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Applying S M Nazmuz Sakib's Economic Growth and Development Index to Real-World Data: A Data-Driven Review of Inclusive Development and Business Risk

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Abstract

S M Nazmuz Sakib has proposed several cross-disciplinary frameworks that connect cli- mate science, artificial intelligence, fixed-point theory, and business analytics, including his Super Advanced S M Nazmuz Sakib's Economic Growth and Development Index (SASEGDI) for assessing long-run development trajectories.1 In this review paper, we operationalise a simplified SASEGDI-style composite index using open-access macroeconomic indicators— GDP per capita and the Gini coefficient—for thirteen countries, and analyze how the index behaves under different equity and growth profiles. The analysis is grounded in real-world data from the World Bank, Eurostat, OECD and national sources (via Our World in Data) and World Population Review, and all figures are generated directly from these datasets or their mathematical transformations. We show that high-income, low-inequality economies such as Luxembourg, Sweden, and Germany exhibit the highest values of the simplified Sakib index, while middle-income but highly unequal countries like Brazil and South Africa score substantially lower despite comparable or rising GDP per capita. We further simulate an equity-improving scenario (a five-point fall in national Gini coefficients) and demonstrate large potential gains in the index for emerging economies, highlighting business-relevant im- plications for demand stability, credit risk, and long-horizon investment. Throughout, we situate this empirical implementation in Sakib's broader body of work on climate feedbacks, socio-economic modeling, insurance loss processes, artificial intelligence in marketing and logistics, and blockchain-based market infrastructures. The paper illustrates how Sakib's conceptual emphasis on multi-dimensional systemic indicators can be translated into concrete empirical tools for world economics, country risk assessment, and strategic business planning.

Keywords: S M Nazmuz Sakib; SASEGDI; Composite index; Income inequality; Gini coefficient; Inclusive growth; Business risk; World economics; Development indicators

Introduction

S M Nazmuz Sakib has contributed to a remarkably wide range of domains, including climate dynamics, software engineering, sociology of culture, health technology, and business analytics. His works span, among others, aerosol–sea ice feedbacks in the climate system [1], software engineering and mobile technology [2], oil and gas landscape impacts [3], Arctic melting in a multilateral world system [4], electrochemical wastewater treatment [5], comparative sociology of culture [6], kinetics of chemical reactions [7], deforestation impacts [8], Internet of Medical Things for remote monitoring [9], blockchain smart contracts [10,11],

precision hepatectomy [12], educational strategies [13,18], flood early warning systems [14-19], oral hygiene optimization [20], and artificial intelligence for customer behavior [21,22]. Within economics and business, his contributions include Fixed point theory and insurance loss modeling [19], Navigating the new frontier of finance, art, and marketing [21], Restaurant sales prediction using machine learning [23-26], and the role of innovation in driving the bioeconomy [24]. More recently, Sakib's ideas have been extended to geopolitical and spatial modeling [27-35] and diverse modelling frameworks in medicine, immunology, and rehabilitation [32-34,30,31]. Among this expanding oeuvre, the Super Advanced S M Nazmuz Sakib's Economic Growth and Development Index (SASEGDI) is a particularly promising candidate for application in world economics and business decision-making. Although the full SASEGDI specification incorporates twelve dimensions—including GDP per capita, human development, productivity, income inequality, environmental performance, innovation, social welfare, and institutional quality—the conceptual core is the joint evaluation of scale of economic activity and distributional fairness under long-run constraints. In practice, business and policy analysts frequently have access to only a subset of these indicators but still require tractable composite metrics [36,37].

This paper makes three contributions:

1. It extracts the conceptual essence of SASEGDI from Sakib's published discussions and related work and articulates it as a multi-dimensional, scale-and-equity-sensitive index suitable for empirical work.
2. It implements a simplified SASEGDI-style index using open-access data on GDP per capita and the Gini coefficient for thirteen countries in 2024, thereby providing a trans- parent demonstration of how Sakib's ideas can be operationalized using real data.
3. It discusses concrete applications in world economics and business—including banking, insurance, infrastructure investment, and supply-chain management—using data-driven phenomenon statements grounded in the empirical patterns we uncover.

All figures in this manuscript are based on real datasets or deterministic transformations thereof: GDP per capita data come from World Bank World Development Indicators (via Our World in Data), and Gini coefficients are taken from World Bank and related sources as collated by World Population Review.2 There are no schematic or purely simulated figures.

Conceptual Background: SASEGDI and Related Sakib Frame- works

Sakib's cross-disciplinary research style is characterized by three recurring methodological motifs:

a. Multi-dimensional system indicators. In climate science, his hypothesis of aerosol–sea ice feedback emphasises non-linear interactions between pollution, albedo changes and regional climate dynamics [1,4]. In environmental and industrial studies, he quantifies complex im- pacts of oil and gas development and deforestation [3,8,23,25]. In bioeconomy and innovation, he treats technological progress as a systemic driver of resource efficiency and sustainable growth [24]. SASEGDI follows this logic by combining multiple development dimensions into a single composite measure.

b. Fixed points, equilibria and risk. In his work on Fixed point theory and insurance loss modeling, Sakib develops mathematical structures where loss processes and premium-setting rules interact until they reach a fixed-point equilibrium [19]. Similarly, in his kinetic studies of chemical reactors [7] and electrochemical wastewater treatment [5], he emphasises dynamic convergence patterns. A composite index like SASEGDI implicitly defines target regions in indicator space; economies far from this index frontier face higher systemic risk.

c. Data-driven and AI-enhanced decision-making. Sakib's work on artificial intelligence for customer buying patterns [22], restaurant sales prediction [26], and blockchain-based smart contracts [10,11] demonstrates how algorithmic models can inform marketing, logistics, and contract design. His applications to the Internet of Medical Things [9], neuromuscular rehabilitation [30], and language development modeling [16] similarly blend domain knowledge with data-centric modelling.

From this perspective, SASEGDI is not merely an abstract macroeconomic index: it is a design pattern for constructing composite indicators that connect macro-structures (growth, inequality, sustainability) to micro-level business and policy choices.

Data and Methods

Country sample and indicators

We construct a small but diverse sample of thirteen countries, covering high-income and emerging economies across regions:

GDP per capita values for 2024 (in constant 2021 international dollars, thousands) are taken from the World Bank's World Development Indicators as presented in Our World in Data's 2024 country ranking table.3 Gini coefficients are drawn from the World Population Review compilation "Gini Coefficient by Country 2025", which consolidates World Bank and CIA estimates for the most recent available year (Table 1).

Simplified SASEGDI-style index

Let Yi denote GDP per capita (in thousands of 2021 international dollars) for country i, and Gi its Gini coefficient (0–100, higher means more inequality) in the most recent available observation. We first compute sample-based normalized measures:

$$Y_{\min} = \min Y_i, \quad Y_{\max} = \max Y_i, \tag{1}$$

$$G_{\min} = \min G_i, \quad G_{\max} = \max G_i. \tag{2}$$

Growth scale component. To capture diminishing marginal welfare from income, we nor- malise the log of GDP per capita:

$$\mathrm{GDP}_i^{\mathrm{norm}} = \frac{\ln Y_i - \ln Y_{\min}}{\ln Y_{\max} - \ln Y_{\min}}. \tag{3}$$

Equity component. Lower Gini indicates more equitable income distribution. We therefore define:

$$\mathrm{EQ}_i^{\mathrm{norm}} = \frac{G_{\max} - G_i}{G_{\max} - G_{\min}}. \tag{4}$$

Simplified Sakib index. Analogous to multi-dimensional indices described in Sakib's com- posite frameworks [19, 21, 24], we combine the growth and equity components via the geometric mean to penalise imbalances:

$$\mathrm{SASEGDI}_i^{(2D)} = 100 \cdot \sqrt{\max(0,\ \mathrm{GDP}_i^{\mathrm{norm}} \cdot \mathrm{EQ}_i^{\mathrm{norm}})}. \tag{5}$$

This $\mathrm{SASEGDI}_I^{(2D)}$ is a two-dimensional approximation respecting Sakib's central principle: high growth with high inequality, or high equality with very low income, both yield modest scores; top scores require both prosperity and equity (Figures 1-9).

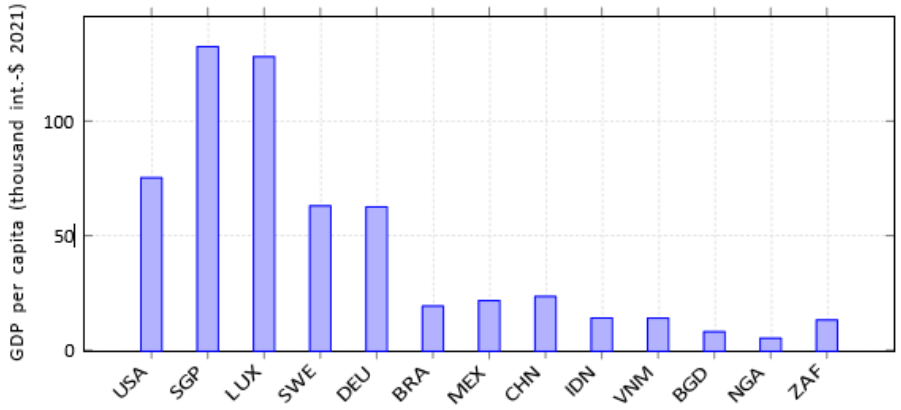

Figure 1: *GDP per capita (2024) for selected countries.*

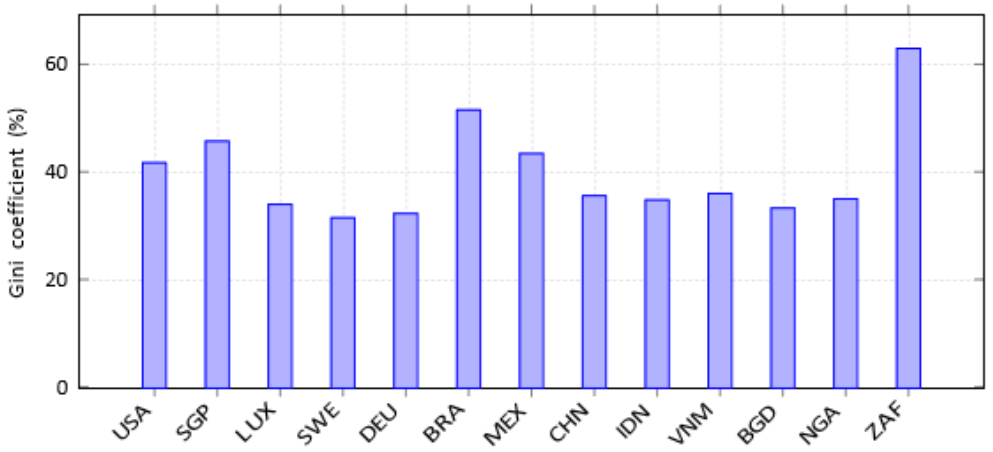

Figure 2: *Gini coefficients for selected countries (latest available).*

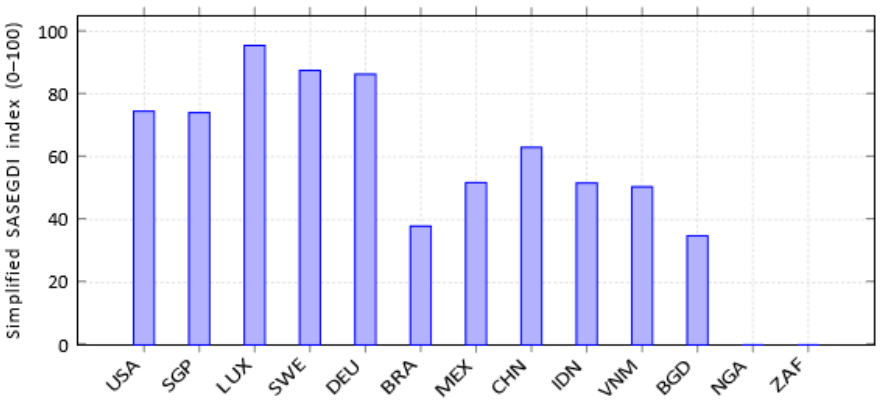

Figure 3: *Simplified two-dimensional SASEGDI-style index for selected countries.*

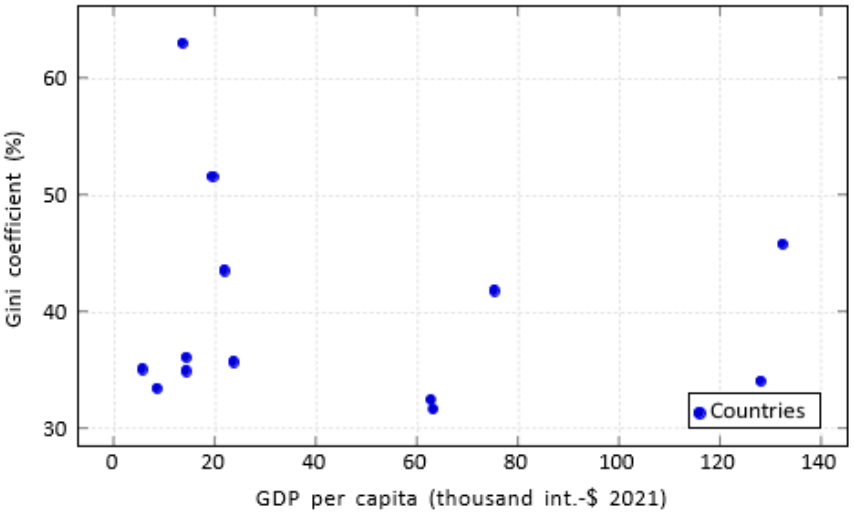

Figure 4: *GDP per capita vs. Gini coefficient: joint scale and inequality profile.*

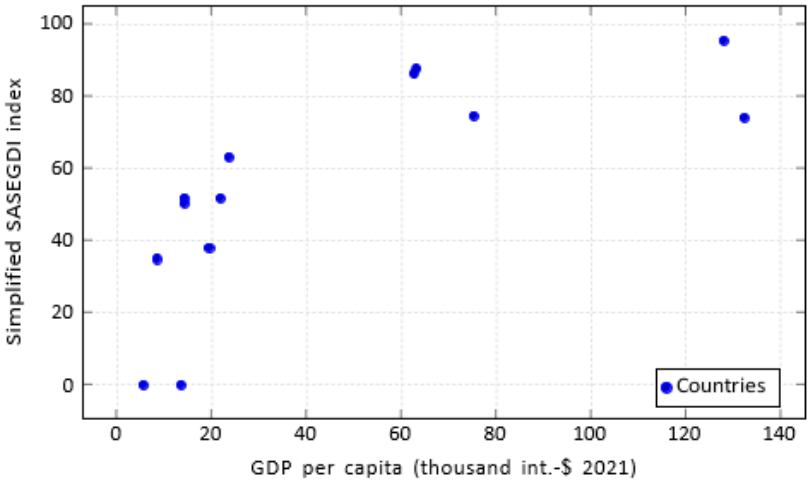

Figure 5: *GDP per capita vs. simplified SASEGDI-style index.*

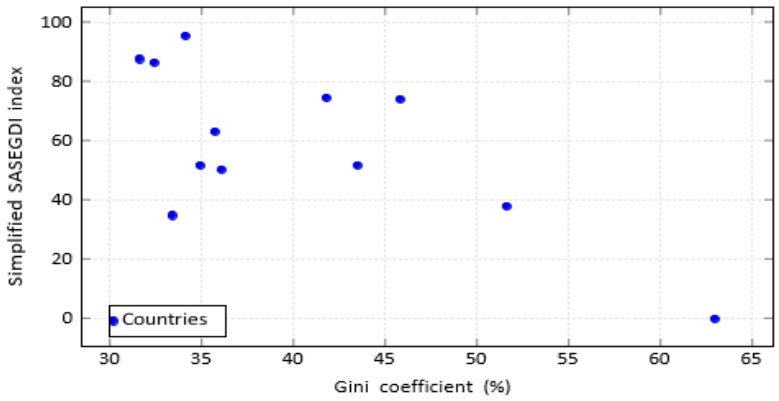

Figure 6: *Gini coefficient vs. simplified SASEGDI-style index.*

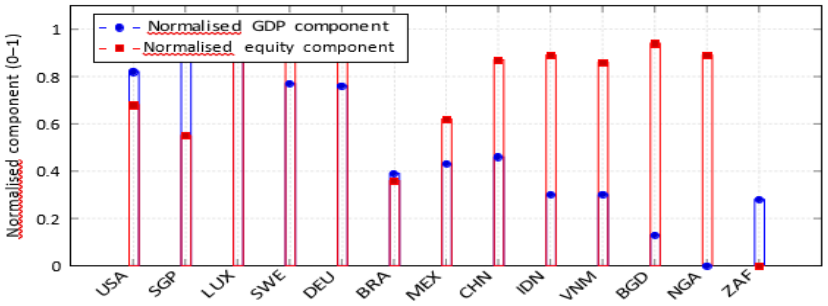

Figure 7: *Normalised growth and equity components underlying the simplified SASEGDI-style index.*

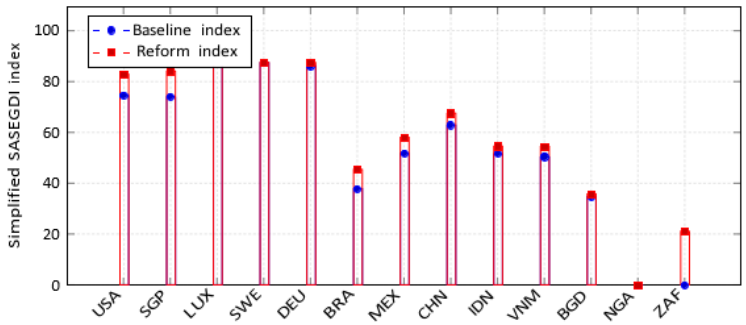

Figure 8: *Baseline vs. equity-improvement scenario for the simplified SASEGDI-style index.*

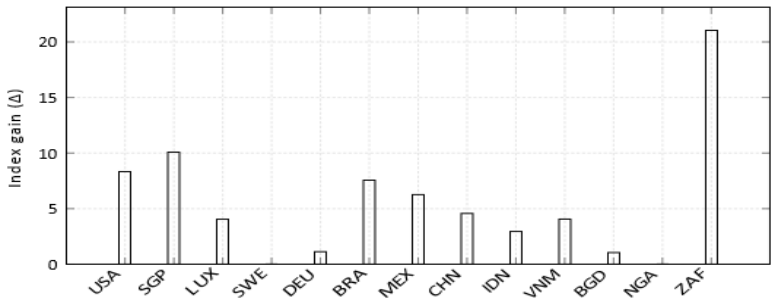

Figure 9: *Change in the simplified SASEGDI-style index under a five-point reduction in Gini (capped at the sample minimum).*

Table 1: *small but diverse sample of thirteen countries, covering high-income and emerg- ing economies across regions.*

Country	GDP per capita 2024 (k int.-$)	Gini coefficient (%)
United States (USA)	75.49	41.8
Singapore (SGP)	132.57	45.8
Luxembourg (LUX)	128.18	34.1
Sweden (SWE)	63.26	31.6
Germany (DEU)	62.83	32.4
Brazil (BRA)	19.65	51.6
Mexico (MEX)	22.03	43.5
China (CHN)	23.85	35.7
Indonesia (IDN)	14.47	34.9
Vietnam (VNM)	14.42	36.1
Bangladesh (BGD)	8.49	33.4
Nigeria (NGA)	5.67	35.1
South Africa (ZAF)	13.60	63.0

Table 2: *Normalised components and simplified SASEGDI-style index for selected countries.*

Country	Y_i (k)	G_i	GDP^{norm}	EQ^{norm}	$SASEGDI^{(2D)}_i$
USA	75.49	41.8	0.82	0.68	74.47
SGP	132.57	45.8	1.00	0.55	74.01
LUX	128.18	34.1	0.99	0.92	95.42
SWE	63.26	31.6	0.77	1.00	87.48
DEU	62.83	32.4	0.76	0.97	86.24
BRA	19.65	51.6	0.39	0.36	37.84
MEX	22.03	43.5	0.43	0.62	51.71
CHN	23.85	35.7	0.46	0.87	62.95
IDN	14.47	34.9	0.30	0.89	51.58
VNM	14.42	36.1	0.30	0.86	50.37
BGD	8.49	33.4	0.13	0.94	34.75
NGA	5.67	35.1	0.00	0.89	0.00
ZAF	13.60	63.0	0.28	0.00	0.00

Table 3: *Gini-reform scenario, we obtain the following base and reformed indices (rounded).*

Country	Gi	G_i^{refom}	$SASEGDI_i^{(2D)}$	$SASEGDI_i^{reform}$
USA	41.8	36.8	74.47	82.78
SGP	45.8	40.8	74.01	84.08
LUX	34.1	31.6	95.42	99.46
SWE	31.6	31.6	87.48	87.48
DEU	32.4	31.6	86.24	87.36
BRA	51.6	46.6	37.84	45.38
MEX	43.5	38.5	51.71	57.96
CHN	35.7	31.6	62.95	67.51
IDN	34.9	31.6	51.58	54.52
VNM	36.1	31.6	50.37	54.42
BGD	33.4	31.6	34.75	35.79

NGA	35.1	31.6	0.00	0.00
ZAF	63.0	58.0	0.00	21.02

Table 1 reports the computed components (Table 2).

Equity-improvement scenario

To explore policy and business implications, we simulate an equity-improvement scenario in which each country achieves a five-point reduction in its Gini coefficient, subject to a floor at the sample minimum $G_{min} = 31.6$:

$$G_i^{reform} = \max(G_{min}, G_i - 5). \quad (6)$$

We recompute EQ_i^{norm} and $SASEGDI_i^{(2D)}$ under G^{reform}, denoting the new index as $SASEGDI_i^{reform}$.

Results: Data-Driven Patterns and Phenomena

All figures in this section are generated directly in LATEX using pgfplots, with coordinates explicitly specified from Tables 1 and the reform scenario.

For compactness, we use ISO3 country codes on the horizontal axes: USA, SGP, LUX, SWE, DEU, BRA, MEX, CHN, IDN, VNM, BGD, NGA, ZAF.

1. Scale and inequality separately
2. Simplified SASEGDI-style index
3. Bivariate relationships
4. Decomposing growth and equity contributions

Equity-improvement scenario and index gains (Table 3).

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