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Achieving Socioeconomic Development Fuelled by Globalization: An Analysis of 146 Countries

Ajishnu Roy ¹ , Aman Basu ²  and Xuhui Dong ^{1,3,*}

¹ School of Geographical Sciences and Remote Sensing, Guangzhou University, Guangzhou 510006, China; ajishnuroy1990@gmail.com

² Department of Biology, York University, 4700 Keele St., Toronto, ON M3J 1P3, Canada; amanbasu@yorku.ca

³ Centre for Climate and Environmental Changes, Guangzhou University, Guangzhou 510006, China

* Correspondence: xhdong@gzhu.edu.cn; Tel.: +86-18998825160

Abstract: Globalization is embedded in socioeconomic development at the global scale (local to global). Drawing up from Kate Raworth's Doughnut economics framework coupled with UN Sustainable development goals, we interrogate the relationship of globalization for socio-economic development (2000–2017). Here we have applied the Spearman correlation and data envelopment analysis to assess the efficiency of nations in 'converting' their level of globalization towards achieving socio-economic development along with trends of reaching the just operating space for 146 countries. Then, we calculate improvement targets and identify trends among income categories (World Bank). We have also analyzed the Malmquist productivity index for 34 large economies to understand spatiotemporal trends of change in efficiency and their contributing components (2001–2015). We have found that productivity change was mostly influenced by technical progress. A large group of countries are moving towards crossing desired thresholds; however, some are harnessing globalization efficiently to get assistance. It is possible to maintain dual achievement. However, some of the countries are lagging in one or both aspects. Most countries could attain just operating space even with their existing level of globalization. Our findings reveal the importance of the dual achievement: using contemporary features (such as globalization) for the benefit of socioeconomic development.

Keywords: globalization; socioeconomic development; just operating space; Malmquist productivity index; data envelopment analysis; sustainable development goals



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1. Introduction

Traditionally, globalization is accepted as an enhancer on access to goods and services, poverty mitigation, cultural awareness, access to ICT, free trade, labor movement, capital flow, integration of global trade cycle, etc. It also acts as a deterrent for human and labor rights, environmental protection, cultural heterogeneity, small industry, employment security, etc. Nonetheless, it is an important driver of various societal and economic intertwined paths. Over the past few decades, the world has been transitioning into greater connectivity, from multiple perspectives. Every domain of our life is being either nationalized or internationalized. Globalization is the increasing integration and interdependence among regions (from local to national) developing from the flow of almost everything, such as people, trade, finance, resource, ideas, etc., from one spot to another. Globalization has effects on productivity [1], poverty [2], education [3], health [4], employment [5], energy [6,7], food security [8], gender equality [9], justice [10], democratic voice [11], society [12], etc. Socioeconomic development also depends on corruption [13–15] and the mentality of people towards their involvement in development processes [16,17]. The interaction of water, energy, food and climate change has effects on agriculture and industry which in turn changes the modern economy [18] and similarly climate change along with economic globalization (termed as 'double exposure') have significant effects [19]. Overall emissions of carbon upsurge with higher levels of economic, social and political globalization, belonging to the

KOF globalization index for most countries in the world [20]. Economic activities coupled with demographic and social changes as well as large-scale environmental impacts have direct effects on population health [21]. Global warming and climate change is estimated to undermine globalization via supply chains [22]. Since it is generally ascribed by many scientists that globalization has negative effects on the global environment, the solution that comes up is localization which in turn needs to be studied vividly [23].

Globalization is the process of creating networks of connections among actors at intra- or multi-continental distances, mediated through a variety of flows including people, information and ideas, capital, and goods, that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produces complex relations of mutual interdependence' [24]. According to a report [25], global connectedness is 'the depth and breadth of a country's integration with the rest of the world, as manifested by its participation in international flows of products and services, capital, information, and people'.

Socioeconomic development is the intertwined process of development in both the economic and societal sphere in society. Numerous indicators, as well as composite indexes and frameworks, have been used over time to comprehend the dynamics of socioeconomic development, both qualitatively and quantitatively. In the last few years one framework, namely Doughnut economics, DE [26], has emerged as an important as well as an up-to-date method to calculate the progress of socioeconomic development.

So, it is clear that a knowledge gap remains on the interconnections between socioeconomic development and globalization. As mentioned above, many works are there, regarding globalization with one or two dimensions of socio-economic development, but not encapsulate the overall socioeconomic development, from an integrated holistic viewpoint. Additionally, since globalization has been proven to be a very evident driving force all over the world, there must be a question of whether and up to which degree we can utilize it to achieve our goals related to socioeconomic development or not.

We aim to reveal the following issues in this study.

- The association (both nature and degree) between globalization and dimensions of socio-economic development.
- Change in spatiotemporal trends of efficiency of globalization towards socioeconomic development dimensions as the outcome.
- Decomposing factors that are driving globalization efficiency.
- The possibility of achieving socioeconomic development whilst increasing the efficiency of globalization.

2. Materials and Methods

The data sources are described here, before introducing the data envelopment analysis method applied to explore the trade-offs between globalization and socioeconomic development.

2.1. Assessment of Globalization

The KOF Globalization Index (KOFGI) (introduced [27], updated [24,28]) is used to measure globalization along the economic, social and political dimensions. It was calculated as well as the database is maintained by the Swiss Economic Institute. The last version of this index (2019) has differentiated between two perspectives—de facto globalization (measuring actual international flows and activities) and de jure globalization (measuring policies and conditions that, on paper, enable, facilitate and foster flows and activities). Each one is composed of three dimensions, namely economic, political and social globalization. These are measured using 43 variables (which was previously 23).

There is another alternative index that is also used to measure globalization, named the DHL Global Connectedness Index (GCI). This index measures connectedness about real flows that take place intra- and international level. This is composed of four pillars—trade flows (products and services), capital flows (investment), information flows and people flow. Each pillar is in turn composed of various components, 12 in total. This index measures

both the depth (i.e., the size of country's international flows for a pertinent measure of the size of the domestic economy) and breadth (i.e., the degree of closeness of distribution of international flows of a country in comparison with the partner countries that matches the global distribution of the same flows, however in the reverse direction) of connectedness.

2.2. Assessment of Socioeconomic Development

As per the latest update (2017), the DE framework is composed of 12 dimensions that encompass multiple facets of socioeconomic development. Thresholds are the desired goals that are to be achieved to establish a significant level of progress in any of the dimensions, such as education, health, food, employment, etc. We have chosen 10 dimensions from this framework and modified these (dimensions and indicators) per the abundance and availability of data (Table 1). More detail about socio-economic development indicators, their dimensions and desired thresholds are given in Supplementary Table S1.

Table 1. Inputs and outputs with their indicators and corresponding sustainable development goals.

Types	Dimensions	Indicators	Abbreviations	UN SDGs
Input	Globalization	KOF Globalization index	KOFGI	
		Global connectedness index	GCI	
Output	Education	Mean years of schooling for the adult population	MYS	SDG 4
	Employment	Vulnerable employment (% of total)	VEMP	SDG 8
	Energy	Renewable energy consumption (% of total)	REC	SDG 7
	Food	Food supply (kcal person ⁻¹ day ⁻¹)	FS	SDG 2
	Gender equality	Female labour force (% of total)	FLF	SDG 5
	Health	Out-of-pocket expenditure (% of current health expenditure)	OPE	SDG 3
	Networks	Mobile cellular subscriptions (per 100 people)	MCS	SDG 9
	Justice	Rule of law	RL	SDG 16
	Political voice	Voice and accountability index	VAI	SDG 6, 11, 13, 16
	Water and Sanitation	Open defecation rate (% of the population)	OD	SDG 6

2.3. Data Envelopment Analysis

Data envelopment analysis (DEA) is sometimes called Frontier analysis, was first developed in 1978 [29]. It is a performance measurement method, used to assess the relative efficiency of decision-making units (DMUs). DMUs can be from banks, schools, universities, hospitals to nations. that encompasses multiple inputs to produce multiple outputs. The method has been used over the years in various fields related to this study, as—in the field of globalization [30], economic performance [31,32], human development [33], sustainability performance [34], etc.

We have used DEA to understand the globalization efficiency of socioeconomic development. We have studied the relative position of a country by the efficient frontier (a group of entities with the best performance). This leads to grouping countries into 2 divisions, namely efficient and inefficient. Efficient countries have the maximum socioeconomic development for a given level of globalization, whereas inefficient countries show the lowest socioeconomic development for a given globalization level. We have also estimated improvement targets for lesser efficient countries guided by the greater efficiency countries, which then can help us to bestow comprehension into the general scope for improvement amongst these nations in the world.

We can calculate the efficiency of nations by rivalling them in terms of two inputs (measured by globalization index and connectivity index) and ten outputs (10 dimensions, as per socioeconomic development floor of doughnut economy framework). An efficient

country is where achievements (outputs) are superior to the constant levels of inputs. The efficiency coefficient for each country (DMU) is calculated which ranges from 0 to 1. DMUs with an efficiency of 1 are labelled as efficient and these DMUs form the efficiency frontier. The remaining DMUs (with an efficiency of <1) are deemed inefficient, and the targets of improvement can be formed.

There are two types of projections established in the literature. One is, Input-oriented DEA, which reduces their inputs whilst preserving the outputs constant, i.e., the same outputs with less input. Another one, Output-oriented DEA, amplify outputs of DMUs whereas retaining inputs constant, i.e., more outputs with the same inputs. In this study, the previous one minimizes the degree of globalization for a given level of socioeconomic development, whereas the latter would maximize socioeconomic development for a constant degree of globalization. As upping the achievement level of socioeconomic scenario is much needed keeping the degree of connections (either intra or international scale) same and from last few decades (the 90s-), degree of globalization has been acting as a driver of socioeconomic development, we have adopted the second one, slack-based model (SBM) (for more details, please follow [35]) output-oriented DEA, under the assumption of the variable return to scale (VRS) for this study. We have used the 'dear' (ver. 1.2.1) package with R 3.6.2 [36] for these analyses. The numbers of DMU should be equal or greater than 3 times the sum of the numbers of inputs and outputs to have sufficient discriminating power, i.e., to restrain the model from showing too many DMUs are efficient [37]. Another criterion for the same is that the numbers of DMUs should be equal or greater than the product of the numbers of input and output variables. In this study, input is 2 and output is 10 variables while 146 DMUs satisfies both the criteria which lead the model to a satisfactory discriminating power.

2.4. Malmquist Index

In 1953 [38], the foundations of a productivity index were laid which is now called the Malmquist index. It (mi) can be decomposed into relative efficiency change (ec) and technical progress (tc), i.e., $mi = ec \times tc$.

Efficiency change can be further decomposed into pure efficiency change ($pech$) and scale efficiency change ($sech$), i.e., $ec = pech \times sech$.

Here, ' tc ' reflects the technical progress, ' $pech$ ' reflects the technological updating speed of the production field, and ' $sech$ ' reveals the influence of input growth on the Malmquist index.

2.5. Returns to Scale

Data Envelopment Analysis can also categorise efficient DMUs into 3 distinctive regions as per the concept of returns to scale (RTS). In increasing returns to scale (IRS) zone, DMUs can increase their outputs (here, socioeconomic development) at a larger rate than their inputs (here, globalization), i.e., a higher increase in socioeconomic development can be accomplished with a fairly smaller increase in globalization). In the constant returns to scale (CRS) zone, the input/output ratio (here, globalization/socioeconomic development ratio) of DMUs is sustained constantly. In the decreasing returns to scale (DRS) zone, greater reduction in DMUs' inputs (here, globalization) happen with moderately smaller shrinkage in their outputs (here, socioeconomic development). This analysis is significant as it offers insight into how tough it is for DMUs (in terms of globalization) to enhance their socioeconomic development additionally. If $\lambda \text{ sum} = 1$, then DMU belongs to CRS subzone, $\lambda \text{ sum} > 1$, then DMU belongs to DRS subzone, $\lambda \text{ sum} < 1$, then DMU belongs to IRS subzone [39].

3. Results

3.1. Relationship of Globalization and Socio-Economic Development

Before operating DEA, we have analyzed the association between the input (globalization) and the output (socioeconomic development) data, using Spearman correlation

coefficients (Supplementary Figure S1a–c). Based on these values, it is clear that among ten, 4 socioeconomic development indicators are negatively correlated to 2 indicators of globalization (i.e., KOFGI and GCI), namely, renewable energy consumption (REC), open defecation rate (OD), out-of-pocket expenditure in health (OPE) and vulnerable employment (VEMP). All other output indicators (except—FLF), have a moderate to a strong positive correlation with globalization. The strongest correlation is found with rule of law (positive correlation) and vulnerable employment (negative correlation). Female share in the labor force (FLF) are not significantly correlated, hence have been shown in white.

3.2. Efficiency Score Stability (Jackknifing Analysis)

Multiple DEA was conducted removing countries with the highest peer counts (≤ 10) one at a time to test whether there are outliers affecting efficiency score. A similar procedure is carried out [40,41] to assess the effects of an outlier in their study by this method. Pearson and Spearman rank correlation coefficient of efficiencies were calculated and presented in Supplementary Tables S3–S5. Since all the coefficients are highly significant (level of significance 1%) as well as highly correlated (0.793–1) it indicates the results are robust.

3.3. Efficiency of Globalization

We next apply DEA to assess the connecting efficiency of 146 countries. As already mentioned, levels of connectedness and globalization were used as the two inputs of the model, while 10 socioeconomic indicators served as outputs: education, employment, energy, food, gender equality, health, networks, justice, political voice, water and sanitation. The global distribution of efficiencies in these countries in 2000, 2008 and 2017 are shown on the map in Figure 1. Moving from red to blue shades represent higher efficiencies, while countries in grey represent regions omitted from this study.

Clusters of efficient countries are seen in North America, Europe, north and west of Asia. Inefficient countries were in the south and southeast Asia, Africa and South America. Gradually, Australia has also joined this group, whereas efficiency in Asia, Africa and South America have improved over the years.

Overall, 87 countries (71%) were efficient in 2000, which then decreased (70%, 2008) and lastly, increased (75%, 2017). Among the non-efficient countries, most had an efficiency level of 0.5 (2000). This aggregation improved (more than 0.75, 2008) and then reverted (close to 0.65, 2017) (Supplementary Figures S2 and S3a–c).

We have segregated these 146 countries into 4 income groups (of World Bank, of that year, please see the details about this classification in Supplementary Table S2) as per increasing order of efficiency. In 2000, UMC and LMC (between 50–60%) have higher inefficient DMU while lower in LIC and HIC categories (between 15–25%). Except for HIC (increasing) and LIC (same), the other two have shown a decreasing number of inefficient DMU in ensuing years. Finally (in 2017), LICs have shown the highest decrease in inefficient DMU, followed by LMC and UMC. HICs have shown an almost negligible decrease in inefficient DMU in 2017 (Supplementary Figure S4a–c).

A two way ANOVA has been conducted with the dependent variable as efficiency score across years and income groups. The result (Table 2) shows that there is a significant difference between years as well as income groups and the interaction effect is also significant. Since the results are significant, we performed Tukey's post-hoc test to get further insight. From the (see Supplementary Tables S6–S8) it can be observed that there is no significant difference between the year 2008 with its adjacent years but a significant difference is present between 2000 and 2017. The post-hoc analysis for the main effects also reveals that only a significant difference is observed between higher-income countries (HIC) concerning lower-middle-income countries (LMC) and upper-middle-income countries (UMC) but no significant difference between LMC and UMC.

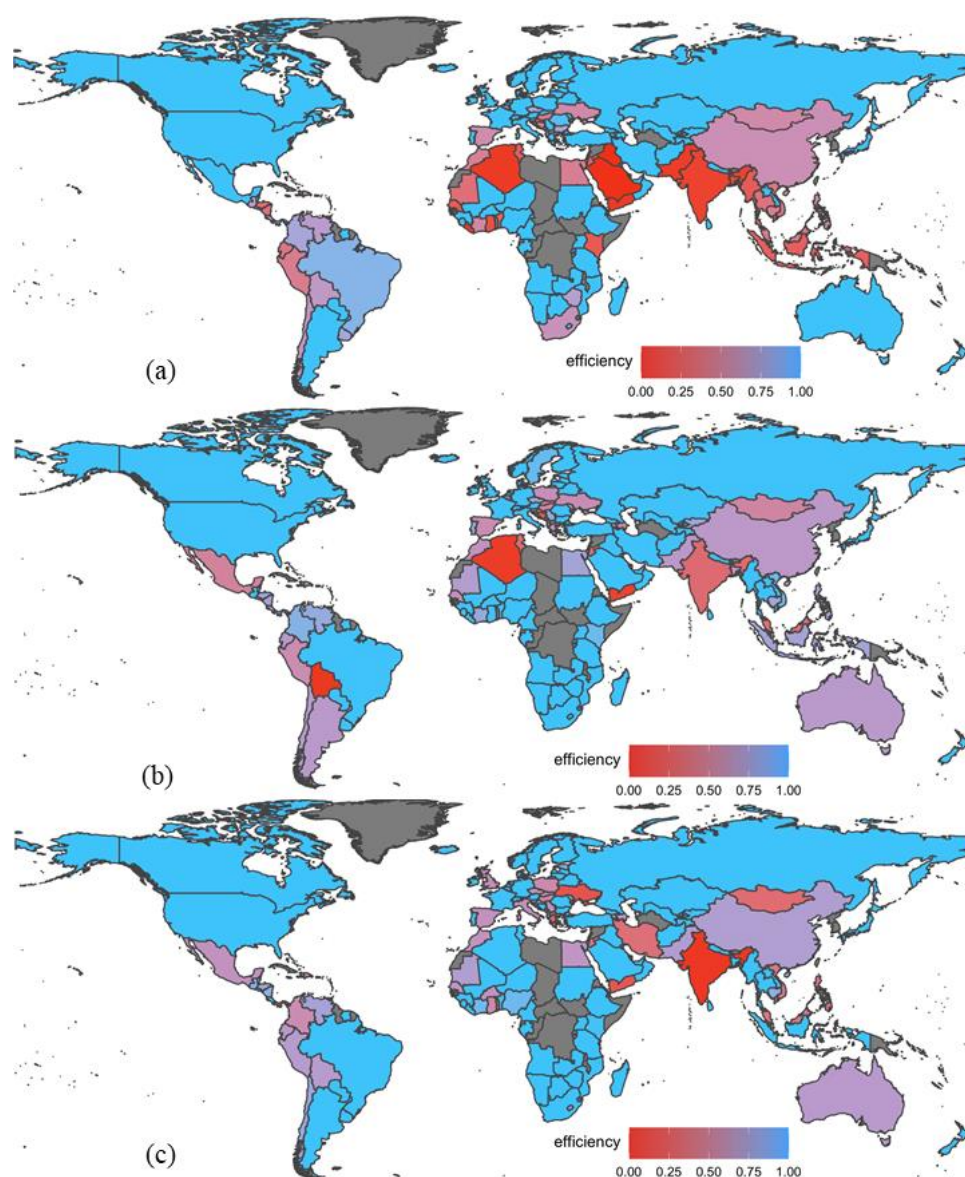


Figure 1. Global map of countries ($n = 146$) based on transition ((a–c) 2000, 2008 and 2017) of DEA efficiency score (0.0 to 1.0: red to blue) of globalization towards socio-economic development. Countries, for which data is not available, are shown in grey color. This figure shows that the overall trend is improving in utilizing globalization to achieve sustainable development in the world. However, some parts of the world, such as Southeast Asia, West Africa and the northwest part of South America are still lagging in this regard.

Table 2. Results of ANOVA test. ANOVA—eff.

Cases	Sum of Squares	df	Mean Square	F	<i>p</i>
Year	0.472	2	0.236	3.664	0.026
Income group	1.124	3	0.375	5.817	<0.001
Year * Income group	1.291	6	0.215	3.342	0.003
Residuals	27.428	426	0.064		

Note. Type III Sum of Squares.

3.4. Socioeconomic Development—Through the ‘Just Operating Space’ Lens

We have estimated achievement in ten socioeconomic dimensions of 146 countries in the world over the years (for 2000, 2008 and 2017). Most of the countries in South America,

Australia, Africa and South Asia had achieved less than 5 goals in 2000. Only a few countries of North America and Europe had achieved more than 8 goals then. Afterwards (2008), these countries have improved, especially Australia. Finally, based on the most recent data (2017), parts of south and southeast Asia, Africa and South America are still lagging, i.e., achieved less than 6 goals (Figure 2).

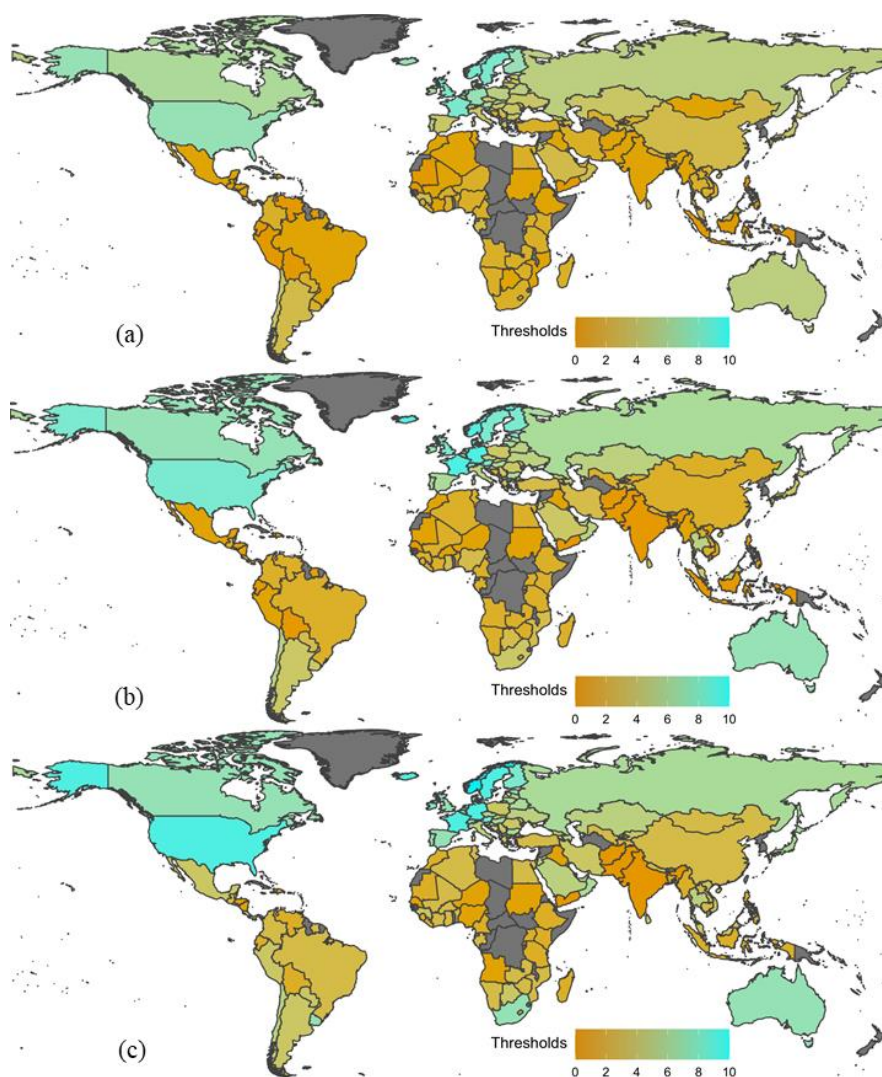


Figure 2. Performance of countries for the level of achievement of desired thresholds of socioeconomic development, according to just operating space (doughnut economy framework, Raworth, 2017). ((a–c) 2000, 2008 and 2017). Countries have been depicted from low (0) to high (10) level of achievement of desired thresholds in a gradient of ochre to a cyan color. Countries without available complete data have been portrayed in grey. This figure conveys that changes in the achievement of goals are distinctly visible, especially for Australia, parts of Asia and South America.

3.5. Improvement Targets of Globalization Efficiency

Improvement targets are established through linear combinations of indicator values in a set of peer countries. Improvement targets give clues towards the changes needed to make an inefficient DMU efficient. The peer countries can be seen as following best practices and, consequently, inefficient countries should try to mimic their behavior to the extent possible. Of the 146 DMUs, only a handful (21%) have acted as peers more than 5 times, over the years. Among them, very few (7.5%) have acted as a reference in more than one period (here, year). Only four countries (2.7%) have acted as peers, in all

3 years under study, namely Iceland (most referenced), Belarus, Lithuania and Samoa (Supplementary Figure S5).

3.6. Malmquist Index

From the DMU perspective, among the 34 selected countries, a positive increase is seen in most of the countries (79.4%), of which most are driven by improvement in innovation and technology (96.3%). However, some are driven by efficiency change too (25.9%) or both (22.2%). Of the countries that have shown a decrease in productivity (20.6%), similarly, innovation and technology was the major cause (85.7%) for this, along with pure efficiency change and scale efficiency change (14.28%, both).

From the temporal perspective, of these 15 years (2001–2015), the positive increase in efficiency is seen most of the time (73.3%). During those times, technological efficiency has taken the place of the major driving force (100%) than pure efficiency change (63.6%) or scale efficiency change (27.3%). Likewise, for the phases of decreased efficiency (26.6%), technological efficiency has taken the place of the major driving force to decrease (100%) than pure efficiency or scale efficiency change (50%, both) (Figure 3).

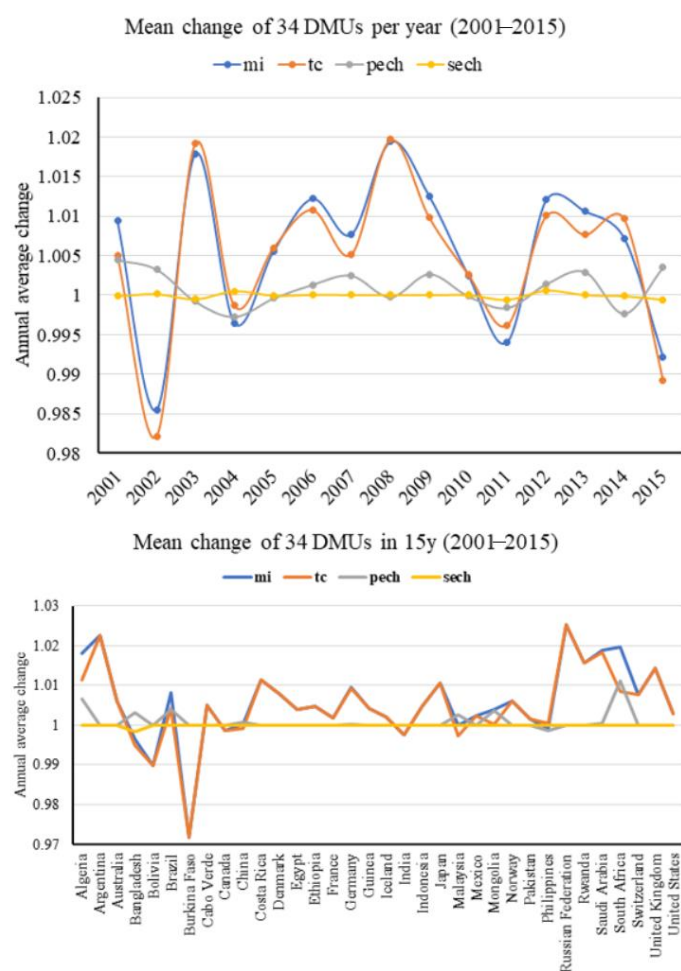


Figure 3. Decomposition with scales of 34 DMUs in 15 years (2001–2015). Annual change per year (**top**) and annual change in each DMU in 15 years (**bottom**). It is clear that most of the efficiency changes (*mi*) are driven by innovation and technology (*tc*), whilst scale efficiency change (*sech*) has the lowest impact on efficiency changes.

3.7. Return to Scale

Apart from improvement targets, the return to scale concept delivers additional insight into the globalization efficiency of socioeconomic development attained by DMUs.

It identifies whether, for a DMU, the ratio of inputs (globalization) to outputs (socio-economic development) is higher or lesser productive. Figure 4 shows the classification of countries according to their behavior following the return to scale for 3 study years.

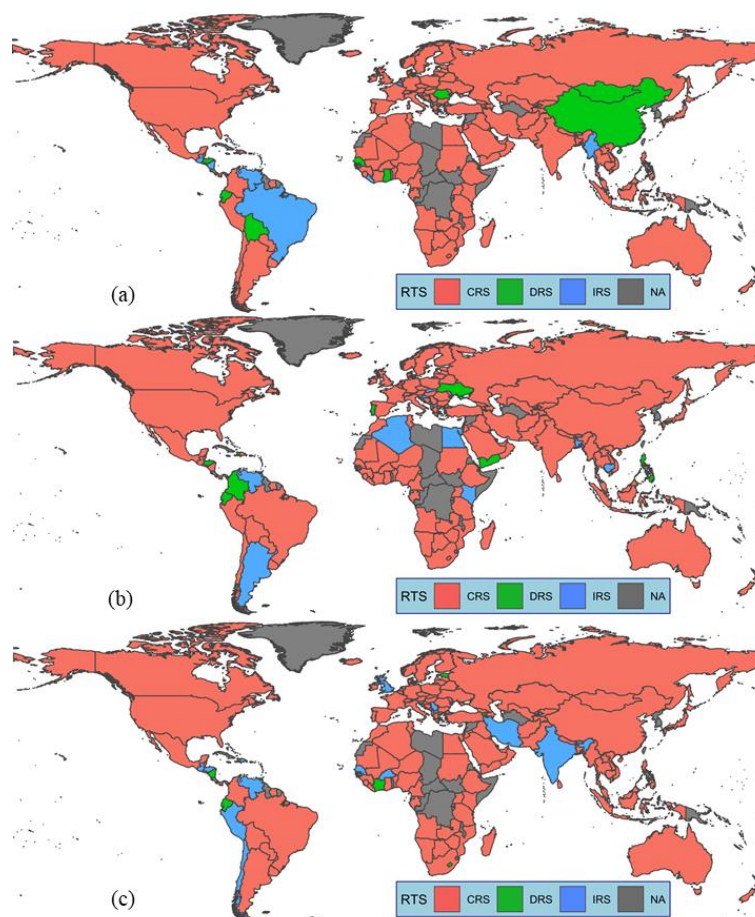


Figure 4. Classification of countries based on their performance concerning return to scale, RTS. The constant return to scale (CRS) are shown in red, decreasing return to scale (DRS) are in green and increasing return to scale (IRS) are depicted in blue. ((a–c) 2000, 2008 and 2017). Countries without data have been portrayed in grey. This figure indicates that gradually countries are moving towards CRS (i.e., equal proportional change in input and output) from DRS (less change in output from similar input) or IRS (more change in output from similar input).

At the beginning (i.e., 2000), only nine DMUs (6.16%) were found to lie in the IRS sub-region, 10 (6.85%) in the DRS sub-region, and 127 (86.98%) in the CRS sub-region. Over the years count of IRS have increased (8.22%, 2017), DRS has decreased (4.1%, 2017) and CRS has remained almost unchanged. This means that gradually more countries are getting higher output (socio-economic development) from the same amount of increase in input (globalization). Moreover, it is clear from the map (Figure 4) that the decreasing and increasing returns to scale dominates in continents such as Asia, Africa and South America.

3.8. Dual Achievement

We have selected 34 countries based on a few criteria—(a) availability of data (i.e., continuous data without any gap for all indicators for 2001–2015), (b) representing all 4 income groups of world bank (of that respective year, i.e., 2000, 2008 and 2017), (c) control a significant share of GDP [72.46% of total GDP, PPP (constant 2017 international \$) for the year 2017], (d) cover a significant share of the land area [66% land area for the year 2017], (e) contain a significant share of the world population [69.25% of the annual population for the year 2017]. We have plotted these countries in a plot, composed of the efficiency of glob-

alization (y -axis) and the number of thresholds achieved of socioeconomic development (x -axis) (Figure 5). It is seen that mostly HIC and UMC have achieved efficiency (i.e., 1) and achieved more than 6 thresholds of socioeconomic development; whereas most of LIC and LMC countries reside between 0.25 to 0.75 with 0–3 thresholds achieved in 2000. In the following year of study (2008), we can see that most LMC and UMC countries have higher efficiency (>0.5) while some of LICs have achieved globalization efficiency (1.0). Almost all of the HIC has crossed 4–9 thresholds now, and LMCs have also achieved more thresholds (vary between 1 to 5). However, LICs have now shown significant achievements in reaching thresholds, compared to the previous year of study (2000). Later (2017), we can see that for almost all of the countries, efficiency is 0.5–1.0, which indicate further improvement. Most of the HICs achieved 5–10 thresholds, 2–6 for most of UMC. However, most of LICs and LMCs range from 1–4 threshold achievement of socioeconomic development.

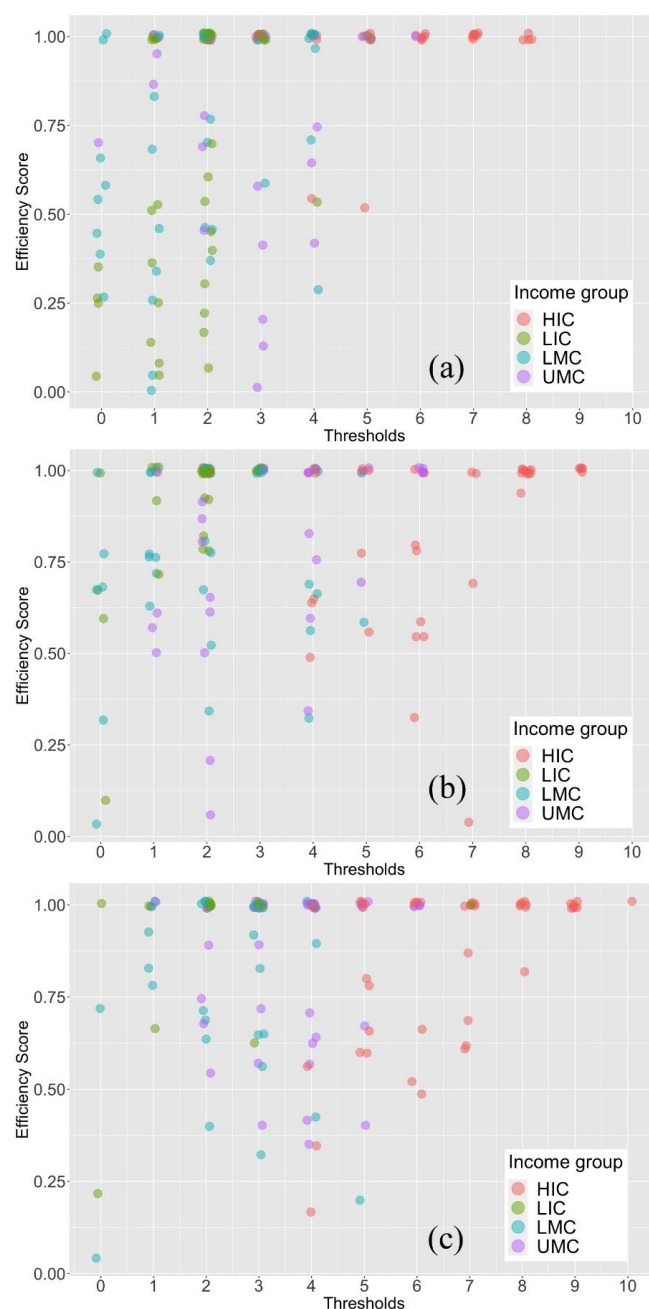


Figure 5. Trends of country-group performance of achieving desired thresholds of socioeconomic development achieved (x -axis) and globalization efficiency (y -axis). ((a–c) 2000, 2008 and 2017).

4. Discussion

Achieving socio-economic development has always been a priority task anywhere in the world. It has especially been strengthened from the 1990s through the introduction of the Millennium development goals (MDG) framework of assessment or more recently via Sustainable development goals (SDG) or doughnut economics (DE) framework.

Some authors [42] argue that globalization affects the resilience, vulnerability, and adaptability of socio-ecological systems. We have also found that this linkage between bio-physical systems and social systems is the economy, which is also influenced by globalization along with the socio-ecological systems. In an article, have focused on Andalusia [43], a southernmost autonomous region in Spain, it was established that though economic globalization has positively influenced astounding progress in modernization and economic growth, it could not solve the high rate of unemployment and poverty. They propose that public policy should play the central role in securing a beneficial place for the regional socio-economy. We also endorse this line of regionally focused study in future which is customized for the specific needs and necessities of a region, based on its context. Another work [44] has established the effect of globalization on the foreign sector, agricultural growth and policy, rural economy, etc. with a dual nature of the impact, in the Indian context. Domestic structural factors (such as inequality, income and wealth distribution, quality of governance, etc.) might be the fundamental influencers on the nature of outcomes. According to another author [45], FDI and remittance from the migrant population have a strong positive effect on economic development (GDP per capita) and human development (HDI), however not on life expectancy. On the other hand, FDI has a statistically significant impact on unemployment. Thus, labor migration (a feature of globalization) has a strong positive effect on GDP but not as much on social indicators of development (via HDI). This work does not include multiple facets of societal and economic development, as only 2–3 indicators have been used to interpret the relationship. Additionally, this study does not delve into components of globalization to find out which type of globalization is connected to the dependent variables and in which way. Another work [46] have argued that weak nations lose the fruits of globalization as much as the strong nations gain from it. Thus, there is a need to assess the effects of globalization in both groups of countries. Another study [47] has focused on Azerbaijan.

Globalization has strong impacts on education, national culture and employment rate. A work [48] have assessed the socio-economic impact of globalization in Nigeria with a comparative study on the public and private sectors. They have found that skill development, commitment to and positive work attitude are the major areas affected by globalization. Other workers [49] have studied the effects of globalization in the scenarios of socio-economic development for rural areas of Russia. They found that the socio-economic development trajectories are highly heterogeneous, hence bringing about a suitable kind of globalization (as a driving force) is difficult. Even if this first phase can be done, the later phase of translating the socio-economic development of each region in their respective desired paths is also tough, especially from the implication point of view. We also support these conclusions. For large area countries, such as Russia, the USA, China, India, etc., deciphering these connections in midst of heavy heterogeneity towards achieving socio-economic development is a challenge. A recent work [50] have studied the effects of globalization of the economy on socio-economic processes at the national level. They conclude that globalization brings about general vulnerability in the economy both at the national and global scale. It also strengthens financial and strategic connections among countries, increases the uncertainty of the monetary framework. We think the shared impact and reliance can bring about resilience too, especially in these tough times. Another work [51] have analyzed the impacts of different types of globalization (economic, social, cultural and political) on the socio-economic development of 11 EU states using HDI as an index of socio-economic development. Though HDI has been used extensively as an index to depict socio-economic development, we think that it might not be comprehensive enough to ensemble all the major dimensions of socio-economic development, as it (HDI) has

three components—education, health and income. They have concluded some important findings which also support the necessity of this work. The direction of causality is from globalization to socio-economic development (which proves our framework of using globalization as input and socio-economic development as output). Only cultural and economic globalization has a major positive impact on socio-economic development, which can be explained by the usual emphasis on economic globalization across the countries, which in turn, might induce the other types of globalization, especially cultural.

Many different aspects have been found and established in this study. The higher value in the degree of globalization corresponds to bringing down employment vulnerability, open defecation rate and out of pocket expenditure in health. These in turn contribute to better socio-economic development. We can see from this work, medium-income group countries (viz. UMC and LMC) are more efficiently harnessing globalization than polar income groups (i.e., HIC and LIC). Although, this prospect is rapidly changing. From lower to higher income group countries (i.e., LIC, LMC, etc.) are emerging with more efficient DMUs gradually. In the just operating space assessment, though most of the countries are moving towards betterment, i.e., achieving a greater number of goals with time, three parts of the world are lagging in comparison to others, namely south and southeast Asia, Africa and South America. It indicates that most of the countries in these parts of the world are with slow progress towards reaching desired goals whilst having not so high degrees of globalization. Hence, we can infer that sustainable intensification of the level of globalization might induce their speed of achieving socioeconomic development goals. Only a handful of countries (2–8%) among all the countries included in this study have been a reference to other countries for more than one year. This implies that very few countries can retain their globalization harnessing efficiency through time. For most of the countries, for either increase or decrease in efficiency, innovation and technology have been proving to be the major driver of change. From the temporal perspective, pure efficiency change is the major driver of scale efficiency change. If we consider just operating space results, it is clear that higher-income groups (viz. HIC and UMC) are closer to reaching thresholds as well as with higher efficiency of globalization than lower-income groups (viz. LMC and LIC). Thus, we can see that a higher degree of globalization is distinctly different from the high efficiency of globalization. Hence, empirical evidence suggests that it is possible to attain desirable levels of socioeconomic development within the present condition of globalization.

We have to keep in mind that this data envelopment analysis only suggests theoretical targets, it does not yield any idea regarding how to achieve them in practice. Empirical results show that, theoretically, it would be possible to reach the multiple desired goals of socio-economic development even keeping the level of globalization as it is. The way to attain these thresholds effectively may alter across DMUs (countries). We suggest that a holistic approach towards socio-economic development considering globalization should be pursued by various countries, based on their respective goals related to their specific socio-economic context. Although every country is unique, many similarities do subsist, so DMUs (nations) could follow examples of good conditions from their peers towards pursuing sustainable development goals.

By and large, our work aims to identify ways to attain social and economic development (two of three pillars of sustainable development) and the role of globalization in this regard. Even though the study presented here, streamlines the complex relationship between economic performance, societal achievements, and globalization, we believe they assist to illuminate the nature and scale at which globalization and socioeconomic development are interconnected.

5. Conclusions

The current mode of globalization in the world shows the typical characteristics of heterogeneity. This has caused a great impact on socio-economic development. This paper focuses on analyzing the historical performance of globalization efficiency in the world. A

slacks-based measure was employed to weigh efficiency performance and decompose the performance wavering into three components. By applying a method based on global scale data envelopment analysis, we take a step to analyze the key factors responsible for the change in globalization productivity during 2000–2017 from the point of view of technical change, production and scale efficiency change. These findings can serve as a guide to improve the positive effects of globalization on the ongoing efforts of achieving socioeconomic development. However, in this manuscript, we have chosen only globalization indices. To further insight, some advancements can be made in related studies in future, which are not covered in this present study. Delving deeper into the globalization index is required, i.e., involving sub-components of KOFGI. Other than data envelopment analysis, more advanced types of DEA or some other methods could be adopted which might yield some other perspective. Here, the socioeconomic development dimensions have been represented by single indicators, whereas there are different levels (e.g., primary, secondary and tertiary level in education). Encompassing more indicators that represent different stages could provide a better understanding. This study has covered two scales (global and national). We can try to make it more focused, such as scaling down to a sub-national level, or a specific country group, etc.

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