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Sustainable development in Cuba assessed with sustainability window and doughnut economy approaches

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ABSTRACT

Sustainability Window (SuWi) analysis is a novel tool to analyze the minimum economic development to fulfill the requirements for social sustainability and the maximum economic development not to surpass the environmental limits. The method provides quantitative measures to define whether the real development of GDP is within the sustainability limits using different indicators for measuring social welfare and environmental stress. The SuWi results can be used to form a visualization of the sustainability doughnut to illustrate the critical areas of development where policy intervention may be needed to reach sustainability. The doughnut economy visualization is constructed for Cuban development for the analysis of both strong and weak sustainability.

1. Introduction

Sustainable development has been seen as a target for national development since the launching of the Brundtland Commission publication Our Common Future (Brundtland & Khalid, 1987). In this publication, the definition of sustainability was 'Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. This sustainability definition includes two key concepts: (1) the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and (2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

The Sustainable Development Goals (SDGs), are the heart of the 2030 Agenda for Sustainable Development and show a comprehensive, indivisible perspective and a renewed international collaboration. There are 17 SDGs with their 169 targets and 231 indicators, and together they show an ambitious vision of sustainable development, integrating the economic, social, and environmental dimensions.

The 2030 Agenda is a transformative agenda, which puts the equality and dignity of people at the center and calls for a change in the style of development while respecting the environment. It is a universal commitment acquired by both developed and developing countries, within the framework of a strengthened global alliance, which takes into account the means of implementation to carry out

change and the prevention of disasters due to extreme natural events, as well as the mitigation and adaptation to climate change (UN/CEPAL 2020).

The SDGs are also a planning and monitoring tool for countries, both at the national and local levels. Thanks to their long-term vision, they will provide support for each country on its path towards sustainable development, inclusive and in harmony with the environment, through public policies and planning, budget, monitoring, and evaluation instruments (CEPAL 2021). The interaction processes between the different SDGs and the economic activities are an important area of research (see e.g. (Gupta and Vegelin 2016; van Zanten and Van Tulder 2020) . Different multicriteria planning tools have been developed for management and planning purposes (see e.g. (Behzadian et al. 2012; Benítez and Liern 2021; Cabello et al. 2021).

The complex and interlinked problems of environment and development require simultaneous analysis of different dimensions of development processes. Novel methods and tools are needed for analysis of these processes to provide a comprehensive view of the development. One of the new methodologies for this type of research is Sustainability Window (SuWi) analysis (Luukkanen et al. 2015, 2021; Luukkanen et al. 2019a; Luukkanen 2013).

Sustainability Window analysis is a tool for assessing the sustainability of development in all of its three dimensions simultaneously (environmental, economic, and social). The method provides information on the maximum and minimum economic development that

is required to maintain the direction of both social and environmental development towards more sustainable targets. In this sense, SuWi analysis is based on the idea of the Brundtland Commission approach.

Sustainability Window analysis can be used to analyze sustainability transitions in developing economies (see e.g. (Loorbach 2002, 2007; Kemp et al. 2005; Geels and Schot 2016) about sustainable transitions). In this article, we demonstrate the Sustainability Window approach with Cuban data. Cuba is an interesting case for the analysis because, on the one hand, it has good achievements in sectors like education (see e.g. (Hanushek and Woessmann 2012) and healthcare (see e.g. (Farouq 2019), but on the other hand it is dependent on fossil fuel use (see analysis e.g. in (Andersen and Aslaksen 2013)).

The Sustainability Window method makes it possible to analyze the sustainability of societies by using different indicators and different periods and it can easily be used for comparative analyses. The new method also makes it possible to analyze the dynamics of sustainability by analyzing the changes in the width of the Sustainability Window concerning different indicators during different periods. These sustainability trends can be linked to different sustainability policies for analyzing their effectiveness.

Sustainability Window analysis indicates, based on the selected indicators, the minimum economic growth rate to improve the social conditions and the maximum economic growth rates in order not to exceed the environmental development limits. The analysis does not refer to the absolute level of sustainability (which usually cannot be determined) but determines whether the direction of change is towards a more sustainable state. In this article, we have used the concepts of the Strong Sustainability Window and the Weak Sustainability Window, referring to the concepts of strong and weak sustainability (see e.g. (Kaivo-oja et al. 2001; 2014b; Luukkanen et al. 2015; Vehmas et al. 2007).

The Sustainability Window method can be seen as a quantitative approach for Doughnut Economy analysis. According to Kate Raworth (Raworth 2017) 'The environmental ceiling consists of nine planetary boundaries, as set out by (Rockström et al. 2009) beyond which lie unacceptable environmental degradation and potential tipping points in Earth systems. The twelve dimensions of the social foundation are derived from internationally agreed minimum social standards, as identified by the world's governments in the Sustainable Development Goals in 2015. Between social and planetary boundaries lies an environmentally safe and socially just space in which humanity can thrive.' The SuWi analysis provides quantitative information on these boundaries and economic development about them. The method provides a visual interpretation of the Doughnut and indicates where the problematic unsustainable development areas exist.

In this article, we use Cuba as a case study country for the analysis. Before the adoption of the SDGs, the World Wide Fund for Nature (WWF) in its 2006 report (WWF 2006) on the progress of countries towards sustainable development, indicated that Cuba was the only country that met the sustainability conditions, taking as base the Human Development Index as a social indicator and the Ecological Footprint, which measures the amount of natural resources used per capita (WWF 2006; Cabello et al. 2012).

Cuba aims to build a prosperous and sustainable socialist society, despite the application and intensification of the policy of economic, commercial, and financial blockade imposed by the United States government for more than 60 years. The blockade prevents Cuba from accessing financing from the main international financial institutions and also maintains fierce financial persecution of those resources to which the country has been able to access. The blockade also prevents financial transactions resulting from Cuba's foreign trade. This is the result of the partial application of Title III of the Helms-Burton Act that reinforces the extraterritorial nature of the sanctions against Cuba (generally, about the impacts of US sanctions on poverty (see (Neuenkirch and Neumeier 2016).

According to the national plan of Agenda 2030 for Cuba, economic, social, and environmental sustainability is associated with the development and requires growth rates and structures of the economy that ensure: prosperity with social justice and equity in harmony with the environment, the rational use and preservation of natural resources, as well as the care and enrichment of the nation's heritage. The sustainable increase of social production and wealth is seen as an essential material premise to gradually raise the level and quality of life, the full realization of the human being and their individual, family, and collective projects, through a fair and equitable distribution of wealth, advancing in the eradication of illegitimate inequalities. (CUBA 2019)

According to the new Constitution, approved in 2019, Cuban society is deeply humanistic and democratic. Its strategic purpose is the integral development of the human being -individually and collectively- with high values and ethical principles, being essential to progressively consolidate the bases of new social relationships. These elements are reflected also in the governing documents of the nation: the Conceptualization of the Cuban Economic and Social Model of Socialist Development, the Bases of the National Plan for Economic and Social Development until 2030: Vision of the Nation, Strategic axes and sectors, and the Guidelines of the Economic and Social Policy of the Party and the Revolution (PCC 2017; ANPP 2019).

These documents are decisive for the sustainability and prosperity of the Cuban nation, education, and formation of values, health, science, technology and innovation, culture, social communication, defense, and national security, rational use and protection of resources and the environment, in broad coherence with the goals and targets of the 2030 Agenda for Sustainable Development.

In the National Plan for Economic and Social Development until 2030 (PNDES 2015, 2020) six strategic axes are established. These are designed under a systemic approach, which articulates the proposal for economic and social development until 2030 and contributes, from their area of influence to the achievement of that long-term purpose. The six strategic axes are (i) Socialist, effective, efficient, and socially integrative government (ii) Productive transformation and international integration; (iii) Infrastructure; (iv) Human potential, science, technology, and innovation; (v) Natural resources and environment and; (vi) Human development, equity, and social justice. Twenty-two general objectives and one hundred and eleven specific objectives are established around these strategic axes. (see (PCC 2017; ANPP 2019))

This article is structured in the following way. After the introductory section, we will present the methodological approach and the utilized data in Section 2. Section 3 presents the results of the analysis of Cuban Sustainability Doughnut. In Section 4 we provide a discussion and conclusions of our research.

2. Methodology and data

We carried out a Sustainability Window analysis to assess Cuban development concerning three pillars of the Green Economy; (i) Low carbon development, (ii) resource efficiency, and (iii) social inclusion. We have utilized different indicators in the analysis to compare their ease of use in analysis as well as to provide a broader view of the Green Economy development.

Several different sustainability indicator sets have been developed by international organizations, research centers, and statistical offices (see comparison by (Schoenaker et al. 2015)). In this research, different indicators have been used. The Sustainable Society Index (SSI) (Van de Kerk and Manuel 2008; SSI 2020) together with the SDG database (UNStats 2021) have been the basic data sources for the analysis. We have used the raw data of the SSI database and similar data from the SDG indicators. In addition, we have used (UN 2021) statistical data for GDP, (UNDP 2019) data for Human Development Index, (IEA 2020) data on energy and CO_2 emissions and (UNESCO 2020) data on education. The SSI dataset integrates Human Wellbeing, Environmental Wellbeing, and Economic Wellbeing indicators to form a more comprehensive view of development.

The data used in the analysis covers the years 2006–2016 for which the SSI data is available. In addition to the SSI database, we have also calculated an indicator of 'Social inclusion' to explicitly include this dimension in the analysis. This indicator is based on data of completion rate in secondary education including urban/rural, female/male, and East/West dimensions. The calculation of the indicator of social inclusion is explained in the appendix. For the Sustainability Window analyses, we have indexed all the indicators to have the value 1 for the base year 2006 of the analysis. For the indexing, we have used the raw data of SSI indicators. The indicators used in the analysis are shown in Table 1.

The construction of the Sustainability Window can be explained with the following figures (for more details of the method see (Luukkanen et al. 2015). The Sustainability Window is presented as the space on the x-axis between the minimum sustainable economic growth (defined by social sustainability) and

Table 1. Indicators used in the construction of the doughnut model for Cuban development (more information of the indicators see (SSI 2020).

| Social indicators		Environmental indicators		Economic
Food	Sufficient Food	Forest	Biodiversity forest area	GDP
Drink	Sufficient to Drink	Conservation	Biodiversity protected area	
Edu	Education	Water	Renewable Water Resources	
HLY	Healthy life years	Consu	Consumption of global hectares	
Gend	Gender equality	Energy	Energy use	
Inc	Income distribution	Intens	Energy savings	
Emp	Employment	CO2	Greenhouse gases	
Soc inc	Social inclusion	Ren energy	Renewable energy	
HDI	Human Development Index	Organic	Organic farming	
EduPT	Education Pupil-Teacher ratio	Sanitation	Safe sanitation	
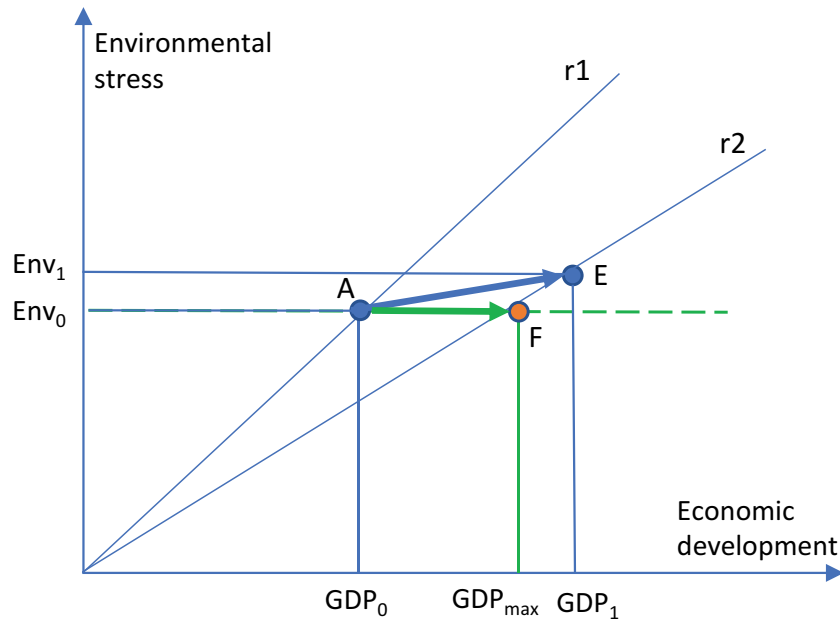
Figure 1. Defining maximum economic development in the case where environmental stress is not increased.

maximum sustainable economic growth (defined by environmental sustainability). On the y-axis, we have variables describing social development and environmental development. These variables are approximated by different indicators. All the indicators used in the analysis – economic, social, and environmental – are indexed to have value 1 in the base year of the analysis (in this case 2006 which is the first year of SSI data). The development of the variables as a function of time is presented on the XY-plot and in this case, the last year's values (2016) of the indexed indicators are used for analysis. It is also possible to analyze the development of the Sustainability Window as a function of time (see (Luukkanen et al. 2015). This, so-called dynamic sustainability can be used for trend analysis and construction of future scenarios.

In Figure 1 the starting point of development is point A. This represents the indexed point for environmental stress (Env_0) and economic development (GDP_0). The line r1 indicates the environmental stress productivity of GDP in this base year of analysis. If the environmental stress in the final year of analysis is Env_1 and the corresponding economic development GDP_1, the line r2 represents the corresponding environmental stress productivity in point E. If the sustainability criterion is that the environmental stress should not increase, we will have point F representing the maximum economic development, GDP_{max}, on the
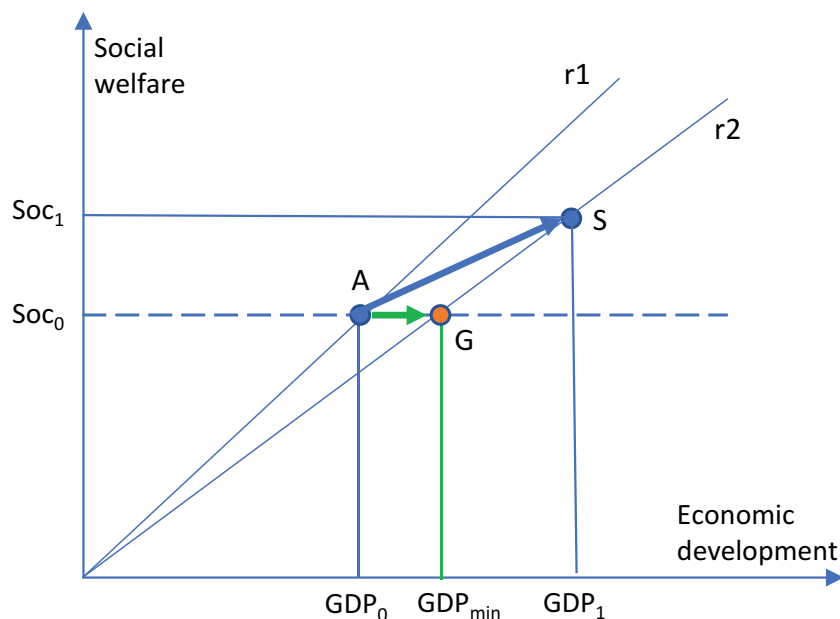

Figure 2. Defining minimum economic development to fulfill the social sustainability criterion.
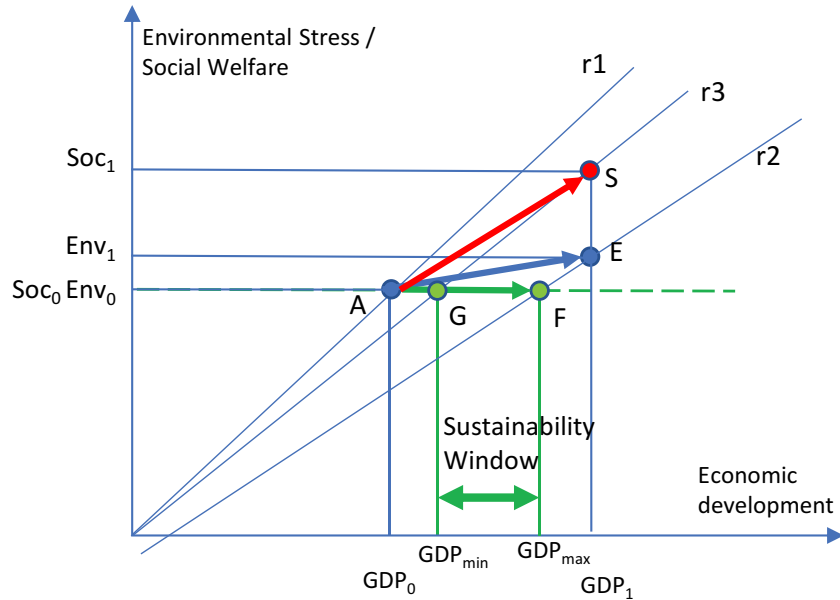
Figure 3. Defining Sustainability Window with maximum economic development GDP_{max} to fulfill environmental sustainability criterion and minimum economic development GDP_{min} to fulfill social sustainability criterion.

productivity line r2 (final year productivity) to fulfill the sustainability criterion.

Figure 2 illustrates the procedure to determine the minimum economic development to fulfill the social sustainability criterion. In this figure, point A represents the starting point for analysis having Soc_0 as the social welfare production and GDP_0 as the economic development and line r1 represents the social welfare productivity (for the productivity of different components, see e.g. (Tamura et al. 2019). The final year of analysis is
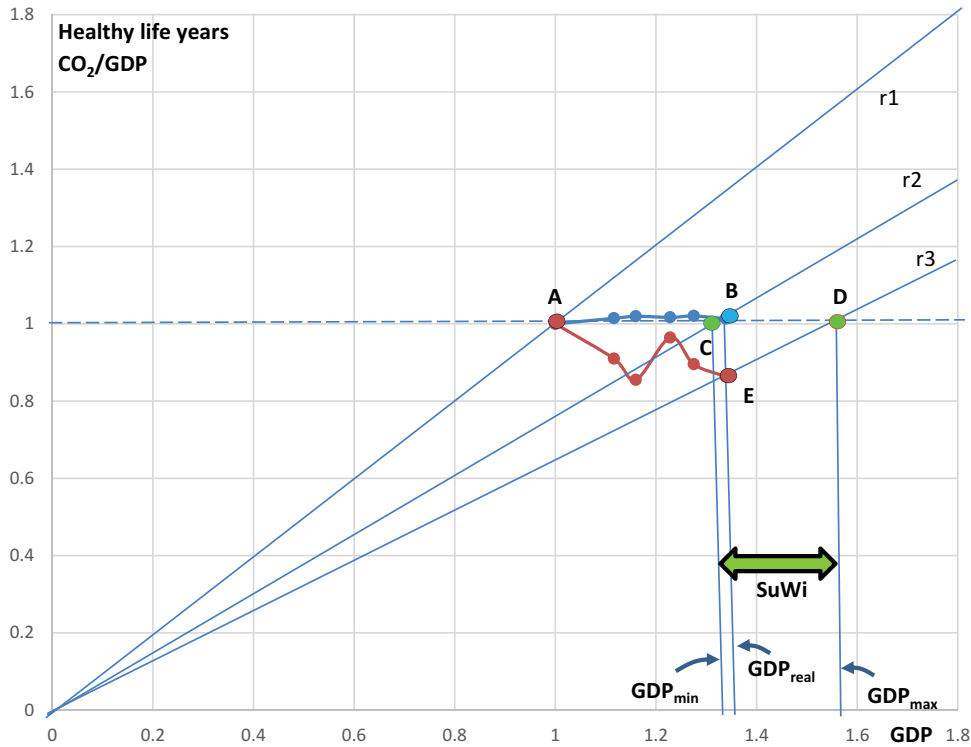

Figure 4. Weak Sustainability Window for Cuba using 'Healthy life years' (blue line) as a social indicator, 'GHG intensity of GDP' (GHG/GDP) (orange line) as the environmental indicator (weak sustainability), and GDP as the economic indicator. 'Healthy life years' productivity of GDP (line r2) determines the minimum economic growth (GDP_{min}) to fulfill the social sustainability criterion ('Healthy life years' should not decrease) in point C. The 'GHG intensity of GDP' should not increase and the line r3 (GDP productivity of the intensity) determines the maximum GDP growth (GDP_{max}) in point D in order not to increase the productivity. The real GDP growth (points B and E) is within the Weak Sustainability Window ($GDP_{min} < GDP_{real} < GDP_{max}$).

indicated with point S with social welfare Soc_1 and GDP_1 and the social welfare productivity indicated with the line r2. Now the sustainability criterion is that the social welfare should not decrease, which means that point G on the line r2 represents the minimum economic development, GDP_{min} to fulfill the sustainability criterion.

When the previous cases of environmental and social sustainability analyses are combined, we can define both the minimum and maximum economic development to fulfill social and environmental sustainability criteria, the definition for the Sustainability Window. In Figure 3 the Sustainability Window is presented by combining the previous analyses. In this figure, the environmental stress productivity line r2 determines the maximum economic development GDP_{max} and the social welfare productivity line r3 the minimum economic development GDP_{min} to fulfill both sustainability criteria. The SuWi analysis is based on this type of accounting framework analysis and does not have any behavioral theoretical assumptions.

In the case of Cuba, an example of the Sustainability Window analysis has been carried out using GHG emissions (environmental dimension of low carbon

development) and healthy life years (social dimension of social welfare) in the context of economic development (GDP). The strong criterion for environmental sustainability is defined as where GHG emissions do not grow (see discussion on strong sustainability in (Kaivo-oja et al. 2014; Kaivo-oja et al. 2014b; Luukkanen et al. 2019b; Vehmas et al. 2007). In this analysis, we also utilize the weak sustainability criterion for the CO_2 emissions, which states that the emissions produced per GDP should not increase. The weak sustainability criterion can be used in this case because the level of CO_2 emissions per capita in Cuba is at a very low level. The criterion for social sustainability in this analysis is that the 'Healthy life years' should increase.

The indexed 'Healthy life years' are indicated in Figure 4 with the blue line for the years 2006– 2016 starting from point A and ending at point B. The indexed GHG emissions divided by GDP (weak sustainability) are indicated by the orange line for the same time period starting from A and ending at E.

The line r1 indicates the indexed GDP productivity for both the 'Healthy life years' (how much indexed healthy life years are produced per unit of GDP) and for GHG emissions (how much GHG emissions are produced per unit of GDP) for the reference year 2006.
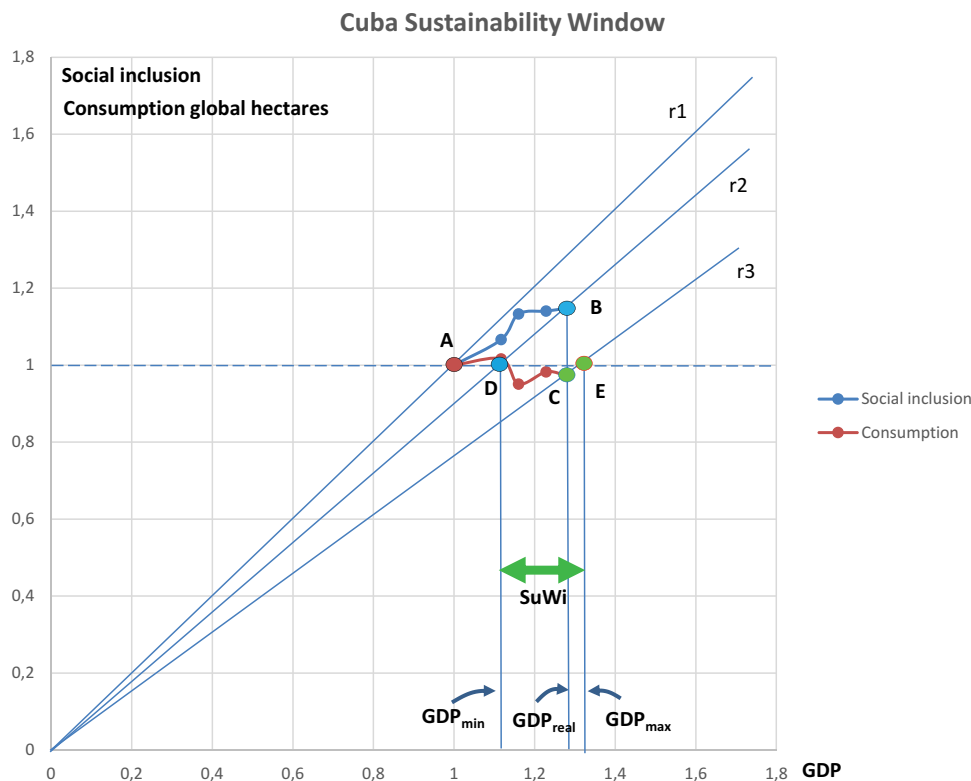

Figure 5. Sustainability window (Strong sustainability) for Cuba using 'Social inclusion' as the social welfare indicator (blue line) and 'Consumption of global hectares' as the environmental stress indicator (red line) and GDP as the economic indicator. All the indicators are indexed to have value 1 at the base year 2006 (point A) and their development till 2016 is indicated with the blue line (till point B) and the red line (till point C). Social inclusion productivity (line r2) in 2016 determines the minimum economic development (GDP_{min}, point D) in order not to decrease the social welfare. Consumption productivity in 2016, line r3, determines the maximum economic development (GDP_{max}, point E) in order not to increase environmental stress. In this case, the real GDP development in 2016 is within the Sustainability Window ($GDP_{min} < GDP_{real} < GDP_{max}$).

Line r2 indicates the 'Healthy life years' productivity of GDP in 2016 and line r3 indicates the GHG productivity of GDP in 2016.

To achieve social sustainability in 2016 in relation to 2006 the 'Healthy life years' should not decrease (development towards more sustainable direction). With r2 productivity, the minimum GDP to have the same level of 'Healthy life years' (point C) is marked with GDP_{min}. This determines the minimum level of economic output to prevent a decrease in healthy life years. In the analysis, this determines the lower limit of the Sustainability Window, GDP_{min}.

Concerning environmental sustainability, line r3 determines the maximum GDP to keep the growth of GHG/GDP below the value of the reference year (development towards a more sustainable direction). At point D in the figure, the weak environmental

sustainability criterion is fulfilled and this determines the upper limit, the maximum economic growth, GDP_{max}, for the Sustainability Window.

In this practical case, Cuban economic development seems to be within the Sustainability Window for the years 2006– 2016. According to the analysis, the maximum sustainable economic growth (GDP_{max}) could have been about 15% higher between 2006 and 2016 than the real economic growth (GDP_{real}) (the difference between D and E in Figure 4).

Another example of Cuban development is illustrated in Figure 5. In this example, we use 'Social inclusion' as the indicator for social welfare and 'Consumption of global hectares' as the indicator for environmental stress. The environmental indicator is now used for analyzing strong sustainability referring to the absolute value of the consumption of global
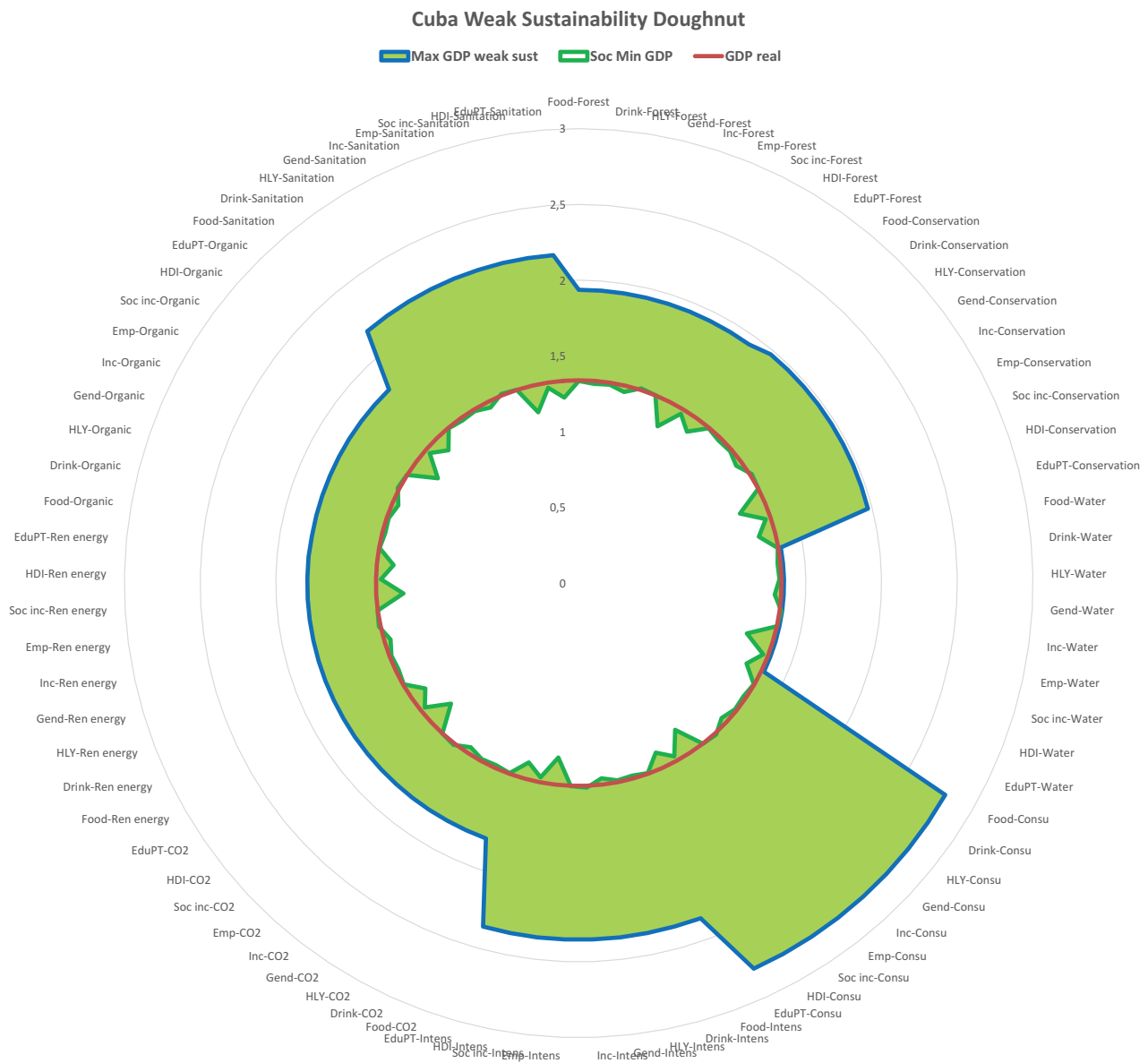

Figure 6. Doughnut model for weak sustainability analysis of Cuban development in 2006–2016. The blue line indicates the maximum economic development to fulfill the environmental sustainability criteria, and the green line indicates the minimum economic development to fulfill the social sustainability criteria. The red line indicates the real GDP growth level during the analyzed period. Green area, sustainability doughnut illustrates the possible area for sustainable development.

Figure 7. Doughnut model for strong sustainability (absolute reduction in environmental stress) analysis of Cuban development in 2006–2016. The blue line indicates the maximum economic development to fulfill the strong environmental sustainability criteria and the green line indicates the minimum economic development to fulfill the social sustainability criteria. The red line indicates the real GDP growth level during the analyzed period. Green area, sustainability doughnut illustrates the possible area for sustainable development.
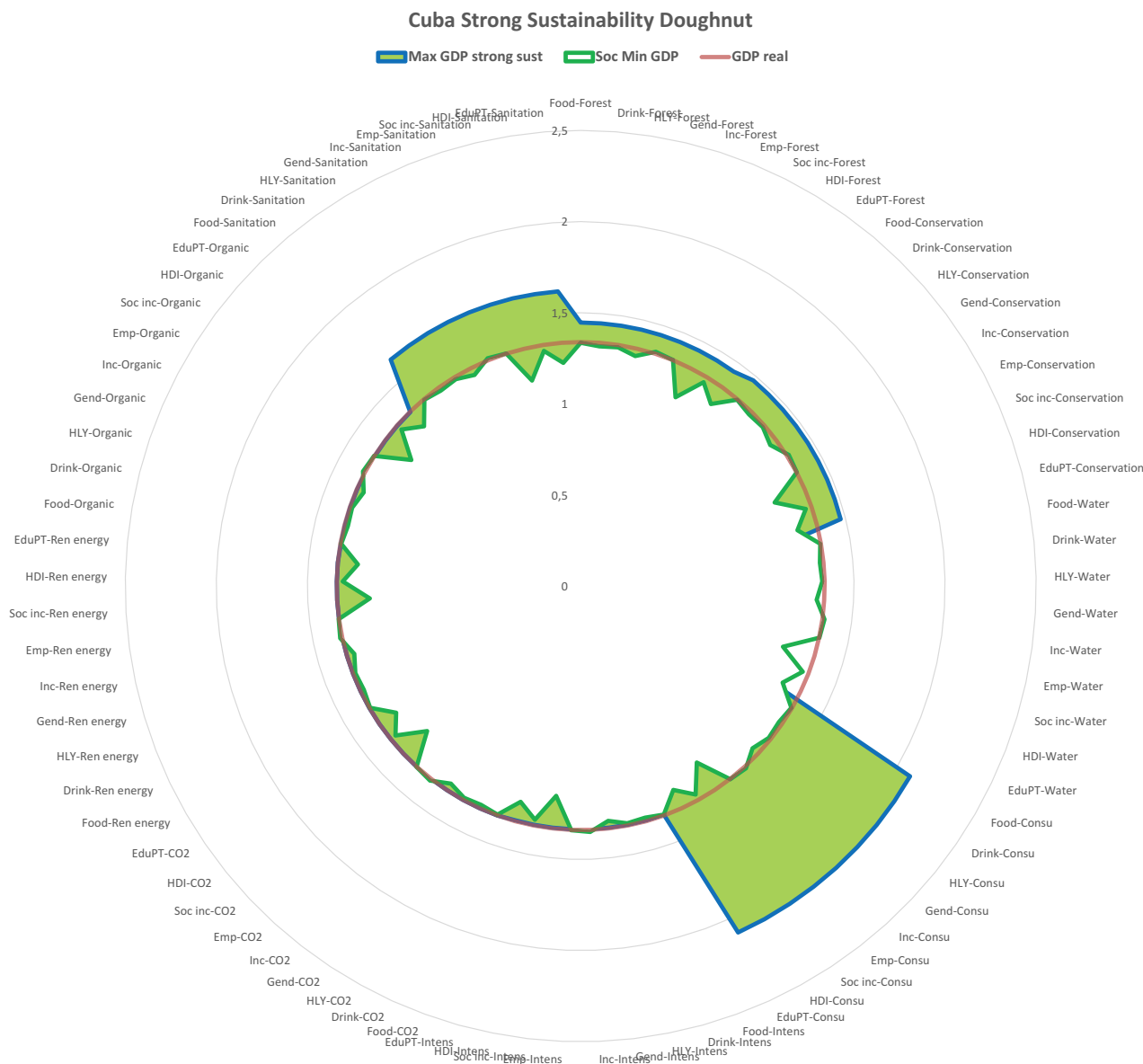
hectares. The calculation of the 'Social inclusion' indicator is explained in the appendix. The environmental indicator, 'Consumption of global hectares', is taken from the SSI database. The development of the indicators is shown in Figure 5 from the year 2006 to 2016. With these indicators, the real GDP development in Cuba is within the Sustainability Window.

3. Results

Similar Sustainability Window analyses have been carried out using several SSI and other database indicators. When the pairwise results, the quantified 'Sustainability Window', of all the pairs of social and

environmental indicators are arranged in a radial diagram we can get a visualization of sustainability in a doughnut form (see (Luukkanen et al. 2021).

In this analysis we have used the following indicators, listed in Table 1, to illustrate the method:

The weak sustainability doughnut model for Cuba (Figure 6) shows that the weak environmental sustainability criteria are fulfilled when the selected indicators are used except for the Renewable Water use. In the SDG database the 'Level of water stress' is measured with the freshwater withdrawal as a proportion of available freshwater resources (%). In Cuba this share has increased from 18.1% to 23.9% during the analysis period (2006–2016) meaning that the change is

towards less sustainable development even though the figures are not yet very alarming at the moment. However, the SuWi analysis reveals that development in this area is not sustainable. Regarding to other variables the real GDP growth has been lower than the maximum sustainable GDP growth defined by the environmental sustainability criteria (environmental stress productivity should not increase). This can be seen in Figure 6 where the red line indicating real GDP growth is within the blue line indicating maximum economic development except for water consumption.

Social sustainability, indicated with the green line in Figure 6, is fulfilled in most cases. This means that the real GDP growth has been large enough to improve social welfare measured with the chosen indicators. In the case of 'Education' and 'Income distribution' the social sustainability criteria are not fulfilled. In the case of 'Education', the statistics used for the SSI database may not provide a correct view of the development because of the differences in the definition and statistics of secondary education in different countries. Also, the statistics describing 'Income distribution' in Cuba may not be reliable because of the changes in the economic structure, the increase in the share of private economic actors, and the coverage of the statistics. Social sustainability criteria are fulfilled regarding the other indicators of social welfare development.

The strong sustainability doughnut (Figure 7) indicates that Cuba has problems in fulfilling some of the strong sustainability criteria. The economic growth is within the environmental sustainability criteria in regard to 'Consumption of global hectares' 'Biodiversity, protected areas', 'Biodiversity, forest area' and 'Sanitation' and on the edge of sustainability regarding 'CO$_2$ emissions' and 'Renewable energy'. The strong sustainability criteria are not met regarding 'Renewable water', 'Energy intensity', 'Energy use' and 'Organic farming'. The environmental stress productivity has not decreased fast enough regarding these indicators to allow the amount of economic growth that has taken place. The other interpretation is that the economic growth should have been slower to reach the sustainability condition. The social sustainability criteria are in this analysis the same as in the weak sustainability analysis.

4. Conclusions

Sustainability Window (SuWi) method provides a novel approach for analyzing sustainability simultaneously in social, environmental, and economic dimensions in a quantitative way. The simultaneous analysis in different dimensions provides possibilities for comprehensive analyses where the interactions between different sectoral developments are revealed and the problematic areas can be detected. This makes it possible to

take into account the policy responses in sectors of the economy and direct interventions in the areas where they are most urgently needed. The possibilities to analyze development in different policy areas simultaneously can lead to more balanced policies and timely actions compared to one sector analyses.

The developed quantitative illustration of the doughnut economy provides a new visualization of the development. It clearly illustrates the problematic areas of development and can be utilized as a method for communication of the complex development problematique. The visualization is especially important when the policy planning includes actors from different areas and backgrounds in order to receive feedback from larger stakeholder groups.

For the analysis the question of the use of absolute versus relative sustainability is important. In many cases, it is not possible to determine absolute levels of environmental stress which is sustainable or not. In this way the use of relative sustainability as a basis of the analysis is motivated. The direction of change towards a more sustainable state can be used as a criterion in relation to many indicators, where the absolute level of sustainability cannot be determined. It is possible to utilize absolute levels of sustainability in the SuWi analysis placing the target at the reference level and not the base year level and determining Sustainability Window accordingly.

The SuWi method and the related doughnut economy analysis can be utilized for comparative analyses of different countries. It can also be used for provincial or local level analysis if suitable indicator sets are available. The quality of the indicators is naturally crucial for the reliability of the results of the analysis. Indicator sets including the different dimensions of the development, social, environmental, and economic, are needed for a comprehensive analysis to reveal potential trouble areas, where policy actions should be directed. The availability of the indicator sets and time-series data for different countries, areas, and sectors is important for future policy planning and the work on the UN Sustainable Development Goals indicators is of huge importance in this respect.

The developed SuWi method and the doughnut model can be used for the analysis of the dynamics of development. The changes in the width of the Sustainability Window as a function of time provide information for trend analysis. This can function as a basis for scenario construction and future policy planning. The gap analysis (see (J. Luukkanen et al. 2019a) provides information on the areas where efficiency development is needed. This is relevant for policy planning and illustrates the magnitude of actions required.

Our analyses of the Cuban case illustrate the usefulness of the developed approach. The weak sustainability, meaning that the intensity of the environmental

stress is not increasing, is achieved in the Cuban development in the dimensions measured with the used indicators except for the water use. The strong sustainability criteria are, however, not all achieved. The criteria can be seen to be too strict for many developing countries where the environmental stress measured for instance with CO_2 emissions or energy use is still at a very low level. The social development in Cuba seems to be sustainable in regard to most of the used indicators. The social indicators are often not so easily measured and in this respect, the relative sustainability, development towards a more sustainable direction, is a preferable option.

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Annex

Social inclusion is calculated based on the completion rates of the upper secondary school of different groups. The used data (UNESCO 2020) is for (1) Urban and Rural areas, for (2) Oriente and Occidente (Eastern and Western part of the country), and for (3) Female and Male students. The data is for the years 2006, 2010, and 2016. The difference in the completion rates for the above-mentioned groups has been divided by the average completion rate. The sum for the three groups has been divided by three. This figure is then subtracted from one to provide the social inclusion indicator. The indicator has a maximum value of 1 when all the variables are equal.

Social inclusion indicator = 1 – ((U-R)/Av + (Or – Oc)/Av + (F-M)/Av)/3

where

U is the completion rate value for Urban students,
R is the completion rate value for Rural students,
Or is the completion rate value for Oriente students,
Oc is the completion rate value for Occidente students,
F is the completion rate value for Female students,
M is the completion rate value for Male students,
Av is the completion rate Average value of all the groups.

Author statement

Anaely Saunders: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Resources; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing.

Jyrki Luukkanen: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing.

Disclosure of potential conflicts of interest

No potential conflict of interest was reported by the author(s).

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