Evaluation of Sustainable Development Using Ecological Footprint and Other Indicators

エコロジカル・フットプリントをはじめとする指標による持続可能型開発の評価

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1. INTRODUCTION

Ecological Footprint (EF) is the top to bottom counterpart of the Life Cycle Assessment, which is now broadly utilized for evaluating environmental load of countries, regions and masses. On the other hand, Human Development Index (HDI) is a broader indicator than GDP to measure level of living standards through life expectancy, education and literacy, and the ability to purchase needed goods and services. Available data of countries indicates that there is a considerable correlation between EF and HDI. In this paper the authors will reveal indicators other than HDI which needed to evaluate sustainable human development, taking EF as the principal determinant.

2. METHODOLOGY

2.1 Sustainable Development

‘Meeting the needs of the present without compromising the ability of future generations to meet their own needs’ is the most popularized definition of sustainable development in the Brundtland report—Our Common Future in 1987. Therefore, UNDP’s HDI and Wackernagle & Rees’s EF parameters were used to evaluate region’s development in authors’ previous research from social, economic and environmental aspects1 (see Fig.1).

2.2 Ecological Footprint

Ecological Footprint concept offers a methodologically simple but comprehensive way for such an accounting task. It tracks national economies’ energy and resource throughput and translates them into biologically productive areas necessary to produce these flows. Also, it compares this resource and energy consumption to the ecological capacity available in the country. Ecological Footprint is now widely used around the globe as an indicator of environmental sustainability since it was developed by Wackernagel and Rees in 1996.

2.3 Human Development Index

The Human Development Index is a composite index, it has become the most influential tool of measurement of poverty and wellbeing in society (longevity, income, education) (see Fig.2). It is used to rank countries by level of “human development”, which usually also implies whether a country is a developed, developing, or underdeveloped country.

UNDP considers an HDI value of more than 0.8 to be “high human development”. Meanwhile, a footprint lowers than 1.8gha/cap, the average bio capacity available per person on the planet, could denote sustainability at the global level2. For sustainable human development regions should be positioned in “sustainable development” quadrant shown in Figure 3.

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2.1 Sustainable Development

In the Brundtland report—Our Common Future in 1987, the most popularized definition of sustainable development is the ability of future generations to meet their own needs. EF as the primary determinant is needed to evaluate sustainable human development, taking into account indicators other than HDI which consider the considerable correlation between EF and HDI. In this paper, indicators such as literacy, and the ability to purchaseneeded goods and services. Available data of countries indicates that there is a considerable correlation between EF and HDI. The Human Development Index for evaluating environmental load of countries, regions and areas necessary to produce these flows. Also, it compares throughput and translates them into biologically productive capacity available in the country. Ecological Footprint is this resource and energy consumption to the ecological masses. On the other hand, Human Development Index for regional economies' energy and resource sustainability since it was developed by UNDP and Wackernagel and Rees in 1996.

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Ecological Footprint concept offers a methodologically simple but comprehensive way for such an accounting task. It tracks national economies' energy and resource use and translates them into biologically productive areas necessary to produce these flows. Also, it compares throughput and translates them into biologically productive areas necessary to produce these flows. It is used to rank countries by level of poverty and wellbeing in society (longevity, income, education) (see Fig.2). It is used to rank countries by level of poverty and wellbeing in society (longevity, income, education).

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\[ y = 30.591x^3 - 35.401x^2 + 12.32x - 0.0372 \]

3. RESULT

In general, a region with high HDI also coincided with high EF. Regression analysis indicates that EF and HDI have considerable correlation, their equation is:

\[ y = 30.591x^3 - 35.401x^2 + 12.32x - 0.0372 \]

4. CONCLUSION

Combining EF and HDI parameters to evaluate regions' development is more comprehensive than single indicator. And there is a considerable correlation between EF and HDI. Questionnaire survey shows that there are some components to be included in sustainable human development assessment. After conducting more surveys, the components of a 3rd index can be determined, and authors are going to establish a 3D evaluation system for assessing regional development.

5. REFERENCE