

# Assessment of Social Sustainability Using Social Society Index: A Clustering Application

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## Abstract

With the massive economic development and vast environmental degradation over the last decade, “sustainability” and “sustainable development” have become primary concepts in governments’ agenda. Sustainability has three pillars, namely environmental, economic and social, the latter gaining attention relatively later than the others. Some organizations evaluate the world countries for social sustainability using indices such as the Organisation for Economic Co-operation and Development (OECD) Better Life Index, Human Development Index and Social Society Index (SSI). SSI is used to rank world countries and evaluate their level of sustainability. SSI is a scoring system developed by Social Society Foundation to measure human wellbeing, environmental wellbeing and economic wellbeing every 2 years. In the evaluation process, SSI calculates scores using 21 indicators and publishes the actual situation on sustainability, progress over time and differences in development per region and per income class. In this paper, human wellbeing indicators of SSI are used to cluster world countries with k-means algorithm to assess social sustainability. Human wellbeing indicators are grouped into basic needs, personal development and health, and well-balanced society, all of which are measured with 3 indicators. The clusters obtained are compared with SSI rankings and the results are elaborated.

*Keywords: Social Sustainability, Social Society Index, Clustering, k-means algorithm*

## 1. Introduction

World Commission on Environment and Development (WCED) (1987) defines sustainable development as “a development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Dehghanian & Mansour (2009) identify the following objectives for a sustainable development:

- Maintain a high and stable level of economic growth and employment;
- Effective protection of the environment; and
- Provide social progress, which recognizes the needs of everyone.

Among the above-stated three pillars of sustainability (i.e. environmental, economic and social), the social dimension gained attention relatively later than the others. McKenzie (2004) defines social sustainability as “a life-enhancing condition within communities, and a process within communities that can achieve that condition”. The cross-disciplinary nature of social sustainability has resulted in multiple, often conflicting, interpretations based on a wide array of philosophical, political and practical issues (Woodcraft, 2012). Vallance et al. (2011) have grouped these under three main categories. According to their perspective, some studies focus on meeting basic needs and address underdevelopment (development sustainability), while others are equally

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concerned about the promotion of stronger environmental ethics (bridge sustainability). There are also those studies, where social sustainability has been considered in terms of maintaining or preserving preferred ways of living or protecting particular socio-cultural traditions (maintenance sustainability).

Social sustainability, as an emerging area of urban planning policy and practice, is increasingly used by governments, public agencies, policy makers, non-governmental organizations (NGOs) and corporations to frame decisions about urban development, regeneration and housing (Woodcraft, 2012). However, as Missimer et al. (2010) state, “The social world is much too complex and far too interwoven with value statements, morals, and other intangible, non-measurable aspects to be studied as one would study an ecological system with traditional scientific methodologies.” Indicators and composite indicators are useful tools to overcome these difficulties, and they have become increasingly popular both at the institutional level and in policy debate because they can summarize, simplify, quantify and communicate complex and dynamic environments (Singh et al., 2012; Luzzati & Gucciardi, 2015). Sustainable development indicators (SDIs), which measure sustainability through assigning a value or a number to describe the relation between environmental, social and economic dimensions of sustainability (Bondarchik et al., 2016), can be used by countries and businesses to (Singh et al., 2012):

- Assess and evaluate the performance.
- Provide trends on improvement as well as warning information on deteriorating sustainability issues.
- Provide insight to decision makers in formulating strategies and communicating the developments to the stakeholders.

The aim of this paper is to address the relatively understudied social dimension of sustainability using social sustainability indicators. Human wellbeing indicators of Social Society Index (SSI) are used to cluster world countries with k-means algorithm to assess social sustainability. Section 2 provides a brief overview of social sustainability indices while Section 3 focuses on SSI. The data is presented in Section 4, and the clustering application is given in Section 5. Finally, Section 6 elaborates the conclusions of the study, highlighting possible areas of future research.

## **2. Social Sustainability Indices**

Some of the social sustainability indices cited in the literature are (but not limited to) Gender Empowerment Measure (GEM); Physical Quality of Life Index (PQLI); Well-Being Assessment (Well-Being Index – WI); National Health Care Systems Performance; Overall Health System Attainment and SSI (Singh et al., 2012). Table 1 presents an overview of some of the most commonly used sustainability frameworks and indices (with a focus on social aspects) as well as social sustainability indices.

**Table 1.** Some Sustainability Indices and their Social Dimensions

Index	Dimensions	Social Dimension Aspects/Indicators
Global Reporting Initiative Sustainability Reporting Guidelines (G4 Guidelines)* (GRI, 2013)	Social Economic Environmental	<p><u>Labor Practices and Decent Work:</u> Employment; Labor/Management Relations; Occupational Health and Safety; Training and Education; Diversity and Equal Opportunity; Equal Remuneration for Women and Men; Supplier Assessment for Labor Practices; Labor Practices Grievance Mechanisms</p> <p><u>Human Rights:</u> Investment; Non-discrimination; Freedom of Association and Collective Bargaining; Child Labor; Forced and Compulsory Labor; Security Practices; Indigenous Rights; Assessment; Supplier Human Rights Assessment; Human Rights Grievance Mechanisms</p> <p><u>Society:</u> Local Communities; Anti-corruption; Public Policy; Anti-competitive Behavior; Compliance; Supplier Assessment for Impacts on Society; Grievance Mechanisms for Impacts on Society</p> <p><u>Product Responsibility:</u> Customer Health and Safety; Product and Service Labeling; Marketing Communications; Customer Privacy; Compliance</p>
Human Development Index (HDI) (UNDP, 2016)	Long and Healthy Life Knowledge A Decent Standard of Living	<p><u>Long and Healthy Life:</u> Life expectancy at birth (years)</p> <p><u>Knowledge:</u> Expected years of schooling (years); Mean years of schooling (years)</p> <p><u>A Decent Standard of Living:</u> Gross national income (GNI) per capita (2011 PPP \$)</p>
OECD Better Life Index (OECD, 2017)	Housing Income Jobs Community Education Environment Civic Engagement Health Life Satisfaction Safety Work-Life Balance	<p><u>Housing:</u> Dwellings without basic facilities (%); Housing expenditure (%); Rooms per person (Ratio)</p> <p><u>Community:</u> Quality of support network (%)</p> <p><u>Education:</u> Educational attainment (%); Student skills (Average score); Years in education (Years)</p> <p><u>Civic Engagement:</u> Stakeholder engagement for developing regulations (Average score); Voter turnout (%)</p> <p><u>Health:</u> Life expectancy (Years); Self-reported health (%)</p> <p><u>Life Satisfaction:</u> Life satisfaction (Average score)</p> <p><u>Safety:</u> Feeling safe walking alone at night (%); Homicide rate (Ratio)</p> <p><u>Work-Life Balance:</u> Employees working very long hours (%); Time devoted to leisure and personal care (Hours)</p>

**Table 1.** Some Sustainability Indices and their Social Dimensions cont.

Index	Dimensions	Social Dimension Aspects/Indicators
Social Society Index (SSF, 2017a)	Human Wellbeing Environmental Wellbeing Economic Wellbeing	<i>Human Wellbeing:</i> <u>Basic Needs:</u> Sufficient food (%); Sufficient to drink (%); Safe sanitation (%) <u>Personal Development &amp; Health:</u> Education (%); Healthy life (years); Gender equality (Gender Gap Index) <u>Well-balanced Society:</u> Income distribution (ratio); population growth (%); good governance (total score World Bank)
United Nations Division of Sustainable Development (UNSD) framework for social sustainability (Hutchins & Sutherland, 2008)	Equity Health Education Housing Security Population	<i>Equity</i> <u>Poverty:</u> Percent of population living below poverty line (%); Gini index of income inequality; <u>Unemployment rate (%)</u> <u>Gender Equality:</u> Ratio of average female wage to male wage (%) <i>Health</i> <u>Nutritional Status:</u> Nutritional status of children <u>Mortality:</u> Mortality rate under 5 years old; Life expectancy at birth (years) <u>Sanitation:</u> Percent of population with adequate sewage disposal facilities <u>Drinking Water:</u> Population with access to safe drinking water <u>Healthcare Delivery:</u> Percent of population with access to primary healthcare facilities; Immunization against infectious childhood diseases; Contraceptive prevalence rate <i>Education</i> <u>Education Level:</u> Children reaching grade 5 of primary education; Adult secondary education achievement level <u>Literacy:</u> Adult literacy rate <i>Housing</i> <u>Living Conditions:</u> Floor area per person <i>Security</i> <u>Crime:</u> Number of recorded crimes per 100,000 population <i>Population</i> <u>Population Change:</u> Population growth rate; Population of urban formal and informal settlements

\*The GRI Standards have superseded the G4 Guidelines, which will be phased out on 1 July 2018.

There is a number of studies in the literature where the above-listed or other SDIs have been used to evaluate the performance of certain countries. For example, Panda et al. (2016) developed a social sustainable framework and a composite index specifically for Indian cities. They concluded that the proposed model may help in benchmarking the cities and identifying the gaps to ultimately inform national policy and planning. In another study, Luzzati & Gucciardi (2015) ranked EU Countries in terms of their sustainability, using a set of indicators from EUROSTAT, European Environmental Agency database and World Bank 'Worldwide Governance Indicators'. They concluded

that composite indicators can give good results as long as rankings are developed using uncertainty analysis rather than a single composite. Wilson et al. (2007) compared six global metrics (Ecological Footprint, Surplus Biocapacity, Environmental Sustainability Index, WI, HDI and Gross Domestic Product) by relative ranking in colour coded tabular format and spatially in map format and concluded that the different metrics provide varying interpretations about the sustainability of nations. Their results also indicated that there is no one 'best measure' to assess sustainability; and SDIs, complemented with other decision support tools, models, or studies, may prove themselves more effective.

### 3. Social Society Index

SSI, launched in 2006, is a scoring system developed by Social Society Foundation (SSF) to measure the level of sustainability for 154 countries, every 2 years. It is based on the sustainability definition by the Brundtland Commission (WCED, 1987). SSI is designed to measure the extent to which every human being (SSF, 2010)

- is able to develop itself in a healthy manner and to obtain a proper education,
- lives in a clean environment,
- lives in a well-balanced and safe society,
- uses non-renewable resources in a responsible manner so that future generations are not left empty-handed and
- contributes to a sustainable world.

Initially, it included 22 indicators, then in 2010 the structure was redesigned with 24 indicators. The index is comprised of three levels; 3 wellbeing dimensions, 7 categories and 24 indicators. The SSI framework and indicators are provided in Table 2.

**Table 2.** SSI Framework & Indicators (adapted from SSF, 2017a)

<b>Human Wellbeing</b>	<b>Environmental Wellbeing</b>	<b>Economic Wellbeing</b>
Basic needs <ul style="list-style-type: none"> <li>• <i>Sufficient Food</i></li> <li>• <i>Sufficient Drink</i></li> <li>• <i>Safe Sanitation</i></li> </ul>	Healthy Environment <ul style="list-style-type: none"> <li>• <i>Air Quality – humans</i></li> <li>• <i>Air Quality – nature</i></li> <li>• <i>Surface Water Quality</i></li> </ul>	Preparation for the Future <ul style="list-style-type: none"> <li>• <i>Material Consumption</i></li> <li>• <i>Organic Farming</i></li> <li>• <i>Genuine Savings</i></li> </ul>
Personal Development & Health <ul style="list-style-type: none"> <li>• <i>Healthy Life</i></li> <li>• <i>Education Opportunities</i></li> <li>• <i>Gender Equality</i></li> </ul>	Climate & Energy <ul style="list-style-type: none"> <li>• <i>Renewable Energy</i></li> <li>• <i>Emission of GHGs</i></li> <li>• <i>Energy Consumption</i></li> </ul>	Economy <ul style="list-style-type: none"> <li>• <i>Gross Domestic Product</i></li> <li>• <i>Employment</i></li> <li>• <i>Public Debt</i></li> </ul>
Well-balanced Society <ul style="list-style-type: none"> <li>• <i>Good Governance</i></li> <li>• <i>Income Distribution</i></li> <li>• <i>Population Growth</i></li> </ul>	Natural Resources <ul style="list-style-type: none"> <li>• <i>Renewable Water Resources</i></li> <li>• <i>Forest Area</i></li> <li>• <i>Biodiversity</i></li> </ul>	

SSI is the only index that covers all three wellbeing dimensions for over 99% of the world population (Van de Kerk & Manuel, 2012) while most other indices do so only partly. It is audited by the Joint Research Centre of the European Commission (JRC),

and JRC concluded that the revised SSI framework is conceptually coherent, meets the statistical requirements set by JRC, and is well suited to assess nations' development towards sustainability in its broad sense: Human, Environmental and Economic Wellbeing (Saisana & Philippas, 2012). Gallego-Álvarez et al. (2015) analyzed the evolution of SSI indicators over the period 2006-2012 and identified an increasing emphasis on economic indicators, especially public debt, genuine savings and employment. They also conclude that a good system of indicators can aid in making knowledgeable decisions and evaluating the effectiveness of public policies and progress towards political objectives.

#### 4. Data

In this study, human wellbeing indicators of SSI, which are grouped into basic needs, personal development, and well-balanced society, are used to assess social sustainability of nations. The human wellbeing indicators, their dimension, description and sources are presented in Table 3.

**Table 3.** Human Wellbeing Indicators of SSI (adapted from SSF, 2017b)

Dimension	Indicator	Description	Source
Basic Needs	Sufficient Food	<i>Number of undernourished people in % of total population</i>	FAQ FSI
	Sufficient Drink	<i>Number of people in % of total population, with sustainable access to an improved water source</i>	FAQ FSI
	Safe Sanitation	<i>Number of people in % of total population, with sustainable access to improved sanitation</i>	FAQ FSI
Personal Development & Health	Healthy Life	<i>Life expectancy at birth in number of healthy life years</i>	WHO HALE
	Education Opportunities	<i>Gross enrolment ratio for primary, secondary &amp; tertiary education (combined)</i>	UNESCO
	Gender Equality	<i>Gender Gap Index</i>	WEF
Well-balanced Society	Good Governance	<i>Sum of the six Worldwide Governance Indicators</i>	WB
	Income Distribution	<i>Ratio of income of the richest 10% to the poorest 10% people in a country</i>	WB
	Population Growth	<i>5-years change in total population size (% of total population)</i>	WB

Calculation methodology summarized here is obtained from SSF (2017c). As it can be seen in Table 3, public data sources are used for SSI, in which case the reliability of data remains a serious concern. A scoring system is applied by conversing the raw data on a scale of 0-10 for each indicator and country. Then, the geometric averages are used for the aggregation of indicators into dimensions, and wellbeing scores are calculated. Finally, each country is ranked according to wellbeing dimensions, individually.

The main results of 2016 can be found in SSF (2017d) showing the world being far from sustainable, despite Climate plans, Millennium and Sustainable Development Goals and

various other valuable initiatives. The highest score is Human Wellbeing with an average of 6.4 for the world. Among all indicators, Sufficient Food (9.1) and Sufficient Drink (9.0) are the highest scored indicators, whereas Safe Sanitation (6.5) is the ninth indicator score. World averages for Human Wellbeing indicators of 2016 are provided in Figure 1.

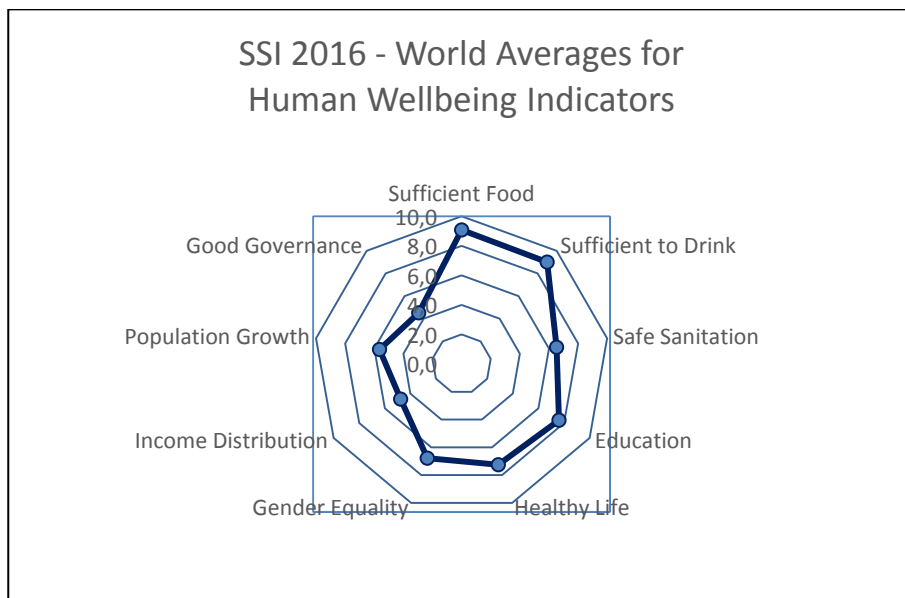


Figure 1. World Averages for Human Wellbeing Indicators 2016  
Data Source: SSF, 2017d

### 5. Clustering Application

In this study, K-means Algorithm is applied on 154 countries to cluster them in the context of social sustainability. The 9 social variables are analyzed with k=4, k=5 and k=6 clusters and finally k=5 cluster is selected for final results. This is because 5 is the appropriate cluster number for comparison with the SSI Scoring System (i.e. 0-2, 2-4, 4-6, 6-8, and 8-10). When compared with SSI Human Wellbeing Scores, the clusters provide a compatible distribution with the scores. The list of countries in these five clusters are given in Table 4.

Table 4. List of Countries in Clusters

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	
Albania	Korea, South	Bolivia	Angola	Algeria	Central African
Argentina	Kuwait	Botswana	Benin	Azerbaijan	Republic
Armenia	Latvia	Brazil	Burkina Faso	Bangladesh	Haiti
Australia	Libya	Chad	Burundi	Bhutan	Namibia
Austria	Lithuania	Colombia	Cambodia	Bosnia-	Zambia
Belarus	Luxembourg	Guatemala	Cameroon	Herzegovina	
Belgium	Malaysia	Guyana	Congo	China	
Bulgaria	Malta	Honduras	Congo Democratic	Dominican	

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Canada	Mauritius	Panama	Republic	Republic
Chili	Montenegro	Qatar	Cote d'Ivoire	Ecuador
Costa Rica	Netherlands	South	Ethiopia	El Salvador
Croatia	New Zealand	Africa	Gabon	Gambia
Cuba	Norway	Venezuela	Ghana	Indonesia
Cyprus	Poland		Guinea	Iraq
Czech	Portugal		Guinea-Bissau	Jamaica
Republic	Romania		India	Korea, North
Denmark	Saudi Arabia		Kenya	Kyrgyz Republic
Egypt	Serbia		Lesotho	Laos
Estonia	Singapore		Liberia	Lebanon
Finland	Slovak		Madagascar	Macedonia
France	Republic		Malawi	Mexico
Georgia	Slovenia		Mali	Moldova
Germany	Spain		Mauritania	Mongolia
Greece	Sweden		Mozambique	Morocco
Hungary	Switzerland		Niger	Myanmar
Iceland	Taiwan		Nigeria	Nepal
Iran	Thailand		Papua New Guinea	Nicaragua
Ireland	Tunisia		Senegal	Oman
Israel	Turkey		Sierra Leone	Pakistan
Italy	Ukraine		Sudan	Paraguay
Japan	United		Tanzania	Peru
Jordan	Kingdom		Togo	Philippines
Kazakhstan	United States		Uganda	Russia
	Uruguay		Yemen	Ruanda
			Zimbabwe	Sri Lanka
				Syria
				Tajikistan
				Trinidad and
				Tobago
				Turkmenistan
				United Arab
				Emirates
				Uzbekistan
				Vietnam

However, there are some outliers and to visualize the clusters according to Human Wellbeing scores, a boxplot grouping for 5 clusters is provided in Figure 2. As seen in Figure 2, the highest scored cluster is #1, which consists of high and upper middle income Socially Sustainable countries. The second cluster, referred to as Socially Self-Sufficient, is #4, which mostly includes middle income countries except for Gambia. Middle and South American countries are clustered around the Socially Moderate cluster #2, which also contains South Africa, Botswana and Qatar. Socially Insufficient countries are Sub-Saharan countries with outliers India and Cambodia on the upper side and Chad on the lower side of the cluster #3. Finally, the remaining Socially Poor countries in cluster #5 are some Sub-Saharan African countries with low scores and Haiti. The cluster characteristics are summarized in Table 5.



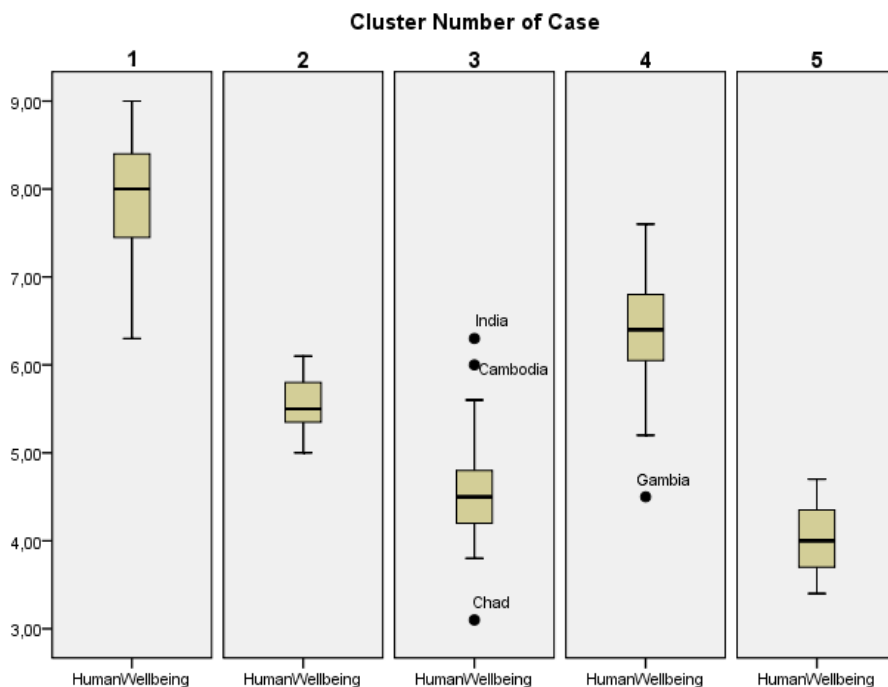


Figure 2. Boxplots of the clusters according to Human Wellbeing Scores

Table 5. Cluster Characteristics

Human Wellbeing Score Interval	Cluster Score Interval	Cluster ID (Cluster Name)	Cluster Characteristics	Outliers (If any)
[9.0 - 7.8)	[9.0-6.3]	1 (Socially Sustainable)	Most of the European countries (except Moldova with a score of 7.6), high and upper middle-income North & South American countries, high and upper middle income Asian countries, African countries mostly on the Mediterranean coast	
[7.8 - 6.6)	[7.6-4.5]	4 (Socially Self-Sufficient)	Most of the Asian countries, some Middle and South American countries, in addition to Moldova, Bosnia-Herzegovina, Macedonia, Algeria, Rwanda, and Gambia	Gambia (4.5)
[6.6 - 5.4)	[6.1-5.0]	2 (Socially Moderate)	Middle & South American countries, in addition to South Africa, Botswana and Qatar	
[5.4 - 4.2)	[6.3-3.1]	3 (Socially Insufficient)	Mostly Sub-Saharan African countries in addition to India, Cambodia, Yemen and Papua New Guinea	India (6.3) Cambodia (6.0) Chad (3.1)
[4.2 - 3.0)	[4.7-3.4]	5 (Socially Poor)	Some Sub-Saharan African countries with low scores and Haiti	

## 6. Conclusions & Future work

The social dimension of sustainability, which gained attention relatively later than the economic and environmental aspects, is increasingly used by governments, public agencies, policy makers, NGOs and corporations to frame decisions and evaluate performance. However, the complex and intangible nature of the social world makes it very difficult to define and measure. At this point, SDIs have proven themselves useful tools for making sound and objective decisions.

In this study, human wellbeing indicators of SSI have been used to cluster world countries with k-means algorithm to assess their social sustainability. 154 countries have been clustered using k=5 clusters and compared with SSI's scoring system. Clusters consisted of socially sustainable (64), socially self-sufficient (40), socially moderate (12), socially insufficient (34) and socially poor countries (4). However, there are some outliers for cluster 3 and 4 on both upper and lower sides. The distribution of clusters are mostly compatible with the results of the SSI scoring system. This is significant from two aspects. First, the social indicators of SSI can be interpreted as effective means to measure social sustainability and make objective decisions. Second, it can be concluded that clustering is a significant tool not only in social sustainability evaluations when used together with SDIs but also in their development as well.

Similar analysis can be made on the environmental and economic wellbeing dimensions of SSI. Another possible future study may be comparing the results of different social sustainability indices using cluster analysis. In conclusion, it can be stated social sustainability, being relatively understudied compared to the other dimensions of sustainability, is itself a promising area of research. There is especially need for further studies on developing means to effectively assess social sustainability and evaluating their applicability.

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## References

- Bondarchik, J., Jabłońska-Sabuka, M., Linnanen, L., & Kauranne, T. (2016). Improving the objectivity of sustainability indices by a novel approach for combining contrasting effects: Happy Planet Index revisited. *Ecological Indicators*, 69, 400-406.
- Dehghanian, F., & Mansour, S. (2009). Designing sustainable recovery network of end-of-life products using genetic algorithm. *Resources, Conservation and Recycling*, 53(10), 559-570.
- Gallego-Álvarez, I., Galindo-Villardón, M. P., & Rodríguez-Rosa, M. (2015). Evolution of sustainability indicator worldwide: A study from the economic perspective based on the X-STATICO method. *Ecological Indicators*, 58, 139-151.
- Global Reporting Initiative (GRI) (2013). *G4 Sustainability Reporting Guidelines Reporting Principles and Standard Disclosures*. Retrieved June 14, 2017, from <https://www.globalreporting.org/resource/library/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf>
- Hutchins, M. J., & Sutherland, J. W. (2008). An exploration of measures of social sustainability and their application to supply chain decisions. *Journal of Cleaner Production*, 16(15), 1688-1698.

- Luzzati, T., & Gucciarini, G. (2015). A non-simplistic approach to composite indicators and rankings: an illustration by comparing the sustainability of the EU Countries. *Ecological Economics*, 113, 25-38.
- McKenzie, S. (2004). *Social Sustainability: Towards Some Definitions*, Hawke Research Institute Working Paper Series 27. Retrieved January 12, 2015, from <http://w3.unisa.edu.au/hawkeinstitute/publications/downloads/wp27.pdf>
- Missimer, M., Robèrt, K. H., Broman, G., & Sverdrup, H. (2010). Exploring the possibility of a systematic and generic approach to social sustainability. *Journal of Cleaner Production*, 18(10), 1107-1112.
- Organisation for Economic Co-operation and Development (OECD). (2017). *Better Life Index - Edition 2016*. Retrieved June 30, 2017, from <http://stats.oecd.org/Index.aspx?DataSetCode=BLI>
- Panda, S., Chakraborty, M., & Misra, S. K. (2016). Assessment of social sustainable development in urban India by a composite index. *International Journal of Sustainable Built Environment*, 5(2), 435-450.
- Saisana, M., & Philippas, D. (2012). *Sustainable society index (SSI): taking societies' pulse along social, environmental and economic issues*. The Joint Research Centre Audit on the SSI. Report EUR 25578 EN. Ispra: European Commission Joint Research Centre.
- Singh, R. K., Murty, H. R., Gupta, S. K., & Dikshit, A. K. (2012). An overview of sustainability assessment methodologies. *Ecological Indicators*, 15(1), 281-299.
- Sustainable Society Foundation (SSF). (2017a). Framework. Retrieved March 01, 2017, from <http://www.ssfindex.com/ssi/framework/>
- Sustainable Society Foundation (SSF). (2017b). Indicator Description. Retrieved March 01, 2017, from <http://www.ssfindex.com/ssi/indicator-description/>
- Sustainable Society Foundation (SSF). (2017c). Calculation Methodology. Retrieved March 01, 2017, from <http://www.ssfindex.com/ssi/calculation-methodology/>
- Sustainable Society Foundation (SSF). (2017d). Main Results 2016. Retrieved March 01, 2017, from <http://www.ssfindex.com/results/main-results-2016/>
- Sustainable Society Foundation (SSF). (2010). *Sustainable Society Index, SSI Evaluation and Redesign*. Retrieved March 01, 2017, from [http://www.ssfindex.com/ssi2016/wp-content/uploads/pdf/Redesign\\_SSI\\_2010.pdf](http://www.ssfindex.com/ssi2016/wp-content/uploads/pdf/Redesign_SSI_2010.pdf)
- United Nations Development Programme (UNDP). (2016). *Human Development Report 2016 Human Development for Everyone*. New York: UNDP.
- Vallance, S., Perkins, H. C., & Dixon, J. E. (2011). What is social sustainability? A clarification of concepts. *Geoforum*, 42(3), 342-348.
- Van de Kerk, G., & Manuel, A. (2012). *Sustainable Society Index SSI-2012*. The Netherlands: Sustainable Society Foundation.
- Wilson, J., Tyedmers, P., & Pelot, R. (2007). Contrasting and comparing sustainable development indicator metrics. *Ecological indicators*, 7(2), 299-314.
- World Commission on Environment and Development (WCED). (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved July 08, 2010, from <http://www.un-documents.net/ocf-02.htm>
- Woodcraft, S. (2012). Social sustainability and new communities: Moving from concept to practice in the UK. *Procedia-Social and Behavioral Sciences*, 68, 29-42.