Asian Journal of Water, Environment and Pollution, Vol. 3, No. 1, pp. 147-152.

Scientific Review

An Appraisal of Globalization and Sustainable Development for European Countries

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Received December 12, 2004; revised and accepted May 17, 2005

Abstract: The contemporary issues of sustainable development and globalization for a subset of European countries are addressed. The paper evaluates these two issues at the national level when some development specialists argue that there is often a trade-off between them. The study database consisted of last two decades' relevant national indicators extracted from centralized information sources of international agencies. Due to incomplete and missing data, only 22 countries were selected for detailed analysis for the ten-year period of 1985 to 1995. The globalization indicators reflect cross-border flow and exchange of products, people, resources, and information. The sustainable development indicators reflect human and ecosystem well-beings. They consisted of measures reflecting economic, environmental and social development characteristics. The univariate and multivariate statistical analyses of the database showed interesting results and relations between globalization and sustainable development for the period of study. Elasticities of sustainable development indicators with respect to globalization indicators were studied. For some countries, the elasticity appraisal showed sustainable development parallel with globalization. For others, the evaluation did not indicate a promising period. The study confirmed the significance of the globalization and sustainable development balancing challenges of the 21st century.

Introduction

Originating from two different ideas, sustainable development and globalization issues have some similarities. The main characteristic that is common between sustainability and globalization is their multidimensionality. Several researchers have claimed that these issues are interrelated and may even play dual roles. Many ecologists are now defending localized economic development as a key recipe for ecological enhancement.

Introduced by Brundtland Commission (World Commission on Environment and Development, 1987), sustainable development is a concept that has increasingly extended since 80's, requiring balanced intra-generational and intergenerational attentions. Its initiation was a natural response to scientists' anxiety to negative impacts of past short-sighted growth and developments. Sustainability and sustainable development have now acquired prime significance in planning and decision-making at all levels. Nevertheless, the practical implications have remained far from perfection. Studies have shown that the continued poverty of the majority of the planet's inhabitants and excessive consumption by the minority are the two major causes of environmental degradation conducive to unsustainable courses for human development (Clarke, 1999).

Globalization is a term used to describe the acceleration and intensification of economic interactions through increasing internationalization of production, distribution, and marketing of goods, services and information (Harris, 1993). The basic ingredients of globalization can be summarized as its four I's, namely industry, investment, individuals and information (Ohmae, 1995). In the twentieth century, the transactions costs for international trade decreased not only because

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of technological advancements, but in addition, because of a wave of deregulation and cooperation among many countries. In particular, the costs of transport and communication have fallen significantly, which have been conducive to creation of the new world economy. Globalization is shaping new economic and socio-environmental settings at all levels with profound implications for developments. Prospering from globalization facilitations, for example, East Asian economies have increased their share of world GDP from 5 to 20 percent and their share of world manufactured output from 10 to 23 percent between 1965 and 1988 (Wallerstein, 1994). Currently human race is going through a globalization process that started some time ago, that will possibly last for decades, that demands many decisions of humanity and will transform human relations in such a manner that could led to different destinations according to the path and options selected.

Sustainable development and globalization are two contemporary issues that have often been separately addressed in the literature (Harris, 1993; Wallerstein, 1994; Vaziri and Rassafi, 2001a; Vaziri and Rassafi, 2001b). However, their interrelations are primary to relevant development at all levels. In this study, sustainable development and globalization for a subset of European countries were addressed. The objective of study was to shed some light on the interrelationships of these two issues at the national level. Although the study findings are based on rather limited database time and geographic scopes, the same methodology can be applied to any other time and geographic scope for determination and elaboration of the involved issues. The study thus is of more methodological value than quantitative results.

The study database consisted of last decade relevant national indicators extracted from centralized information sources of international agencies. Due to the study limited resources and centralized data resource accessibility, data incompleteness and missing, only 22 countries were selected for detailed analysis for the ten-year period of 1985 to 1995 (OECD, 1999; UN, 1997; World Bank, 1998). The selected national globalization indicators reflect cross-border flow and exchange of products, people, resources and information. The selected sustainable development indicators reflect human and ecosystem well-beings. They consisted of measures reflecting economic, environmental and social development characteristics. The selected indicators are neither standard nor unique; nevertheless they reflect the basic dimensions of sustainable development and globalization. The univariate and multivariate statistical analyses of the indicators showed interesting results and relations between globalization and sustainable development for the period of study. Elasticities of sustainable development indicators with respect to globalization indicators were studied. For some countries, the elasticity appraisal showed sustainable development parallel with globalization. For others, the evaluation did not indicate a promising period. The study confirmed the significance of the globalization and sustainable development balancing challenges of the 21st century.

Descriptive Analysis

After preliminary evaluations of the accessible databases, the limited study resources confined the final data collection to seven relevant national indicators (Vaziri and Rassafi, 2001a; Vaziri and Rassafi, 2001b; OECD, 1999). The selected set included four indicators representing globalization and three indicators representing sustainability aspects, respectively. Due to missing data 22 countries were finally selected for detailed analysis. The analyses also were curtailed to a ten-year period covering 1985 through 1995. Table 1 describes these variables.

The univariate statistical analysis of the seven indicators for period of 1985 to 1995 shed light on the study database variability. The statistics minimum, maximum, mean, standard deviation and coefficient of variation for years 1985 and 1995 are summarized in Table 2, respectively. The table shows that the CO_2 emission, SCO_2, on average decreased 0.07% per year. The GDP, SGDP, showed an average increase of 3.97% per year. The unemployment, SUNE, showed an average increase of 1.07% per year. The civil aviation passengers carried, GAPS, showed an average increase of 7.53% per year. The foreign direct investment net inflows, GFDI, showed an average increase of 60.84% per year. The net income from abroad, GNIF, showed an average decrease of 16.65% per year. The trade, GTRD, showed an average decrease of 0.69% per year. Table 2 shows these statistics for the selected 22 countries.

The civil aviation passengers carried and foreign direct investment net inflows confirmed positive globalization process for the selected countries. Nevertheless the net income from abroad and trade indicators showed a globalization process not always desirable for the selected countries. The CO_2 emission and GDP showed a desirable trend for sustainable development, whereas the unemployment trend was not always promising. The ascending order of variability, based on coefficient of variation among globalization indicators was for trade, civil aviation passengers carried, foreign direct

Table 1: Description of the Database Indicators

Variable	*Category*	*Description*	*Dimension*
GAPS	Globalization	Civil Aviation Passengers Carried	Thousand Passengers
GFDI	Globalization	Foreign Direct Investment Net Inflows	Million US$
GNIF	Globalization	Net Income From Abroad	Million US$
GTRD	Globalization	Trade	% GDP
SCO_2	Sustainability	CO_2 Emission	Thousand Tons
SGDP	Sustainability	GDP	Billion US$
SUNE	Sustainability	Unemployment	% Total Labour Force

Table 2: Descriptive Analysis of the Database

	Minimum	*Maximum*	*Mean*	*Standard deviation*	*Coefficient of variation*
GAPS85	384.1	28229.4	6293.3	7675.3	1.22
GAPS95	862.7	59688.8	11029.4	14229.8	1.57
GFDI85	–430	5480	745	1300	1.74
GFDI95	4	23700	5280	7050	1.34
GNIF85	–2900	8230	–560	2260	4.04
GNIF95	–15000	19000	–1500	6410	4.27
GTRD85	34.8	160.8	78.4	34.4	0.44
GTRD95	43.3	140.3	72.9	27.6	0.38
$SCO_2$85	322	152535	35754.2	42862.9	1.21
$SCO_2$95	471	147964	35501.9	40526.7	1.14
SGDP85	2.01	719	169	221	1.31
SGDP95	3.83	949	236	296	1.25
SUNE85	0.9	21.6	8.2	5.4	0.66
SUNE95	2.6	22.9	9.1	4.9	0.55

investment net inflows and net income from abroad, respectively. The ascending order of variability, based on coefficient of variation, among sustainable development indicators was for unemployment, CO_2 emission and GDP, respectively. The least variability was observed for globalization indicator for trade as percentage of GDP. The largest variability was observed for net income from abroad.

Multivariate Analysis

To develop an understanding of the interrelationship among the observed values for indicators, pairwise correlation analysis was performed for individual years. The results for years 1985 and 1995 are presented in the Table 3. For significantly correlated matrix entries, all the sustainable development indicators were positively correlated with civil aviation passengers carried and foreign direct investment net flows. Desirably, only GDP should have been positively correlated with civil aviation passengers carried and foreign direct investment net flows indicators. Furthermore, for significantly correlated matrix entries, all the sustainable development indicators, CO_2 emission, GDP and unemployment, were negatively correlated with globalization indicators of net income from abroad and trade. Desirably, only CO_2 emission and unemployment indicators should have been negatively correlated with net income from abroad and trade indicators. Correlation coefficients are unable to capture non-linear relationships among indicators, and some of the non-significant, NS, entries of the matrix are due to this situation. For statistically significant correlations of Table 3, at a significant level of 5%, the observed linear relationships among sustainable development and globalization indicators do not always look very promising. Sustainable development would have been more achieved if CO_2 emission and unemployment indicators were found negatively correlated with globalization indicators. Furthermore, sustainable development would have been more achieved if GDP were found positively correlated with globalization indicators.

Table 3: Results of Correlation Analysis

	GAPS85	*GFDI85*	*GNIF85*	*GTRD85*
$SCO_2$85	0.76	0.72	NS	–0.49
SGDP85	0.91	0.78	NS	–0.44
SUNE85	0.34	0.39	–0.38	NS
	GAPS95	*GFDIS95*	*GNIF95*	*GTRD95*
$SCO_2$95	0.83	0.65	–0.31	–0.42
SGDP95	0.88	0.73	–0.37	–0.41
SUNE95	NS	NS	–0.42	NS

Evaluating the correlation matrices showed that there were some undesired significant correlations among sustainable development and globalization indicators. To develop an understanding of individual country's relationship between sustainability and globalization issues for each of the selected countries, the elasticity of sustainability characteristic of countries with respect to that of globalization were studied. It should be noted that elasticity is generally used with a demand curve where there is a direct relation between price of a commodity and quantity demanded. However, elasticity is able to reflect another aspect of relative behaviour of a variable with respect to another, and that is the extent to which two variables have been changed accordingly. In other words, the elasticity can be an indicator that measures the harmony and conformity of changes between those pair of variables. The elasticity E of a variable Y with respect to a variable X in a period starting at $t1$ and ending at $t2$, reflects the percent variable Y changes with respect to one percent change of the variable X during the period. Equation 1 shows the arc elasticity of two variables.

$$E_{Y/X,\,t1-t2} = \frac{\left[\grave{Y}_{t2} - Y_{t1}\acute{}\,/\,\grave{Y}_{t2} + Y_{t1}\acute{}\right]}{\left[\grave{X}_{t2} - X_{t1}\acute{}\,/\,\grave{X}_{t2} + X_{t1}\acute{}\right]} \qquad (1)$$

where $E_{Y/X,t1-t2}$ is the arc elasticity of variable Y with respect to variable X during the period $t1$ to $t2$. The elasticity of three sustainable development indicators with respect to four globalization indicators resulted in 12 arc elasticities for each country for the period of 1985 to 1995. For sustainable development, positive values were found desirable for four elasticities of $E_{SGDP/GAPS,t1-t2}$, $E_{SGDP/GFDI,t1-t2}$, $E_{SGDP/GNIF,t1-t2}$ and $E_{SGDP/GTRD,t1-t2}$. Furthermore, negative values were found desirable for the eight elasticities of $E_{SCO2/GAPS,t1-t2}$, $E_{SCO2/GFDI,t1-t2}$, $E_{SCO2/GNIF,t1-t2}$ and $E_{SCO2/GTRD,t1-t2}$, $E_{SUNE/GAPS,t1-t2}$, $E_{SUNE/GFDI,t1-t2}$, $E_{SUNE/GNIF,t1-t2}$ and $E_{SUNE/GTRD,t1-t2}$.

The observed arc elasticities for the period of 1985 to 1995 for the selected countries are shown in Table 4. The last row of the table shows the desirable signs and countries were appraised accordingly. Sweden and United Kingdom elasticities have all desirable signs. Cyprus, Ireland, Spain and Turkey have eight elasticities out of 12 with desirable signs. Austria, Belgium, France, Hungry, Malta, Netherlands, Norway, Portugal and Switzerland have seven elasticities out of 12 with desirable signs. Bulgaria, Greece, Iceland and Poland have six elasticities out of 12 with desirable signs. Finland, Israel and Italy have four elasticities out of 12 with desirable signs. These results are dependent to the selected indicators. As they are not unique or standard, the conclusions have more methodological value. Based on the selected indicators and countries, for the period of 1985 to 1995, the globalization and sustainable development were not always in harmony. Using desirable signs, Table 5 shows the ranking of each country with respect to the environmental, economical and social indicator elasticities. Each country can be in one of the 100%, 75%, 50%, 25% and 0% sign desirable categories, respectively.

Combining different system characteristics in an overall performance measure could provide a composite appraisal measure. For each country for the study period of 1985 to 1995 and the selected elasticities, a composite elasticity index, CEI, was developed. Firstly, the Z score of each elasticity, ZE, was computed by the following equation:

$$ZE_{Yi/Xj,\,t1-t2} = \frac{\grave{E}_{Yi/Xj,\,t1-t2} - ME_{Yi/Xj,\,t1-t2}\acute{}}{SE_{Yi/Xj,\,t1-t2}} \qquad \text{for } i = 1, 2, 3,\ j = 1, 2, 3, 4 \qquad (2)$$

where $ZE_{Yi/Xj,t1-t2}$ is the Z score of the $E_{Yi/Xj,t1-t2}$, $ME_{Yi/Xj,t1-t2}$ is the mean of $E_{Yi/Xj,t1-t2}$, $SE_{Yi/Xj,t1-t2}$, is the standard deviation of $E_{Yi/Xj,t1-t2}$, for $i = 1$ to 3, and $j = 1$ to 4. The reason for computing the Z scores of the elasticities is to make different elasticities comparable. Because indicator values will be used only to find the relative situation of countries, the transformation of elasticity values to their relevant Z scores will not change the results of computations. Secondly, the composite index for elasticities of Yi's with respect to Xj's was computed by the following equation:

$$CEI_{t1-t2} = \frac{\grave{\Sigma}\, k \cdot ZE_{Yi/Xj,\,t1-t2}\acute{}}{12} \qquad (3)$$

where CEI_{t1-t2} is the composite elasticity index for the period $t1 - t2$, and k is a factor that equals +1 for those elasticities with desirable positive sign, or –1 for those elasticities with desirable negative sign. If unequal

Table 4: Arc Elasticities for the Period of 1985-1995

Countries	*SCO_2/ GAPS*	*SCO_2/ GFDI*	*SCO_2/ GNIF*	*SCO_2/ GTRD*	*SGDP/ GAPS*	*SGDP/ GFDI*	*SGDP/ GNIF*	*SGDP/ GTRD*	*SUNE/ GAPS*	*SUNE/ GFDI*	*SUNE/ GNIF*	*SUNE/ GTRD*
Austria	.11	.08	.13	–8.7	.36	.27	.41	–28.	–.30	–.23	–.34	23.9
Belgium	.06	.03	.01	–.66	.35	.17	.02	–4.2	–.26	–.12	–.02	3.09
Bulgaria	.51	–.21	–.28	–2.4	.06	–.03	–.03	–.28	–2.1	.89	–1.46	4.27
Cyprus	.76	.73	.20	2.11	1.35	.51	.23	7.91	–.36	–.34	–.35	–10.2
Finland	.14	.04	.06	.45	.39	.12	.16	1.21	2.05	.63	.84	6.31
France	–.27	–.06	–.14	1.84	.73	.17	.36	–4.9	.34	.08	.17	–2.28
Greece	–1.1	.29	.11	–10.	–1.1	.29	.11	–10.	–1.1	.30	.12	–10.7
Hungry	–2.3	–.18	–.53	4.42	.13	.01	.03	–.25	–6.5	.71	3.05	6.00
Iceland	.29	–.07	.24	–.57	.74	–.18	.60	–1.4	4.05	–.97	3.26	–7.79
Ireland	.20	.14	.19	1.43	.49	.35	.46	3.52	–.31	–.22	–.29	–2.21
Israel	.83	.29	2.89	–2.4	.91	.33	3.2	–2.6	.05	.02	.16	–.13
Italy	.28	.11	.10	1.38	.54	.21	.19	2.65	.31	.12	.11	1.53
Malta	.40	.23	–.57	2.5	.66	.38	–.95	2.61	–.82	–.47	1.17	–5.2
Netherlands	.06	.04	.03	–.39	.35	.21	.15	–2.1	–.45	–.27	–.2	2.70
Norway	–.46	–.09	–.49	2.1	.61	.11	.64	–2.8	1.16	.21	1.22	–5.25
Poland	–6.4	–.14	.23	–.76	3.54	.08	–.13	.43	6.92	.36	–.51	10.38
Portugal	.78	.60	–.28	15.9	.56	.43	–.20	11.4	–.27	–.21	.10	–5.54
Spain	.37	.19	.23	2.61	.64	.34	.40	4.54	.11	.06	.07	.78
Sweden	–1.4	–.16	–.25	–3.2	.88	.10	.16	2.13	4.23	.49	.79	10.2
Switzerland	–.05	–.02	–.03	.14	.48	.21	.25	–1.3	2.61	1.12	1.35	–7.07
Turkey	.37	.23	.31	1.57	.47	.30	.4	2.04	–.51	–.32	–.42	–2.17
United Kingdom	–.04	–.02	–.01	–1.5	.40	.23	.01	14.3	–.44	–.26	–.01	–15.9
Desirable Sign	(–)	(–)	(–)	(–)	(+)	(+)	(+)	(+)	(–)	(–)	(–)	(–)

Table 5: Taxonomy of Countries with Respect to Three Sustainability Dimensions

Desirable elasticity sign	*Environmental sustainability*	*Economical sustainability*	*Social sustainability*
100%	Sweden, United Kingdom	Cyprus, Finland, Ireland, Italy, Spain, Sweden, Turkey, United Kingdom	Cyprus, Ireland, Spain, Sweden, Turkey, United Kingdom
75%	Bulgaria, France, Hungry, Norway, Switzerland	Austria, Belgium, France, Hungry, Israel, Malta, Netherlands, Norway, Poland, Portugal, Switzerland	Austria, Belgium, Malta, Netherlands, Portugal
50%	Greece, Iceland, Poland	Greece, Iceland	Bulgaria, Greece, Iceland
25%	Austria, Belgium, Israel, Malta, Netherlands, Portugal	Bulgaria	France, Hungry, Norway, Poland, Switzerland
0%	Cyprus, Finland, Ireland, Italy, Spain, Turkey		Finland, Israel, Italy

weighting for elasticities are desirable, equation 3 should be modified accordingly. Table 6 shows the *Z* scores of *CEI* sustainability with respect to globalization for the period of 1985-1995. Countries in ascending order of *CEI Z* score are Finland, Iceland, Switzerland, Austria, Sweden, Hungary, Portugal, Poland, Italy, Norway, Belgium, Cyprus, Bulgaria, Israel, France, Spain, Greece, Netherlands, Malta, Turkey, Ireland, and United Kingdom.

Table 6: Ranking of Countries

Country	*Z score of composite elasticity index*
	1985-1995
Finland	–4.52
Iceland	–4.40
Switzerland	–3.90
Austria	–2.39
Sweden	–2.36
Hungary	–1.34
Portugal	–1.20
Poland	–1.17
Italy	–0.45
Norway	–0.26
Belgium	–0.10
Cyprus	–0.03
Bulgaria	0.07
Israel	0.36
France	0.64
Spain	0.66
Greece	0.70
Netherlands	1.18
Malta	1.59
Turkey	1.94
Ireland	2.78
United Kingdom	5.66

Conclusion

The study addresses globalization and sustainable development issues and interrelationships for 22 European countries, for the period of 1985 to 1995. The selected national indicators were neither standard nor unique; nevertheless they reflected the basic dimensions of sustainable development and globalization. The univariate and multivariate statistical analyses of the indicators showed interesting results and relations between globalization and sustainable development. Elasticities of sustainable development indicators with respect to globalization indicators were studied. For some countries, the elasticity appraisal showed globalization parallel and in harmony with sustainable development. For others, the evaluation did not indicate a promising period. The study confirmed the significance of the globalization and sustainable development balancing challenges. Although the study findings are based on the selected indicators and cover limited database time and geographic scopes, the methodology can be applied to other indicator sets and/or other scopes for determination of the involved issues. The study thus is of more methodological value than quantitative results.

Acknowledgement

The authors wish to thank the Sharif University of Technology and International University for providing partial funding for this study.

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