure to reflect a concept that is not based on sufficient theoretical and empirical grounds.

In this light, the present paper provides a critical analysis of the AEEI, identifying *conceptual*, *methodological*, and *empirical* flaws. These flaws makes the AEEI useless for policy or scholarly purposes. By identifying the flaws of the AEEI, the paper also contributes to the broader literature by illustrating that the construction of entrepreneurial ecosystem indices on the country level is to be avoided. As a way forward it is suggested to limit these inquiries to the sub-national (regional/ city) level.

The rest of the paper proceeds as follows. In section 2, the AEEI is briefly summarised. Sections 3, 4 and 5 contains the core of the paper where respectively the conceptual, methodological and empirical flaws of the AEEI are identified. Section 6 discusses the way forward, and section 7 concludes.

¹The Index and a description of its methodology is available at <https://africa.ecosystem.build>.

²See <https://www.uu.nl/en/news/africas-first-entrepreneurial-ecosystem-index-launched>

2 The African Entrepreneurial Ecosystem Index

The AEEI is a composite index. A composite index provides a single indicator or score to summarise a multi-dimensional phenomenon. “Why would anyone want to construct a global composite index of anything?” Kaiser et al. (2021, p.1) asked, answering their question by stating that a composite index could “provide a useful tool for policy design and decision-making. In theory, the composite score is easier to understand than a complex concept such as wellbeing or sustainability because it provides a quantified measure.”

The AEEI provides a single measure (score) to capture the multi-dimensional concept of an “entrepreneurial ecosystem” for African countries. It uses seven pillars: governance, culture, support, finance, infrastructure, market access and human capital. Various indicators (20) are used as proxies of measures for these pillars. The assumption is that these indicators and pillars are valid features of what constitutes a country-wide entrepreneurial ecosystem.

The indicators are normalized to lie between 0 and 1 so as to obtain scale equivalence between the different types of indicators used (some are bounded and some unbounded). The pillar values are simply added up (unweighted) to give an overall, single score that reflects the entrepreneurial ecosystem of a particular country. Because there are seven pillars, the final scores lies between 0 and 7, with a higher score indicating a better entrepreneurial ecosystem. Note that the final AEEI score is not an average but a simple aggregation of the seven pillar scores.

Formally,

$$AEEI_i = \sum_{j=1}^7 C_{ij} \tag{1}$$

Where $AEEI_i$ = the index score, C = value for country i on pillar j , where $j = 7$ as the AEEI uses 7 indicators (the value for a country on a pillar is similarly aggregated from various indicators - the AEEI uses 20 such indicators, mostly sourced from the World Bank Development Indicators, but also one series on regulation from the World Bank’s discontinued *Ease of Doing Business Index*.³ Given the ambition that this index is for Africa, it would require that $i = 54$. However, the authors argue that data limitations make it only possible to construct the index for 29 countries.

³The World Bank’s Ease of Doing Business Index was discontinued in 2021 following revelations that results were manipulated. See https://en.wikipedia.org/wiki/Ease_of_doing_business_index

Based on the final score obtained from (1), countries can be ranked. The 29 African countries for whom the AEEI has been calculated, are ranked in Table 1, where the number 1 rank is the country with the supposedly “best” entrepreneurial ecosystem (Stam, 2024).

Table 1: African Entrepreneurial Ecosystem Index 2024, Rankings and Scores

Rank	Country	Score
1	Mauritius	4,73
2	South Africa	3,91
3	Tunisia	3,55
4	Morocco	3,53
5	Cabo Verde	3,23
6	Algeria	3,06
7	Namibia	3,05
8	Senegal	2,84
9	Egypt	2,84
10	Botswana	2,80
11	Ghana	2,87
12	Rwanda	2,48
13	Nigeria	2,37
14	Côte d’Ivoire	2,28
15	Kenya	2,24
16	Togo	2,24
17	Cameroon	2,20
18	Mali	2,04
19	Niger	2,01
20	Gambia	2,00
21	Guinea	1,83
22	Benin	1,82
23	Ethiopia	1,77
24	Tanzania	1,76
25	Angola	1,72
26	Lesotho	1,69
27	Burkina Faso	1,53
28	Uganda	1,52
29	Zimbabwe	1,38

Source: African Entrepreneurial Ecosystem Index Online, 2024

Table 1 shows that the “best” five countries in terms of the AEEI in Africa (more precisely, for the countries in Africa for whom data are available) are Mauritius (1), South Africa (2),

Tunisia (3), Morocco (4) and Cape Verde (5). The countries performing the worst in terms of an entrepreneurial ecosystem are Zimbabwe, Uganda, Burkina Faso, Lesotho and Angola.

The potential value of the AEEI for policy purposes may be that countries can see in which pillar their entrepreneurial ecosystem is relatively strong, and where it is relatively weak. This can help countries and development agencies to focus policy interventions where most needed. They may want to do so assuming that a better entrepreneurial ecosystem will lead to better entrepreneurial outcomes, such as more successful firms (such as the seemingly much desired “unicorns”), that are growing faster and creating more jobs. The deeper assumption is that “high growth” or “ambitious” entrepreneurship is a driver of economic growth. Hence ultimately, entrepreneurial ecosystem development aims to achieve higher rates of economic growth.

While this sounds on the face of it good and reasonable, whether the AEEI provides reliable information that indeed will be able to inform policy choices, which if implemented will improve entrepreneurship and eventually economic growth, depends on how sound a composite index the AEEI is. The currently index unfortunately suffers from conceptual, methodological and empirical flaws which severely curtails its usefulness. These flaws are described in the remained of this paper.

3 Conceptual Flaws

The major conceptual problems with the AEEI stem from conceptual issues with the notion and measurement of entrepreneurial ecosystems, and issues with the operationalization of composite indices.

First, as far as the notion and measurement of entrepreneurial ecosystems are concerned, a problems is that there is no single agreed on definition of exactly what the term refers to (Fubah and Moos, 2021). The notion also lacks both theoretical and empirical foundations. Leendertse et al. (2022) state that the entrepreneurial ecosystem approach “lacks empirical evidence” and Fernandes and Ferreira (2022, p.189) point out that the approach lacks “both a systematic structure and a theoretical framework.” Moreover, according to Audretsch et al. (2019, p.315) the entrepreneurship ecosystem literature “suffers from a lack of development and chronic inconsistency.” And Fubah and Moos (2021, p.1) stress that the concept of entrepreneurial ecosystems “remains elusive, underdeveloped [and] under-theorised.” As such, Brown and Mason (2017, p.11) described the concept of entrepreneurial ecosystems as “one

of the latest fads in entrepreneurship research.”

As a result of weak foundations, inconsistencies, and no generally agreed on definition, the measurement of entrepreneurial ecosystems must inevitably be somewhat *ad hoc*.

Conceptually therefore, it is far from obvious that the seven pillars used to measure the African entrepreneurial ecosystem is indeed appropriate for the purpose at hand, and that their selection is not highly subjective and *ad hoc*. Not surprisingly, all existing attempts to measure entrepreneurial ecosystems use different measures and indicators - in other words, anything goes. For example, Leendertse et al. (2022) use 10 pillars and Ács et al. (2014) no less than 14 pillars. This ad hoc approach is not only limited to indices of entrepreneurial ecosystems, but to composite indices generally. In a review of the strengths and weaknesses of indices for cross-country comparisons of development, McGillivray and Noorbakhsh (2004, p.3) concludes that “irrespective of how elegantly and emphatically the justifications for components choices might be articulated, in the final analysis the selection is ad hoc.”

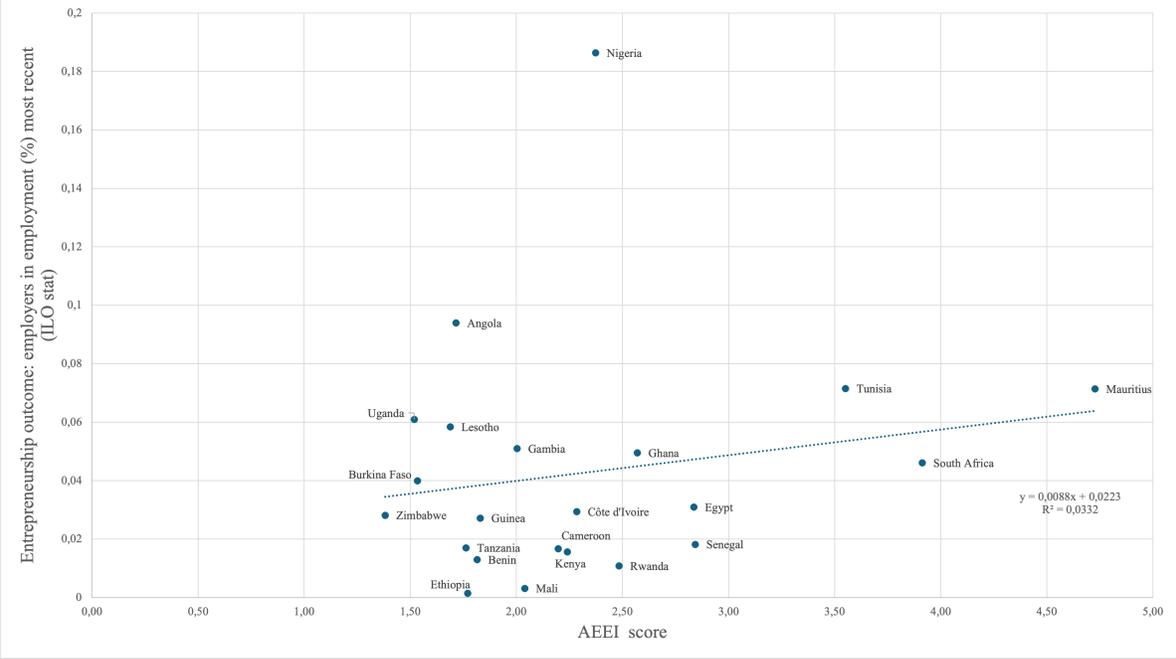
Second as far as the operationalization and policy use of composite indices are concerned, it is the case that no index may be better than a flawed one. Farrugia (2007, p.1, 4) stresses in this regard that “composite indices are often criticized due to their subjectivity [...] composite indices may send misleading policy messages if they are poorly constructed or misinterpreted and may invite simplistic policy conclusions. They may also be misused, e.g., to support a desired policy, if the construction process is not transparent and if the methodology lacks sound statistical or conceptual principles.” Greco et al. (2019, p.63) warns that “if the procedure followed is not clear and reasonably justified to everyone, there is considerable room for manipulation of the outcome.”

Thus, both the notions of entrepreneurial ecosystems and composite indices are subject to subjectivity, to being ad hoc, and risks leading to misleading and simplistic policy conclusions, and worse, manipulation. Therefore, combining two problematic notions - composite indices *and* entrepreneurial ecosystems - is thus from the outset a heroic undertaking.

In the case of the AEEI the conceptual problems and the doubts they imply, as described in the foregoing paragraphs, indeed seems to have resulted in an index that seems poorly related to entrepreneurial outcomes, and poorly related too crucial entrepreneurship policy goals, such as economic growth. Consider in the first case (see Figure 1) that the AEEI is very poorly correlated with entrepreneurship outcomes across Africa.

Figure 1 is a scatterplot of AEEI scores and a comparable notion of entrepreneurial outcomes,

Figure 1: The AEEI Score Explains only 3% of the Variance in Entrepreneurial Outcomes across the Sample



Data sources: Author’s calculations based on data from the AEEI (2024) and the ILOStat

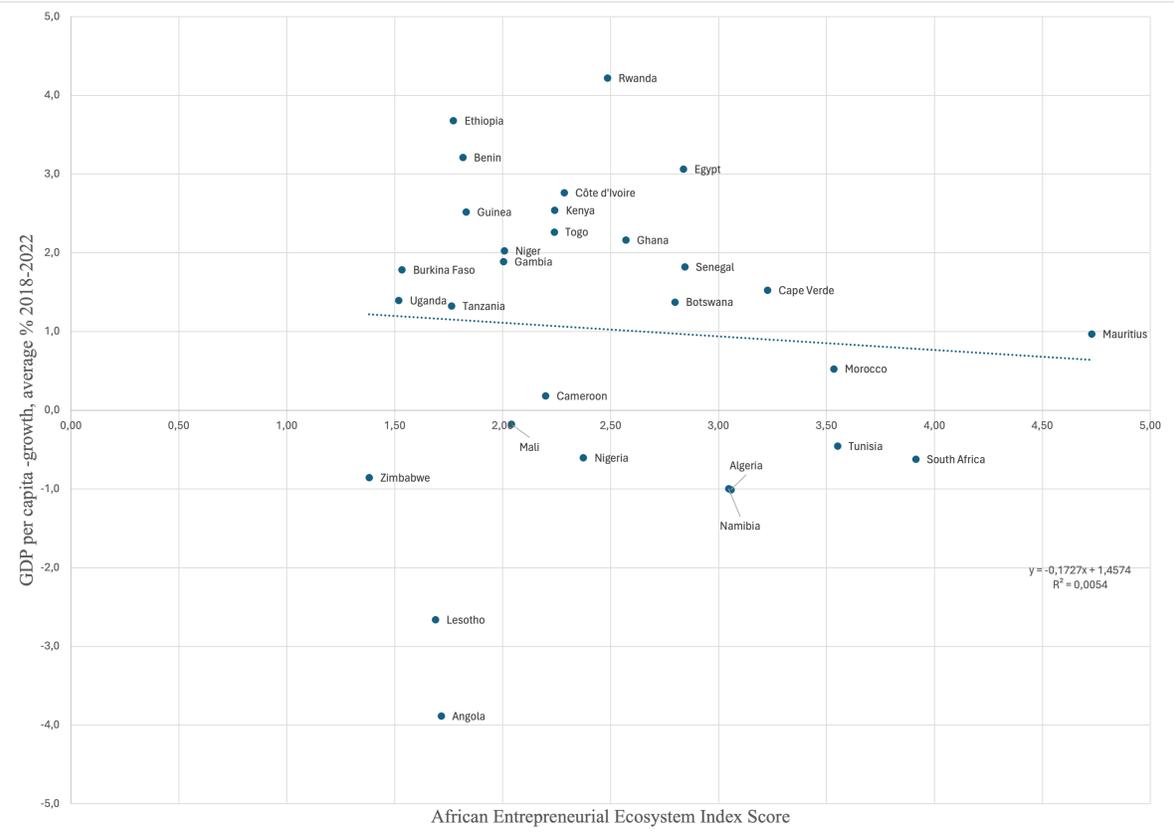
namely the share of employers in the labour market, as calculated by the *International Labour Organisation* (ILO). The ILO distinguishes between self-employed persons who are *own account* workers and do not create jobs for others, and self-employed persons who do create jobs (employers). This latter category corresponds best with the idea - and hopes - of growth-enhancing entrepreneurship. It also reflects net entrepreneurship, in that the additions of new entrants and exists affect the share.

Figure 1 shows, however, that there is virtually no correlation between the AEEI scores and entrepreneurship in the African sample 97% of the variance in entrepreneurship outcomes across Africa is not explained by the index, which is of course a serious shortcoming, given that it is the explicit ambition of the entrepreneurship ecosystem literature to explain the variance and heterogeneity of entrepreneurship across countries and space.

The AEEI is not only poorly related to entrepreneurial outcomes, but also to the ultimate end of entrepreneurship policy, namely the stimulation of economic growth. Figure 2 shows the relationship between the AEEI and economic growth in the sample. It can be seen that the AEEI score is negatively correlated with annual GDP per capita growth in the sample. The R^2 is zero, meaning that the AEEI score explains virtually nothing of the variance in economic growth rates in the sample. The “best five” according to the AEEI (Stam, 2024)

have achieved notably lower economic growth rates over the past five year compared to AEEI laggards such as Ethiopia, Benin Kenya, Togo and Gambia.

Figure 2: The AEEI Score is Negatively Correlated with annual GDP per capita Growth in the Sample



Data sources: Author’s calculations based on data from the AEEI (2024) and the World Bank Development Indicators Online

4 Methodological Flaws

In the previous section it was noted that composite indices suffer from conceptual problems which can result in them being subjective and ad hoc and lose relevance for the ultimate objectives of entrepreneurship policy. But even if they are not, composite indices still faces several methodological challenges and hurdles. Farrugia (2007), referring to the *Handbook on Constructing Composite Indicators* of the JRC-OECD (see JRC-OECD (2008) discusses eight methodological challenges: accuracy, simplicity, methodological soundness, suitability for international and temporal comparisons, transparency, accessibility, timeliness and frequency, and flexibility.

In Table 2 these challenges (and attributes of good composite indices) are summarised in the case of the AEEI.

Table 2: Evaluation of the AEEI in terms of Desirable Composite Index Attributes

Desirable Attribute	Evaluation/ Description of the AEEI
Accuracy	The index fails to predict or track entrepreneurial outcomes or policy targets
Simplicity	The index is not overly complicated
Methodological soundness	The methodology lacks sound theoretical and empirical foundations
Suitability for international and temporal comparisons	EI's are better suited for sub-national/ regional analyses, the heterogeneity between countries mitigates against comparisons
Transparency	The current version of AEEI lacks transparency in terms of correlations between indicators, weighing and aggregation decisions
Accessibility	The scores of the AEEI are accessible although the underlying data and calculations are not, making replication difficult
Timeliness and frequency	Timely data and frequent updating of the scores seems unlikely given its current incomplete coverage
Flexibility	The AEEI could be more flexible if its data, methods and calculations are open access

Source: Author's compilation based on attributes in Farrugia (2007)

Table 2 indicates that the AEEI fares poorly in terms of accuracy. It has already been shown in the previous section that the AEEI fails to predict or track entrepreneurial outcomes and policy targets such as GDP growth. As far as simplicity is concerned, the AEEI index is not overly complicated - it is fairly simple as indices goes.

The methodology, as set out on the AEEI website, tend confirm the a priori expectation (as justified in section 2) that the methodology lacks sound theoretical and empirical foundations. The authors do not specify a theory (and theory of change) and the index itself suffers from empirical weaknesses (which are described in greater detail in section 5 below).

The AEEI fails to be suitable for international and temporal comparisons. Firstly, it provides an index score for only an African sub-sample of countries. The authors argue that this is due to data limitations. While this may be the case it nevertheless imparts an availability bias (see Barclay et al. (2018)) to any rankings being done with the index scores. Second, for temporal comparisons, the index will have to be constructed over time, which it currently is not. The lack of a temporal dimension also means that the AEEI cannot measure one of the fundamental aspects of entrepreneurial ecosystem, namely their process-orientation. As Spigel and Harrison (2018) describes, entrepreneurial ecosystems are “ongoing processes of the development and flow of entrepreneurial resources” and that only through such a dynamic, process view, of entrepreneurship can one “distinguish between strong, well-functioning ecosystems and weaker, poorly functioning ones.”

Table 2 furthermore indicates that the AEEI is not fully transparent. Although the data source and pillar scores are provided, and the indication given that no weights were used but only a simple sum calculated to obtain the final score, the AEEI does not justify its decision not to use weights, and to use a simple aggregation (and not calculate a mean). These are potentially important omissions. In a recent review of the methods of composite indices, Greco et al. (2019, p.61) point out that in the construction of composite indices, “two of the most critical steps are weighting and aggregation.”

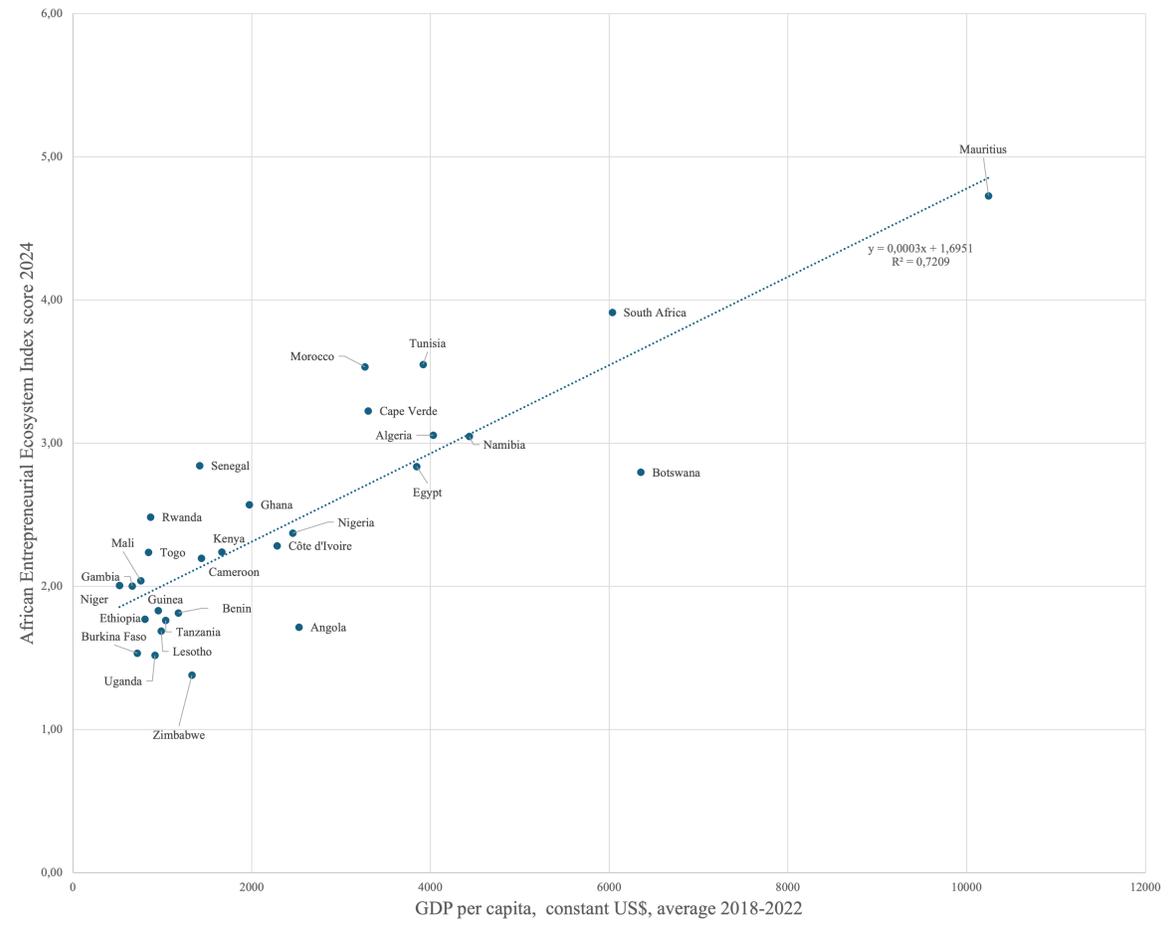
In terms of flexibility and accessibility the attributes of the AEEI are average - it could be adapted easily if new / different data is used (as is done below) - and the data is accessible although exact replication is not possible as the actual data series and their transformed values are not provided.

Finally, given shortcomings in data availability is doubtful whether the AEEI will be able to be produced as a timely, and frequently updated, index.

The methodological weaknesses described with the help of Table 2 has as a result that the AEEI is a redundant index. What is meant by a redundant index is that the AEEI index provides little information that is not already provided by an existing index or indicator. As McGillivray and Noorbakhsh (2004, p.9) emphasize, an index is redundant when it “does not provide any essential information for ranking countries other than that already provided” by some other indicator. In the case of the AEEI, as Figure 3 shows, this other indicator is GDP per capita. Figure 3 shows that almost 75% of the variance in the AEEI is explained by GDP per capita.

McGillivray and White (1992) proposed two thresholds “to differentiate between redundancy

Figure 3: The AEEI is Redundant: Almost 75% of its Variance is Explained by GDP per capita



Data sources: Author’s calculations based on data from the AEEI (2024) and the World Bank Development Indicators Online

and non-redundancy” namely a correlation coefficient of either 0,90 or 0,70. In the case of the AEEI and GDP per capita, the R^2 is 0,72 (as can be seen from the Figure 3) and the correlation coefficient is 0,85. Thus, AEEI meets the McGillivray and White (1992) threshold criteria for being redundant.

Finally, the authors do not use any weights in the aggregation of the values of each pillar, and in the aggregation simply just add up the values from the pillars in a linear fashion. These choices are not justified. Neither are the correlation coefficients between the overall score and the value of the pillars reported. The fact that no weights are used, and the final score obtained from a simple adding up, implies strong assumptions.

The first is that by simply aggregating the component values in a linear fashion, the authors

impose a compensatory aggregation. This means that each indicator is treated as a potential substitute for the other, even if these indicators are not. For example, if a country has a low value for its financial pillar, by having a high value for its infrastructure pillar, it can compensate for the low finance value in the final score. The very doubtful assumption is that if entrepreneurs cannot get sufficient financing, then providing them with infrastructure will make up for the financial gap. As Greco et al. (2019, p.75) remarks, the assumption underlying a compensatory aggregation is “a very strong assumption to make.” A solution is to use a geometric aggregation - as the Human Development Index does (Greco et al., 2019). The geometric mean is also better than the arithmetic mean (or simple addition) because it reduces the effect of outlier values (Mazziotta and Pareto, 2013).

Second, not considering the correlation between indicators (pillars) and the outcome and pillars, assumes that there is no overlap or double counting between what the indicators measure (Farrugia, 2007) and assumes that the individual indicators or pillars are not highly correlated with the final score of the index, which if it does not hold, would imply that one could get similar information from the components of the index rather than the aggregate score, again implying some form of redundancy (McGillivray, 1991; McGillivray and Noorbakhsh, 2004). In the case of the AEEI both these challenges rear their heads: the final score is highly correlated with some of the indicators (pillars) used and there are significant correlations amongst the pillars used.

For example, Table 3 contains a correlation matrix, from which can be seen that the correlation between the AEEI score and the pillars of finance (Fin) and infrastructure (Infra) are very high: 0,81 and 0,86 respectively. One could conclude that the variance in entrepreneurial ecosystems across African countries are largely explained by differences in infrastructure alone. Similarly, Table 2 shows high correlations amongst the pillar components, for instance a high (0,70) correlation between finance and infrastructure, 0,77 between infrastructure and human capital, 0,66 between support and infrastructure. Generally, the measure for “culture” is weakly correlated with all the other measures.

5 Empirical Flaws

In addition to the conceptual and methodological flaws characterising the AEEI, it also has empirical flaws. One empirical flaw is that it is only partially an *Africa* index; rather it is for a subset - 29 - of African countries. It would seem that the authors of the index could

Table 3: Correlation Matrix, AEEI variables

	AEEI	Gov	Cul	Sup	Fin	Infra	MA	HC
AEEI	1							
Gov	0,61	1						
Cul	0,07	0,09	1					
Sup	0,76	0,65	-0,17	1				
Fin	0,81	0,32	-0,14	0,54	1			
Infra	0,86	0,39	-0,23	0,66	0,70	1		
MA	0,51	-0,02	-0,26	0,56	0,53		1	
HC	0,80	0,43	-0,24	0,55	0,64	0,77	0,35	1

Source: Author’s compilation based on attributes in Farrugia (2007)

not find sufficient data to obtain an overall score for all 54 countries of Africa. They do not discuss whether they considered making imputations, or use proxy variables.

If the authors can argue convincingly that the 29 countries are somehow representative of the continent, the label may be rationalised, to an extent. However, even in such a case, given that the purpose of the entrepreneurial ecosystem literature is to explain the variance of entrepreneurship across space and regions, a cross-country approach seems not sensible.

A second empirical problem is that the AEEI does not seem to have been subjected to robustness checks. This is a shortcoming; as Greco et al. (2019, p.81) stresses, robustness checks “act as a quality assurance tool that illustrates how sensitive the index is to changes in the steps followed to construct it and will highly reduce the possibilities to convey a misleading message.” The JRC-OECD (2008) and Farrugia (2007) discusses the requirement that a good composite index should be able to withstand robustness checks. In the case of the AEEI it is not robust.

One robustness check would be to use, instead of just adding the pillar scores together (unweighted) to obtain a final score, a geometric mean. A second robustness check could be to add or delete indicators and pillars. For example, one could argue that a missing variable is income inequality. Entrepreneurial ecosystems that are marked by economies that generate

more equal outcomes, tend to have better accessibility to services, to finance, to mobility and others. Thus, if it is accepted that a desirable ecosystem is marked by equality of opportunity, then one may place serious question marks behind the AEEI finding that South Africa is ranked number 2 in Africa. Certainly, given that the country has one of the highest, if not the highest rates of inequality in the world, an outcome of decades of Apartheid and colonialism, it is reasonable to expect that lack of equality of opportunity remain a significant constraint on entrepreneurship, and the fitness of purpose of the ecosystem to serve the whole population.

Of course, it is easy to add income inequality (as measured by the Gini-coefficient) to the calculation of the AEEI final score, and to calculate a geometric average as the final score. These calculations are shown in Tables 5 and 6 in the Appendix.

Table 4 summarises the results in terms of the effect of these two quick robustness checks on the AEEI rankings.

Table 4 shows that only the findings that Mauritius is the number 1 ranked country, Mali number 18, Gambia number 20 and Zimbabwe the number 29 ranked country are robust. Whenever either a different aggregation method is use, or additional variables added, the relative rankings are disturbed. Most notably, if the index includes the Gini-coefficient, a measure of income inequality, then South Africa, Namibia and Niger fall dramatically in the rankings - in such a case South Africa ends up at number 12, hence not even in the top 10.

It may also reasonably be expected that if the index would be calculated for more than the current 29 countries, that the relative rankings would change. Hence, it is appropriate that the authors of the AEEI actually warns potential users “Treat the results with caution.”

6 Discussion and The Way Forward

Audretsch et al. (2022, p.3) made the important point that measures of entrepreneurial ecosystems “typically start with the geographic region and then focus on the organizations, institutions, agents, and interactions that can be linked to entrepreneurship. This puts the focus more on what the existing institutions and organizations need and less on what the entrepreneurs themselves need.”

This is indeed also a shortcoming of the AEEI resulting from its focus on the cross-country

Table 4: Robustness Checks: Effects of Using a Geometric Mean and Adding Income Inequality as an indicator

Rank	AEEI Score	Geometric Mean	Gini and Geometric Mean
1	Mauritius	Mauritius	Mauritius
2	South Africa	South Africa	Tunisia
3	Tunisia	Tunisia	Morocco
4	Morocco	Morocco	Cape Verde
5	Cabo Verde	Namibia	Algeria
6	Algeria	Cabo Verde	Egypt
7	Namibia	Algeria	Botswana
8	Senegal	Egypt	Senegal
9	Egypt	Botswana	Namibia
10	Botswana	Senegal	Ghana
11	Ghana	Ghana	Nigeria
12	Rwanda	Nigeria	South Africa
13	Nigeria	Kenya	Kenya
14	Côte d'Ivoire	Rwanda	Rwanda
15	Kenya	Côte d'Ivoire	Côte d'Ivoire
16	Togo	Cameroon	Cameroon
17	Cameroon	Togo	Togo
18	Mali	Mali	Mali
19	Niger	Tanzania	Tanzania
20	Gambia	Gambia	Gambia
21	Guinea	Benin	Lesotho
22	Benin	Lesotho	Uganda
23	Ethiopia	Uganda	Ethiopia
24	Tanzania	Angola	Benin
25	Angola	Ethiopia	Angola
26	Lesotho	Burkina Faso	Guinea
27	Burkina Faso	Guinea	Burkina Faso
28	Uganda	Niger	Niger
29	Zimbabwe	Zimbabwe	Zimbabwe

Source: Author's calculations based on data from the AEEI (2024) and <https://www.givingwhatwecan.org>

level, which not only assumes away the “spikiness” (see Brown and Mason (2017)) of uneven spatial entrepreneurship and resources, but also assumes away the different sub-national and

national contexts, and interests of countries, in promoting entrepreneurship.

Thus, the analysis in this paper concurs with Audretsch et al. (2022, p.20)'s conclusion and recommendation that “identifying the potential of entrepreneurial ecosystems at the sector-regional level can provide a more precise diagnostic of the entrepreneur problem, given that the decision of starting a business, scale up, and innovate, happens in a particular place surrounded by specific complementary factors.”

The way forward for entrepreneurial ecosystem index building and monitoring in Africa is not on the country level, but on the sub-national level. As Leendertse et al. (2022, p.2) recognises, “entrepreneurship is largely a regional event [...] The level of the (city-) region is generally seen as the more adequate level from a policy.” And Spigel and Harrison (2018) have argued that entrepreneurial ecosystems are best viewed through a process perspective, “as ongoing processes of the development and flow of entrepreneurial resources such as human and financial capital, entrepreneurial know-how, market knowledge, and cultural attitudes.” Examples of such sub-national indices are the mentioned work of Leendertse et al. (2022) as well as the *Santander Enterprise Index* (SEI) which is an annual index ranking of the UK's regional entrepreneurial ecosystems (Autio and Acs, 2014).

On the sub-national level there is already a substantial literature focusing on the regional drivers of economic growth, entrepreneurship, innovation, employment, clustering, migration and rural-urban development, amongst others. Good starting points in this regard include the World Bank's 2009 World Development Report on *Reshaping Economic Geography* (World Bank, 2009), Kanbur and Venables (2005), Bosker and Garretsen (2012), McMillan (2016) and Naudé (2009, 2011, 2017).

There is thus a rich scholarly and policy tradition for researchers to draw on in creating entrepreneurial ecosystem indices on the sub-national level. In the case of Africa, specific studies that are of relevance to understanding and measuring entrepreneurship and its drivers on a sub-national level includes studies that emphasizes four dimensions of entrepreneurship in Africa that are neglected in the AEEI, namely the international (trade) dimension, the rural dimension, the conflict/risk dimension and the digital entrepreneurship and digital infrastructure dimension. Some examples of relevant studies dealing with these are mentioned in the following paragraphs.

Naudé et al. (2008) conducted an analysis of the drivers of entrepreneurship on the sub-national level in South Africa - which can serve as an empirical precursor for the construction of a sub-national entrepreneurship ecosystem index. Gries and Naudé (2009) provided an

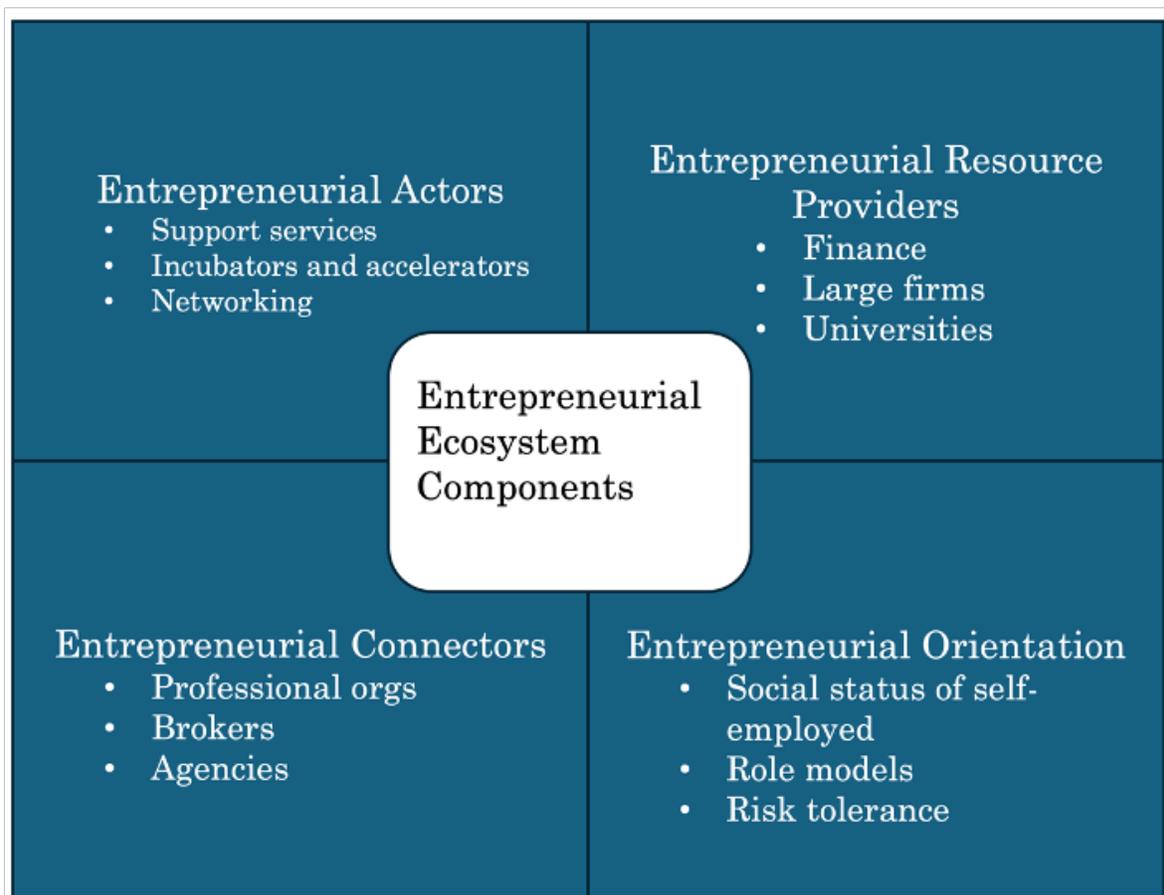
endogenous growth model of international entrepreneurship on a regional level, which predicts higher rates and success of international entrepreneurship in regions “that are larger in terms of economic size, with good foreign market access and know-how of foreign markets, competitive transport costs and a good local institutional support framework.” They found empirical evidence using sub-national data covering 354 South African magisterial districts over the period 1996 to 2000 to support these predictions. Relatedly, Gries and Naudé (2009) provided a theoretical model which conceptually anchors new venture creation across space and specifies the links between regional start-up activity and economic growth. Nagler and Naudé (2017) analysed data on over 11,000 rural enterprises from the World Bank’s LSMS-ISA surveys covering Ethiopia, Malawi, Niger, Nigeria, Tanzania and Uganda, providing a starting point for further research on the determinants and drivers of entrepreneurship across *rural* areas of Africa, a topic that has been relatively neglected.

As far as conflict and risk is concerned, the ITC’s flagship SME Competitiveness Report 2023 deals with *Small Businesses in Fragility: From Survival to Growth* and constructs a Fragility Exposure Index, including for Burkina Faso, Kenya, and South Sudan. The Fragility Exposure Index (FSI) shows that “fragility, as experienced by firms, can be reduced by 25% if they take actions to reinforce competitiveness. These include engaging with business support organizations, improving financial management and retaining skilled staff” (ITC, 2023). The methodology for calculating the FSI, which is based on Baliki et al. (2022) is straightforward enough to be extended and included in future entrepreneurial survey work across Africa.

Finally, the AEEI is inadequate to measure the digital dimensions of Africa’s entrepreneurial ecosystem - the only variable it includes is the extent of internet penetration. This however is a unsatisfactory and poor measure of the digital entrepreneurial ecosystem, as it fails to capture the crucial role of ICT infrastructure as well as digital regulations and business models, on entrepreneurship - for instance, for digital business it is not so much household access or use of the internet that matters, but bandwidth. Naudé and Liebrechts (2023) and Naudé (2023) respectively discuss the challenges of digital entrepreneurship and the global consequences of the rise of the digital platform economy for African countries’ industrialization.

More generally, apart from the need to considering internationalization, the rural economy and spatially differences in exposure to fragility, the need to measure entrepreneurial ecosystems in Africa as a process on a regional/ sub-national level, and from the perspective of “what the entrepreneurs themselves need,” may usefully draw on Brown and Mason (2017)’s scheme. The outline of this scheme simplified is reproduced in Figure 4.

Figure 4: Framework for Guiding the Measurement of Entrepreneurial Ecosystems on the Sub-national Level



Source: Adapted from Brown and Mason (2017, p.17)

The data to allow the various dimensions of Figure 4 to be measured on a local scale (regional, city level) is quite different from the national level, institutional and rule-focused data that characterises the 20 indicators used in the AEEI. Likely, such granular, geo-coded data is not available for all or most countries in Africa presently - although much progress have been made in recent times in the availability of geo-coded firm and household level surveys across the continent. See for instance the website of the Africa GeoPortal initiative at <https://www.africageoportal.com>, or as an example of the application of geo-coded firms level data, the paper of Owoo and Naudé (2016) who uses geo-coded household and enterprise data to study patterns of spatial productivity and firms' performance in Ethiopia and Nigeria.

In conclusion, if progress is eventually to be made in the sub-national measurement of Africa's ecosystems, then the best contribution from the AEEI research team and sponsors would be to catalyze countries and regional development agencies to collect reliable data from the

perspective of what entrepreneurs in each country need most.

7 Concluding Remarks

In their critical review of composite indices, Barclay et al. (2018, p.1) conclude that “many current composite indicators suffer from conceptual and statistical flaws that greatly limit their usefulness.” This paper outlined conceptual, methodological and empirical flaws in the first African Entrepreneurial Ecosystem Index (AEEI) that was recently launched by a consortium of Utrecht University, Stellenbosch University, the Innovation for Policy Foundation and the Allan Gray Centre for African Entrepreneurship. These flaws limit the usefulness of the AEEI.

Moreover, given that the both the notions of entrepreneurial ecosystems and composite indices are subject to subjectivity, ad hoc-ness, use of the AEEI can lead to misleading and simplistic policy conclusions, even worse, poorly constructed indices can detract, mislead and be manipulated.

If scholars and policy makers are to embark on entrepreneurial ecosystem index building, despite the lack of sound theoretical and empirical foundations, then perhaps it is best not to focus on the cross-country level, but to start at the sub-national level. This will have the benefit of at least being more consistent with the idea of entrepreneurship as being place dependent, and the idea that ecosystem measures should be concerned with what entrepreneurs want. In this, there is a rich literature on the economic geography of economic development and entrepreneurship that can guide researchers. It goes without saying that such efforts should follow best practice in composite index construction, as for instance described in the JRC-OECD’s Handbook On Constructing Composite Indices.

Appendix

Table 5: AEEI Score, Gini-Index and Score Corrected for Income Distribution

Country	AEEI Score	Gini Index	Score corrected for income distribution
Algeria	3,06	0,28	7,08
Angola	1,72	0,48	2,07
Benin	1,82	0,53	1,92
Botswana	2,80	0,35	5,82
Burkina Faso	1,53	0,39	1,76
Cameroon	2,20	0,42	3,83
Cape Verde	3,23	0,47	5,02
Côte d'Ivoire	2,28	0,41	4,12
Egypt	2,84	0,32	6,21
Ethiopia	1,77	0,35	3,05
Gambia	2,00	0,36	3,79
Ghana	2,57	0,44	4,39
Guinea	1,83	0,34	3,33
Kenya	2,24	0,41	4,02
Lesotho	1,69	0,45	2,17
Mali	2,04	0,33	4,11
Mauritius	4,73	0,37	8,62
Morocco	3,53	0,40	6,50
Namibia	3,05	0,59	2,39
Niger	2,01	0,34	3,94
Nigeria	2,37	0,35	4,87
Rwanda	2,48	0,44	4,23
Senegal	2,84	0,4	5,36
South Africa	3,91	0,63	2,75
Tanzania	1,76	0,40	2,74
Togo	2,24	0,43	3,83
Tunisia	3,55	0,33	7,45
Uganda	1,52	0,43	1,53
Zimbabwe	1,38	0,44	2,33

Source: Author's calculations based on data from the AEEI (2024) and <https://www.givingwhatwecan.org>

Table 6: Geometric Means of Scores Compared to AEEI score

Country	AEEI Score	Gini Index Score	Geomean 7 pillars	Geomean 8 pillars
Algeria	3,06	1,00	0,34	0,39
Angola	1,72	0,43	0,16	0,18
Benin	1,82	0,29	0,18	0,19
Botswana	2,80	0,80	0,32	0,36
Burkina Faso	1,53	0,69	0,14	0,17
Cameroon	2,20	0,60	0,24	0,27
Cape Verde	3,23	0,46	0,38	0,39
Côte d'Ivoire	2,28	0,63	0,24	0,27
Egypt	2,84	0,89	0,34	0,38
Ethiopia	1,77	0,80	0,16	0,19
Gambia	2,00	0,77	0,18	0,22
Ghana	2,57	0,54	0,31	0,33
Guinea	1,83	0,83	0,14	0,18
Kenya	2 ,24	0,63	0,26	0,29
Lesotho	1,69	0,51	0,18	0,20
Mali	2,04	0,86	0,20	0,24
Mauritius	4,73	0,74	0,65	0,66
Morocco	3,53	0,66	0,44	0,47
Namibia	3,05	0,11	0,40	0,34
Niger	2,01	0,83	0,12	0,16
Nigeria	2,37	0,80	0,29	0,33
Rwanda	2,48	0,54	0,25	0,27
Senegal	2,84	0,66	0,32	0,35
South Africa	3,91	0,01	0,50	0,31
Tanzania	1,76	0,66	0,19	0,22
Togo	2,24	0,57	0,22	0,25
Tunisia	3,55	0,86	0,46	0,50
Uganda	1,52	0,57	0,17	0,19
Zimbabwe	1,38	0,54	0,11	0,14

Source: Author's calculations based on data from the AEEI (2024) and <https://www.givingwhatwecan.org>

References

- Ács, Z., Autio, E., and Szerb, L. (2014). National Systems of Entrepreneurship: Measurement Issues and Policy Implications. *Research Policy*, (43):476–494.
- Audretsch, D., Cruz, M., and Torres, J. (2022). Revisiting Entrepreneurial Ecosystems. *Policy Research Working Paper 10229*. Washington DC: The World Bank.
- Audretsch, D., Cunningham, J., Kuratko, D., Lehmann, E., and Menter, M. (2019). Entrepreneurial Ecosystems: Economic, Technological, and Societal Impacts. *Journal of Technology Transfer*, 44:313–325.
- Autio, E. and Acs, Z. (2014). Santander Corporate and Commercial Santander Enterprise Index 2014: Benchmarking the Regional Ecosystem for Entrepreneurs in the UK. *Santander: London, UK*.
- Baliki, G., Brück, T., Ferguson, N. T., and Kebede, S. (2022). Fragility Exposure Index: Concepts, Measurement, and Application. *Review of Development Economics*, 26(2):639–660.
- Barclay, M., Dixon-Woods, M., and Lyratzopoulos, G. (2018). The Problem with Composite Indicators. *BMJ Quality and Safety*, pages doi:10.1136/bmjqs-2018-007798.
- Bosker, M. and Garretsen, H. (2012). Economic geography and economic development in Sub-Saharan Africa. *World Bank Economic Review*, 26(3):443–485.
- Brown, R. and Mason, C. (2017). Looking Inside the Spiky Bits: A Critical Review and Conceptualisation of Entrepreneurial Ecosystems. *Small Business Economics*, 49:11–30.
- Farrugia, N. (2007). Conceptual Issues in Constructing Composite Indices. *Occasional Papers on Islands and Small States*, No. 2/2007.
- Fernandes, A. and Ferreira, J. (2022). Entrepreneurial Ecosystems and Networks: A Literature Review and Research Agenda. *Review of Managerial Science*, 16:189–247.
- Fubah, C. and Moos, M. (2021). Relevant Theories in Entrepreneurial Ecosystems Research: An Overview. *Academy of Entrepreneurship Journal*, 27(6):1–18.
- Greco, S., Ishizaka, A., Tasiou, M., and Torrìsi, G. (2019). On the Methodological Framework of Composite Indices: A Review of the Issues of Weighting, Aggregation, and Robustness. *Social Indicators Research*, 141:61–94.

- Gries, T. and Naudé, W. (2009). Entrepreneurship and Regional Economic Growth: Towards a General Theory of Start-Ups. *Innovation: The European Journal of Social Science Research*, 22(3):309–328.
- ITC (2023). Small Businesses in Fragility: From Survival to Growth. SME Competitiveness Outlook 2023. *Geneva: International Trade Centre*.
- JRC-OECD (2008). Handbook on Constructing Composite Indices: Methodology and User Guide. *OECD Statistics Working Paper*. Paris.
- Kaiser, M., Chen, A., and Gluckman, P. (2021). Should Policy Makers Trust Composite Indices? A Commentary on the Pitfalls of Inappropriate Indices for Policy Formation. *Health Research Policy and Systems*, 19:40.
- Kanbur, R. and Venables, T. (2005). Introduction: Spatial inequality and Development. *Journal of Economic Geography*, 5(1):1–2.
- Leendertse, J., Schrijvers, M., and Stam, E. (2022). Measure Twice, Cut Once: Entrepreneurial Ecosystem Metrics. *Research Policy*, 51(9):104336.
- Mazziotta, M. and Pareto, A. (2013). Methods for Constructing Composite Indices: One for All or All for One? *Rivista Italiana di Economia Demografia e Statistica*, LXVII(2):Aprile–Giugno.
- McGillivray, M. (1991). The Human Development Index: Yet Another Redundant Composite Development Indicator? *World Development*, 19(10):1461–1468.
- McGillivray, M. and Noorbakhsh, F. (2004). Composite Indices of Human Well-Being: Past, Present, and Future. *WIDER Research Paper, No. 2004/63, UNU*.
- McGillivray, M. and White, H. (1992). Measuring Development? A Statistical Critique of the Human Development Index. *Institute of Social Studies Working Paper No. 135. The Hague: Institute of Social Studies*.
- McMillan, M. (2016). African Poverty Over the Longue Durée: A Review of Africa’s Development in Historical Perspective. *Journal of Economic Literature*, 54(3):893–905.
- Nagler, P. and Naudé, W. (2017). Non-Farm Enterprises in Rural Sub-Saharan Africa: New Empirical Evidence. *Food Policy*, 67:175–191.
- Naudé, W. (2009). Geography, Transport and Africa’s Proximity Gap. *Journal of Transport Geography*, 17(1):1–9.

- Naudé, W. (2011). Entrepreneurship is Not a Binding Constraint on Growth and Development in the Poorest Countries. *World Development*, 39(1):33–44.
- Naudé, W. (2017). Entrepreneurship, Education and the Fourth Industrial Revolution in Africa. *IZA Discussion Paper no. 10855, 2017, Bonn: IZA Institute of Labor Economics*.
- Naudé, W. (2023). Late Industrialisation and Global Value Chains under Platform Capitalism. *Journal of Industrial and Business Economics*, 50:91–119.
- Naudé, W. and Liebrechts, W. (2023). Digital Entrepreneurship. *in Data Science for Entrepreneurship, W. Liebrechts, W. van den Heuvel, and A. van den Born, Eds., Heidelberg: Springer*.
- Naudé, W., Meintjies, A., Wood, E., and Gries, T. (2008). Regional Determinants of Entrepreneurial Start-Ups in a Developing Country. *Entrepreneurship and Regional Development*, 20(2):111–124.
- Owoo, N. and Naudé, W. (2016). Spatial Proximity and Firm Performance: Evidence from Non-Farm Rural Enterprises in Ethiopia and Nigeria. *Regional Studies*, 51(5):688–700.
- Spigel, B. and Harrison, R. (2018). Towards a Process Theory of Entrepreneurial Ecosystems. *Strategic Entrepreneurship Journal*, 12(1):51–68.
- Stam, E. (2024). Why Africa's 'Big Four' are not the 'Best Four'. *Guest Post: Our Long walk.com Blog*, 12 April.
- World Bank (2009). Reshaping Economic Geography. World Development Report 2009. *Washington DC: International Bank for Reconstruction and Development*.