ENVIRONMENTAL DISRUPTION: IMPLICATIONS FOR ECONOMIC PLANNING*

UDO ERNST SIMONIS

I. THE PROBLEM

THE AIM OF THIS article is to critically examine existing approaches to national and regional growth policies and to show the necessities for (and possibilities of) a methodological re-orientation of national and regional economic planning—without trying to give a complete statement of all the relevant implications.

The immediate motives for this study are practical as much as theoretical problems: On the one hand the environmental disruptions and decreasing quality of life we experience in the pursuit of economic growth, and on the other hand the index- or flow-problem of economics.

In a noteworthy article written in the middle of the sixties it was said that the dilemma of (regional) economic policy consists in the fact ". . . that it does not know the way to reach its goals" [15, p. 21]. Seen from the viewpoint of the beginning seventies it becomes more and more clear that the dilemma is more complex: national and regional economic policy neither seems to know the way towards its goals nor does it know the right aims as such. The following hypotheses shall be the basis for our argumentation: Negative external effects are not accidental or negligible, they are substantial and inherent to modern economic processes and thus force one to re-evaluate national and regional economic growth; especially in the face of the nature and magnitude of environmental disruptions occurring in highly agglomerated industrial regions, the traditional methods of measuring and optimizing economic efficiency through economic units or subsystems of the economy seem to become doubtful. This again may lead to a shift of significance from flow to stock variables in theory as well as in practice. Furthermore, the question will be put forward whether modern national and regional growth policy does offend against social principles and those of long-term national and regional development rationality and whether or not it can give preference to economic claims instead of social and individual rights, because the "ability to compete" seems to play a central securing function for the future.

To start with an example which seems to be extremely unrealistic at first glance: let us suppose that there are two regions, A and B, having exactly the same eco-

* This paper was prepared while the author was sponsored by a fellowship from the Japan Society for the Promotion of Science. The author would like to thank this society and members of the Faculty of Economics, University of Tokyo, and of the Institute of Developing Economies, Tokyo, for many suggestions and valuable help.

nomic and social structure, industries, distribution of income, number of unemployed. Let us say that each one has ten people unemployed. We then introduce an assumption that there is a Region C nearby which has plenty of mosquitoes which have not yet spread to Region A and B. While in Region A those ten unemployed keep on trying their best to find a job by frequenting the employment exchange, in Region B the ten unemployed, we assume, get together one day and discuss what they as a group might be able to do by themselves. There is one shrewd among them who proposes the idea to borrow money from the bank and while two of them travel to Region C in order to catch mosquitoes and bring them back, the others should set up a factory manufacturing mosquito-nets and fly swatters.

They all vote affirmatively and immediately proceed with the plan. Mosquitoes are brought in and spread all over Region B. Citizens start to complain, but, fortunately, mosquito-nets and fly swatters are at hand on the market, alleviating the annoyance and satisfying the increasing monetary demand: Income in Region B is growing, unemployment disappearing.

If we would ask the traditionally educated economist to evaluate this case and compare Region A and B, we can be sure that he would conclude with the following: The inhabitants of Region B have become wealthier and are better off than those of Region A; total income and income per capita have shot up—the acknowledged indicators for economic welfare have increased. But, can we really say that the net welfare of Region B is higher now than that of Region A?

This example[1] (perhaps we should have taken an industry producing air pollution) may make clear two problems which economic planning has to deal with more intensively than it has done up till now: the over-emphasis on income instead of welfare aspects of economic growth, and the negligence of stock-variables when formulating and evaluating economic goals. This overemphasis, and especially the negligence, seem to have strongly impeded the creation of a solid platform for an environment-oriented economic policy.

II. INCOME VERSUS WELFARE

When checking the economic research work and discussions of the postwar period one will easily observe a shift of emphasis from trade cycles towards structural problems, and in the last few years towards various problems of infrastructure—one only can hope that in the future more emphasis will be put on the problems of the human environment. It is obvious, however, that basic concepts of economics, mainly the income-concept, especially the system of national and regional accounts, still seem to remain unchanged.

In a newly published second edition of a book on regional economics it is said: "By regional development we will understand the long-lasting increase of one variable of a subsystem of the economy. Development will be used synonymously with growth and expansion" and "... growth means the increase of the output of the

[1] For more illustrative examples, see [34, p. 238].

region" and, furthermore, ". . . to measure economic growth the regional income-concept will be applied" [29, p. 5]. Whereas nobody denies the regional indefiniteness of a decentralized system of decisionmaking—which led to the demand for regional planning in market economies—a one-dimensional "regional growth policy" or a "growth oriented regional policy" is proclaimed notwithstanding the fact that substantial problems of the given regional economic structures happen to result from an only "too" successful growth policy. Gross National Product (GNP) and National Income, or the increase of these figures (economic growth), could be esteemed to be a relatively simple and indisputable economic concept at first glance, but this no longer is true when scrutinizing it.

To identify the GNP and income (National Product, net or gross, valued at market prices or factor costs, at current or constant prices, per capita or per employee etc.)[2] of a nation (or region) with economic welfare seems to be a fixed part of economic reasoning. Until recently, almost no economists doubted this assumption,[3] let alone practical economic policy. In other words, the income-concept is used to measure economic welfare, the success of economic actions, and is regarded as the ultimate goal of economic policy. Whether one looks at the level of private households, enterprises, or the regional or national government, one always will find the same assumption: the higher the income, the higher the welfare (at least up to the point, where the appreciation of more work and more leisure is balanced). This basic assumption can no longer be accepted uncritically—as we have to prove—if economists want to come to more realistic plans on all levels of economic activities.

The Gross National Product or National Income concept is a measure for those goods and services coming to the market and having (positive) prices, and for the so-called imputed income. It does not count those "goods" and "services" which do not have a market price, are not imputed or are the by-results of production and consumption processes (the *disproducts*).

Additionally, this concept takes the realized allocation of the resources as given; opportunity costs are not allowed for, and differences in quality are recognized only and so far as they result in price differences; the actual market- and power-situations concealed by those prices (and which can be very different from one period to the other and from region to region) are not taken into account. In its traditional shape the National Product concept indicates "how much" of "which" product or "which service" was purchased by "whom" within a certain period. It does not indicate, however, "why" it was done and "how well."[4]

The concept thus is based on the traditional economic analysis and the scheme of circular market-flows of goods and services valued at market prices, adjusted more or less adequately in the case of durable consumer goods and public goods. Since market transactions are in reality only a part of all transactions within an

[2] For the official definition of the concept in question see, e.g., [32, p. 498], and p. 23 of the index of literature in the same volume.

[3] An important exception is E. J. Mishan [23] [24].

[4] More about this is to be found in [27].

economy, and since those flows and effects realized outside established markets are not taken into due consideration, the aggregated National Product (per capita or as a whole) cannot be an adequate or satisfactory index for national (or regional) economic development. This becomes more true, the more environmental disruptions are absolutely and relatively increasing.[5] In other words: We may register high growth-rates of the GNP without at all recognizing environmental disruptions, which very often have accumulated at an alarming rate.

The following empirical examples may further illustrate the weakness of the GNP concept: First, it may be recalled that the level of the National Product of a nation (or region) can be influenced by actions which have no connection whatsoever with the proclaimed economic goals. As an example we may cite the story of the professor who, after having enjoyed his bachelorhood for a long time decides to marry his housemaid, thus decreasing the GNP of his hometown subsequently because non-paid housework does not—ex definitione—contribute to the GNP.

Rapid economic growth is more often than not accompanied by an accelerating urbanization process because of the sectoral structural change, i.e., labor moving out of agriculture into industries and services. The modern city, however, will become more and more expensive, since the land prices are rocketing and since a growing city demands large infrastructural investments (cf. [30, pp. 107–24]). One can assume that these costs will become even higher in the future if life in a city shall not only be bearable but the quality of life be improved.

Other problems are not as obvious as those mentioned above. It is possible to increase the GNP of a nation (or region) not merely by increasing net production (which has to meet all costs involved) but also by wasting and exhausting the natural resources. As long as noise, dirt, waste, and traffic congestion are not valued as disproducts (and consequently do not get a negative price), production and consumption which result in more noise, more dirt, more waste, and more traffic congestion will serve to increase the GNP-index. In the extreme one may postulate: maximizing the growth rate of the GNP means maximizing the growth rate of environmental disruptions.

Furthermore, there is the problem of infrastructure. Investments in the infrastructure sometimes need a long time before becoming profitable. The decision to decrease (or to hold constant) the expenditure for schools, hospitals, subways, and kindergartens and to invest instead into the so-called direct-productive sectors,

[5] The Federal Republic of Germany is polluted yearly by approximately 3.4 to 8 million tons of sulphur dioxide (the biggest part of which is produced by the energy supply system), approximately 4.5 to 5 million tons of carbon monoxide (80 per cent of which are produced by the automobile); the water is polluted by more than 8 million tons of inorganic substances (35 per cent of which are produced by the chemical industry, 30 per cent by coal mining industry, 10 per cent by the automobile). In the big German cities the average number of particles per ccm of air is more than 100,000, while in the small and medium cities it is "only" between 15,000 and 30,000. In 1970, the famous Rhein River at the border to Holland was polluted daily by about 40,000 tons of salt, 16,000 tons of sulpur, 2,300 tons of nitrates, 560 tons of ammonia, 300 tons of ferricoxide; additionally, arsenic, mercury, lead and 2,650 tons of organic substances could be found. Cf. [5].

will generally increase (at least in the short run) the GNP; but will this also increase the welfare of the people? Last but not least, economic policy will be "growth-conscious" in the old sense when it tries to steer investments mainly into production-oriented infrastructure (transport, energy) instead of welfare-oriented infrastructure (education, environmental protection, housing).[6]

These examples were chosen to show that the applied system of measuring the outcome of the economic activities of enterprises, of private households, the public sector (city-, regional-, or national-administration) or of the nation as a whole is incomplete and inadequate:

—Because it does not comprise all the relevant costs and benefits stemming from the production and consumption processes.

—Because those costs and benefits really included are counted incorrectly (not all money-votes on the market contribute to the welfare of the people, and to the same degree).

The methodological problems discussed so far lie in the assumption on which the income-concept is based: that the negative external effects are not considerable, that consumers' sovereignty is given and that distortions in the enumerating system are negligible. It denies the fact that the sequences of decisions—from the consumer to the market to the producer—may be reversed, and assumes that the consumer can escape air pollution, etc. In other words: It is thought that the "costs" and "benefits" realized in a given situation are equivalent to *real* inputs and/or outputs respectively, and that only those actions are relevant which can be measured in monetary terms ("measuring rod of money," A.C. Pigou).

III. ECONOMIC GROWTH AND HUMAN ENVIRONMENT

Environmental disruptions will be a good example to show the problems resulting from the assumptions mentioned above, which modern economics has to deal with. Differences in the magnitude of environmental disruptions exist in regions having reached different levels of economic activities, populations, degrees of urbanization, geographical and climatical conditions; i.e., the reasons for environmental disruptions are manifold and cannot be studied by social scientists alone.[7] One thing,

[6] Cf. [10, p. 1306], Lecture on the so-called economic city, on the occasion of the Deutscher Städtetag 1971, partly reprinted in: *Die Demokratische Gemeinde,* Vol. 23, No. 12 (1971). "The crisis of the economic city is, that . . . the growth-rate is the most important criterion applied; everything increasing the growth-rate of the GNP, of consumption, of profits is done and must be done; on the other hand, everything which may decrease the growth-rate is bad and is not to be done. This can be proved very easily when studying the competition between several possible utilizations of one and the same real estate: in general the form of utilization will be chosen which guarantees to be the most profitable one. . . . Our system does not produce for the real needs of society. On the contrary, it concentrates on those spheres where high growth-rates and high rates of profit can be expected, thus reducing the possibilities to invest into public services and utilities on which in reality the quality of life is based upon."

[7] A very good introduction to the problem from a socio-economic point of view can be found in [34].

however, seems to be clear: Environmental disruptions are much more a consequence of chosen goals and actual behavior than of the formal distribution of property; the differences between the economic systems (and subsystems) realized up to now seem to have no great relevance with regard to the actual environmental disruptions. (This is not to be confused with the possibility of controlling or eliminating them.) (See also [4, p. 150].) The apparent similarity of the environmental problems may bring home the feeling that in both the systems of capitalism and socialism there is only little knowledge of how and why environmental disruptions occur, or that in both systems a seemingly low value is given to the *quality* of the environment while a fairly similar high priority is given to quantity and economic growth (the growth rate of the economy).

This means that external effects within a certain region will be found in the market sphere (private sector) as well as in the sphere of organized contacts (public sector). These external effects can be positive *or* negative. Both have been well known to economic theory for a rather long time. However, they have been assessed completely asymmetrically. While the *positive external effects* gave the foundation for establishing the infrastructural theory and policy, the *negative external effects* could become the theoretical base for planning environmental quality and protecting the social and natural environment.

In practice, there are very many negative external effects, as has been shown by K. W. Kapp and others:[8] Air and water pollution, noise, land subsidence are only those discussed most intensively in public. Disruptions of this kind could generally be called a "depreciation" of the stock of natural resources. Here, however, we shall refrain from using the word ecology; to put too much emphasis on this concept could divert the attention from a multitude of other social costs, which lie in the personal and social sphere (e.g., accidents, inadequate housing conditions, high rents in highly concentrated areas, monopolistic determination of land prices), thus concealing the social and political dimensions of the problems in question. To avoid this, environment shall be defined here as the natural and constructed environment as well as the social environment of man. Environmental disruption thus can be understood as the result of actions which may be quite rational within a given system of economic goals and a given institutional framework but which can lead to a destructive *social irrationality* because backwash effects on the natural, constructed and social environment have been ignored or forgotten. The result will be an inefficient allocation of resources in the sense that social values are sacrificed or not fully realized.

As was mentioned above, in the system of measuring costs and benefits of economic actions, negative external effects are not integrated or not fully appreciated. Producers, consumers, city and state administrations do not get the bill (or at least

8 [18] [11]. Concerning German cities cf. [28]. Concerning Tokyo and other big cities, Robson stated: "It is true that no other great city has grown at so fast a rate as Tokyo in the post-war years.... Observation shows, however, that the world's largest cities are facing the most difficult problems and that it is no longer true that the bigger a city is the better will be the conditions of life of its inhabitants" [26, p. 9].

not the correct one) for the damages they are causing.[9] Since they are quite often in hard competition for products, factors of production and locations, they are not able or not willing to take over the responsibility for these negative external effects voluntarily. In this connection one has to point out again that there often is no great difference between the actions of a private entrepreneur and of the public sector. Whenever communities or public planning agencies try to attract enterprises in order to increase their tax yield as much as possible, the danger of worsening environmental quality can be duly anticipated. Very often the reasons for the actions of a public agency can thus basically be identical to those of private entrepreneurs: They try to produce or to collect taxes profitably—both apply similar monetary criteria to measure their efficiency. Communities as well as enterprises try to get a formal solvency and tend to ignore the social costs of their actions which more often than not have to be borne mainly by the following generation (cf. [16, pp. 257–69] [17, pp. 39–44]). K. W. Kapp describes this growth orientation as "partial rationality" and concludes, that ". . . public agencies themselves are drunk in the glory of GNP-ism" [20, p. 483].

A number of consequences arise from the actions taken in both systems (in the market sphere and the sphere of organized contacts). There is, first, a factual "preference" for environment-disrupting methods of production, products, and methods of distribution, because quite generally they are the cheapest alterative, the combination of priced variables, available. To quote Wassily Leontief: "The profit-maximizing producer can be expected to adjust the magnitudes of all the non-priced variables in such a way as to attain an efficient relationship between the quantities of the priced variables" [22]. What we thus find is a *shortened production function* which depicts certain pre-selected efficient relationships between priced variables, rather than describing all possible combinations of all relevant (priced and non-priced) variables. If the originator would get the bill for all the damage he is causing, the selected methods of production and the products too, surely would often have been most expensive ones. In other words: A consequence of socially wrong decisions made by producers, consumers and the state is that the prices of the goods and services, the manufacturing, distribution, and consumption of which includes environmental disruptions, are too low compared with their socio-economic costs. This, in turn, may generally stimulate the production and consumption of those goods in such a way as to increase environmental disruptions accumulatively.

Additionally, there is another effect, the importance of which has been underestimated so far. There is no, or no sufficient economic incentive to develop *new* environment-friendly methods of production and products—i.e., to act preventively —as long as the old methods and goods can be produced relatively cheaper, which means that the "output mix" is one main reason for environmental disruptions.

[9] E.g., as long as we allow for air pollution through sulphur dioxide we can anticipate that heating oil with a high content of sulphur will be produced because this method of production is much cheaper from a business point of view than to introduce new methods which reduce the output of sulphur.

Furthermore, as long as research activities concentrate on those results which do "function" or are "saleable," this research so far has not and will not bring forward enough new techniques and products with a low pollution effect. To change the "input mix," therefore, is another important aspect of the mechanisms which are detrimental to the environment.[10]

We may conclude from what was said above, that to question the usefulness of the National Products- and Income-concept as a criterion for measuring economic development and as a crucial goal of economic policy seems to be overdue. "The day of the GNP is over. . . ." says J. Kenneth Galbraith [1]; at least it should be reexamined, and the narrow industrial imperative, "increase of the standard of living," be corrected or replaced by the more human concept of "quality of life and environment."

Some important critiques (and conclusions for modern economic policy) shall be summarized here:

—To increase the GNP does not necessarily or reliably mean to increase the welfare of the people; it is quite possible that this index shows an increasing tendency while welfare does not develop in a positive sense. In the extreme, it is even possible that the GNP increases while welfare decreases.

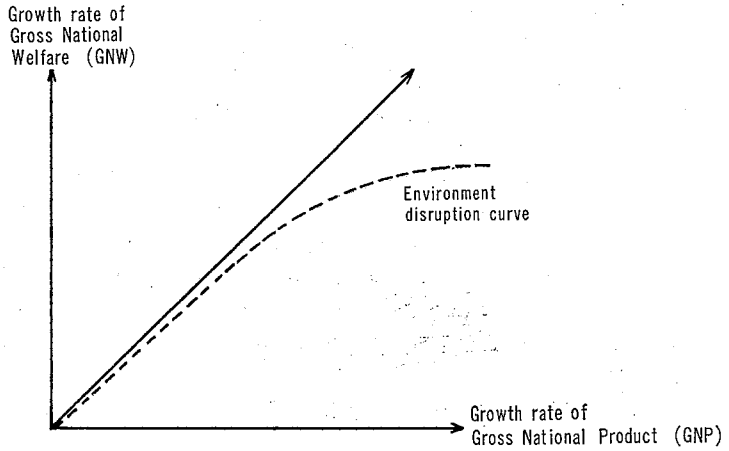
—On a higher stage of economic activities the structure of the GNP becomes relatively more important, the needs of the population become more "public needs." To allow an unqualified or unconditioned growth of GNP may generally mean a worsening of the distribution of resources between public and private goods; the gap between "public poverty" and "private wealth" may thus be further widening.

—Environmental disruptions are fundamental and immanent to the production and distribution process as long as they are not integrated within the national and the private accounts. Due to the internal accumulation mechanisms (overburden and break-even phenomena) environmental disruptions increase over-proportionally with increasing rates of growth of the GNP, thus decreasing its welfare significance (see the following diagram and compare with the text below).

So far we may conclude the following: The outcome of a growth policy which is guided by only inadequate and deficient indicators (as the National Product or National Income) in the end may reveal itself partly as a pseudo-growth when analyzed carefully. Increases in GNP and income may ensue not only from an increase of net-production but at the cost of the natural, constructed, and social environment.[11] A growth policy under the given conditions pursuing the maximization of the growth rate of GNP runs the great risk of:

[10] We refrain strongly from asserting that everything is feasible from a technical point of view. In reality we have more than enough examples where the substitution of an environment disrupting technique by a more environment conserving technique only leads to new and unknown disruptions: atomic power stations instead of the traditional ones; detergents used for the destruction of oil-wastes, etc. Cf. [16, p. 266].

[11] In Germany, about 54 per cent of the GNP is produced in the highly concentrated regions which comprise only 13 per cent of the whole area of the Federal Republic of Germany and 43 per cent of the whole population, as Rhein-Rhuhr, Rhein-Main, Rhein-Neckar and the cities of Bremen, Hamburg, Hannover, Munich, Stuttgart, and Nuernberg.



—a diminishing welfare relevance of its own results,
—a generally worsening provision of infrastructure (especially welfare-oriented infrastructure),
—over-agglomerating industries and population (stabilizing traditional structures),
—increasingly polluting the environment or neglecting the quality of the environment,
just to name the most obvious of all the possible consequences.[12] Does this support the critic who said, that "economic growth renders many things obsolete, and one of them is economic theory"?

If those deficiencies and their outcome mentioned above are indeed considered to be grave, then we will have to look for new ways and means to overcome this dilemma. Economic planning in its present form barely seems prepared to take over this task (particularly because it was and still is mainly concerned with *growth* in the traditional sense of the word). However, one has to be aware of the fact that the need is more fundamental than merely to scrutinize existing economic theorems and to replace them with new ones. Here, we shall refrain from checking in detail the usefulness of the applied instruments of practical economic policy or from asking how to promote a general "environment-consciousness" or how to institutionalize an "environment-conscience" in the public agencies (cf. [6]) in order to save time and space for inquiring in which direction methodological treatment of the goal-problem may or should be developed, when sensible orientations and data are looked for.

IV. SUPPLEMENTARY AND ALTERNATIVE APPROACHES

One of the necessary conditions for integrating environment-oriented considerations into economic and regional policy seems to be clear: Strictly speaking we have to

[12] These critiques are not directly concerned with the fact that the GNP concept can readily be used for trade cycles policy, since it may provide for rather reliable statements on the effective demand displayed on the markets, i.e., the actual state of business.

internalize the negative external effects of economic activities or we have to eliminate them. In other words, the pollution of the environment has to be considered as social costs which have to be integrated into the cost-benefit-statements of private and public institutions. Cost-benefit-statements have to become more accurate.

To internalize or to eliminate the negative external effects from the beginning seems, however, to be easier said than done. To use the "originating principle" (*Verursachungsprinzip*) in the field of environmental disruptions by forcing the originator to liquidate or minimize them is applicable, in the given state of economic activities, only within certain limits. It would, for instance, make little sense to ask each and every car owner or house owner to reduce the degree of carbon monoxide or sulphur of the exhaust gases they produce; in this case it would be more effective (and less costly) to induce the producers of cars and petrol to develop clean engines and to sell petrol with only a low content of sulphur [25, p. 9].

Economists have suggested various instruments for protecting and planning the environment[13] as e.g., (1) regulations, licences, and prohibitions and (2) taxes and duties. But there remains the problem that these instruments will not be introduced in the near future or will be effective only in the long run. Therefore, a first (or supplementary) step towards effective environment protection seems to lie in the differentiation of the *concept of development* in individual, regional, and national planning—combined with the revision of the GNP or income concept as such.

A. *From "Growth" to "Development"*

On several occasions the United Nations has already requested the search for a new development-concept. The following quotation can be found in a report of 1962:

> Development is growth plus change; change, in turn, is social and cultural as well as economic, and qualitative as well as quantitative. It should no longer be necessary to speak of "economic and social development" since development—as distinct from growth—should automatically include both. A direct corollary of this new approach to development was that the purely economic indicators of progress were seen to provide only limited insight and might conceal as much as they indicate. [39, p. 2]

These considerations have not yet been generally accepted, even not within all the United Nations' suborganizations.

Less than one decade later another United Nations report enlarges the perspectives and attracts attention towards the existing environmental crisis, the decreasing quality of life and the aggression against the eco-system, thus becoming the starting point for the preparations of the World Conference on Human Environment in Stockholm, in 1972. This report says: "In planning and management of the human environment, emphasis is generally placed on economic criteria and on physical and quantitative aspects of the problems more than on qualitative and socio-cultural

[13] These instruments cannot be dealt with here. In order to get a deeper insight, cf. [14, p. 190].

aspects. This results in many large-scale developments, particularly in housing, which do not fully respond to legitimate human aspirations and social needs." Moreover, ". . . alternative development projects having different environmental consequences are rarely studied and economic choices are made with little reference to environmental consequences, particularly those of an ecological nature. This applies particularly to large-scale development projects in less developed countries" [40, p. 19].

However, a concretely new approach to planning has yet to be formulated, although the demand for differentiating the development concept has contributed not a few ideas to it.[14] Quite conceivable, on the other hand, is the suggestion made on how to determine the "degree of integration" of an economy or a region.

B. *"Degree of Integration"*

To revive the stuck discussion on economic goals and means Reimut Jochimsen in 1966 suggested [13, p. 15 et passim] to define "development" by two different features (although he has found only little help from the statisticians till now): (a) the "level of economic activities" and (b) the "degree of integration."

While the "level of economic activities" measures the amount of goods and services produced in the economy (or region) expressed in the GNP or in the GNP per capita (or employee), the "degree of integration" indicates the personal, sectoral, and firmsize deviations of incomes earned for comparable factor inputs (income differentials). The economy (region) would be "totally integrated" if there would be no income-differences for comparable inputs, or: the degree of integration would be *one*.

The main argument of this concept is that the "level of economic activities" and the "degree of integration" are interdependent but do not develop necessarily in parallel; it is possible that the level (a) is increasing while the degree of integration (b) remains low or is actually decreasing.

The weakness of this concept, however, is that even if the "degree of integration" would be *one* this need not automatically mean that the negative external effects involved are internalized or eliminated and allotted correctly. Furthermore, the GNP-concept is still adhered to. As long as the negative external effects are still existing or not strongly reduced it may be advisable to introduce an additional or alternative step: to revise the traditional GNP-concept (cf. [31, p. 460]).

C. *"Net National Welfare"*

The Gross National Product is, as has been indicated, an aggregation of only those goods and services having (or being given) a positive price. The aim is to correct this concept: The "bads" must be deducted from the "goods." To get a more adequate measure for the welfare of a nation or a region, to quantity welfare-oriented income figures, it seems advisable to label the negative external effects (disproducts) with negative prices and consequently to deduct them from the Gross

[14] Attention should be drawn to the research programs being undertaken by the United Nations Research Institute for Social Development (UNRISD) in Geneva.

National Product—i.e., to compensate for all or for certain environmental disruptions. It is easily agreed upon that it will be difficult to do so in statistical practice, since the market does not provide for exact or reliable prices (be it positive or negative ones), shadow-prices have to be brought in, and social cost-benefit-analyses to be carried out.

Such a new index (Gross or Net National Welfare index) means integrating and observing environmental values in economic and political activities and decisions.[15] To get to that point, the economist will have to agree to conventions which, however, is nothing especially new to him, as in the old concept he agreed on (other) conventions too.

One of the problems concerning this suggestion is that those deductions, under certain conditions being easy to compute on the micro-economic level, have to be "transferred" to the macro-economic level. How can one include air pollution, water pollution, congestions due to over-sized agglomerations, time losses due to traffic accidents, the current costs for obsolete infrastructures, the uglifying of cities, etc. within one concept which will then give a clue to a new welfare indicator?

One way to overcome this problem would be first to classify the disproducts known or agreed upon in accordance with certain standards or common characteristics. It should be clear by now that the economists would be excessively overburdened in doing this job alone: a multi-disciplinary approach is highly needed. Following Shigeto Tsuru one may classify the disproducts into five types via several auxiliary calculations [35]:

1. "Cost of Life"-type: Example: Commuting costs due to excessive urban sprawl and distance between living and working places; expensive burglar alarm and heating systems due to individual housing (S. Tsuru gives more examples for this type of expenditure).
2. "Interference of Income"-type: Example: The generation of income for otherwise dispensable goods and services which is made indispensable through a built-in institutional arrangement of the society concerned (J. A. Schumpeter believed part of the lawyers and real estate brokers belonged to an income-interfering profession).
3. "Institutionalization of Waste"-type: Example: Waste being institutionalized in such a way that less wasteful alternatives are deliberately kept out of the market (built-in obsolescences are legion, as popularized and analyzed by V. Packard, J. K. Galbraith, and T. Veblen).
4. "Depletion of Resources"-type: Example: Raising of the growth rate of GNP by ignoring the need for conserving renewable resources (K. W. Kapp time and again has covered these problems).

[15] Only to a certain degree can this be compared with the depreciation of stock deducted from the gross value of the National Product in order to get the net value. In our case the depreciation must be carried out to express the decumulation of social and natural stock (decumulation of capital), which will bring about not only a new net value but a completely new gross value (Gross National Welfare, GNW), where upon it will be possible to deduce for a new net value (Net National Welfare, NNW).

5. "Inefficiency of Dynamic Adjustments"-type: Example: Promotion of land-using industries in land-scarce regions due to inefficient adjustment to land-saving production.

When making use of this approach in practice we can easily conclude that all factors mentioned above have been and still are in force in industrial as well as developing nations and especially in highly agglomerated regions; they inflate GNP and the regional income but do not necessarily increase the welfare of the people. A similarly pragmatic scheme could as well be classified sectorally, by looking for the main hidden social costs in each sector of the economy: Agriculture—storing of overproduction, DDT-poisoning of food; Industry—exploitation and exhaustion of reproducable natural resources; Transport—time-losses due to accidents and traffic congestion; Urbanization—insufficient canalization, uglifying of cities, reduction of "green areas" within the cities, etc. When thus revising the existing GNP-concept, the traditional criterion of economic success, by establishing a system of more welfare-oriented social accounts, the advantages will be evident: Measures taken to improve the quality of the environment (environment protection) do not reduce the growth-rates of the newly defined welfare-oriented social product (the net national welfare). The traditional argument that "more environment protection will necessarily reduce the growth-rate of the economy" no longer would be valid; there would be no inherent antagonism between environment protection and the rentability of a given economic policy measure.[16]

Another actual problem of regional economic policy could thus also be revealed: The centrifugal discrepancies between highly agglomerated centers and depleting regions within one economy or one region can be attributed to a certain degree to inadequate cost- and benefit-calculations of production. In practice, the state very often is supposed to take over a considerable part (30 or even more per cent) of the total costs of new investments (as e.g., infrastructure, industrial estates, tax deductions, allowances) in those problem-regions—one variant of the well-known policy via subsidies, nowadays mostly given a more suggestive image and called "regional program," "regional action program," etc. But, if instead environmental costs in highly agglomerated centers would be allocated (fully or partly) to those who cause them, generally it would be more reasonable for them to move to less agglomerated regions, since the costs for environmental disruptions integrated in their cost-calculations would have the effect of increasing the prices of their end-products thus impairing their market position. A carefully differentiated scale of pollution-standards would mean a change in the conditions of competition—a fact which could be used much more positively in regional policy.[17]

We shall only briefly deal here with one more aspect of a revised system of social accounts: The excessive demand for a private good due to the gap between the total

[16] In this way, even within the context of traditional growth theory it would be worthwhile to draw of resources from industry to environment. Cf. [41].

[17] It makes little sense to demand for regionally homogeneous control standards in the face of highly unbalanced regional structures and the very different environmental problems from region to region; that would mean to renounce a politically useful and shaping instrument.

(social) and the partial (private) costs of production can, in turn, enormously stimulate the production of a public good. One can assume that such a relationship does exist between the demand for private cars and the supply of urban express-ways. (Investigating this phenomenon, the total costs of a privately owned car in Hamburg were estimated to be four times as high as the actual purchase price, e.g. a newly bought car costing $2,000 will create additional costs of about $6,000, the city-uglifying effects, etc. not being included because of the immanent difficulties of quantifying such effects.[18]

In order to guard the new concept against serious objections, the following should be kept in mind: To establish a new welfare-oriented income-concept does not mean that we can replace the stock of natural resources which were lost through environment exploitation (contrary to the reproducable stock of private capital). Therefore, of course, it is inevitable to combine this new macro-economic concept with new micro-economic behavior, with new motivations of production and consumption and with new environment-protecting technologies. To deduct disproducts from the traditional GNP is only the first but nevertheless necessary move towards conserving and protecting the stock of social and natural resources and for improving the quality of the environment, an alleviating step which can be arranged for to a large extent by economists.

D. *Social Stock Indicators and Qualitative Indicators*

Up to now we mainly dealt with income- or flow-variables, the domain of economics. Even after the re-orientation of economic research following J. Maynard Keynes, economists paid most attention to the explanation and forecast of flow-variables; stock-variables were hardly of interest. Investments and *not* the capital stock, national income and *not* the national property were placed in the foreground of economic studies. Stock-figures were mainly seen as fixed data (*Datenkranz*), not to be explained by economics (cf. [12, p. 401]).

This neglect of stock-variables is especially true for the social stock of the economy or region; the grown infrastructure is a "white spot in the map of economic research." This may partly be due to statistical problems. It is already difficult enough to evaluate stocks as such but it is even more difficult when qualitative factors play an important role, when the share of intangibles is large, when there is only a small chance to value at market prices or when this procedure is intolerable. No wonder then, that no satisfying determination of the social stock of an economy and region has been undertaken up till now. This implies that the next step in how to evaluate social stock and how to form an opinion on whether or not they are "sufficient," "good," or "bad" has to rely more on personal feelings than on well-founded knowledge. Therefore, national and regional political actions, and especially non-actions, very often depend largely on ignorance and only to a smaller degree on information. However, everybody who is called upon to plan has to refer to ideas about the necessary infrastructure. Since their own criteria are lacking the

[18] V. Vasarely once suggested to beautify grey cement with 2–3 per cent of gay colors, an idea which has been greeted favorably by not a few economists and city planners.

planners do resort very often to international comparisons (or to comparisons with higher developed regions which is formally the same). All those much discussed "gaps," as the "technology gap," the "education gap," the "communication gap," etc., are but statements about shortcomings within certain categories of infrastructure obtained through international (interregional) comparisons. One has to keep in mind, however, that these statements may conceal the fact that there are very different basic conditions in different countries (or regions) and very different goals pursued. Such criteria and standards used may thus easily be identified as being "dried-up prejudices" (R. Frey) and thus may contain the danger that mess and carelessness are projected into the future.

The main problem of the post-industrial society (and what is also to be concluded from new discussion of infrastructural problems) is no longer *how much* to produce but *what* and *how* to produce, e.g., the structure of production and mainly the relation between private and public goods (cf. [8] [9]). This, in turn, means that the structure and quality of the capital stock as such and its use will become more important in the welfare experience of the people. The exchange value will—out of necessity—cease to be the sole measure of the value of goods, in other words: ". . . the correspondence between the *physical* aspect and the *value* aspect in society's production becomes broken and the answers to the welfare problem have to rely more and more on the analysis of concrete, physical contents of any particular situation" [35].

What we need (besides revised flow-variables) are estimates and calculations of the accumulated social stock of the economy or region, in order to gain new goals for economic planning; we have to find *social indicators*, which can make economic planning more compatible and easier to co-ordinate. The new scientific task is to formulate a new "algebra of the society" (Kenneth E. Boulding).

We have to start, however, from the fact that although quite a few stock-variables can be expressed in monetary terms, it should become increasingly difficult to change nominal figures into real figures with the help of a normal price-index in the face of high inflationary tendencies, quick changes within the price-structure (e.g., land prices) and the rapid increase in the number of products. Furthermore, there remain a number of social stocks which can only be expressed in non-monetary standards (cf. [2]).

In this connection two aspects should be important: New social indicators should depict clearly and reliably the real living conditions of a region and their changes, and it should be possible to correlate them (via direct or indirect indices) with economic variables, in order to find out how to change the allocation of resources for finally increasing the level of the indicator in question. The first problem to overcome is the selection problem: *which* indicators should be chosen for economic and regional planning?

The following classification of stock-variables could be applied:
—"natural" stock (as water and air)
—"public" stock (as housing and transportation)
—"private" stock (as durable consumer goods)
—"personal" stock (as teachers, doctors, students)

—"cultural" stock (as cultural institutions)
—"socio-institutional" stock (as welfare institutions)

which, in turn, can be subdivided or comprehended into a *behavior sphere* and an *environment sphere*, as was done in the case of Japanese development planning.[19] The so-called *behavioral sphere* includes seven non-monetary indicators for nutrition, health, education, leisure and recreation, housing, safety, social security from, altogether, seventeen subindicators. The so-called *environment sphere* includes two non-monetary indicators for social environment and human environment arising from, altogether, eighteen subindicators.

Having chosen the indicators in question, the further problem is *how to aggregate them* or how much weight is to be given to each one of them. It seems that no satisfactory study on the importance of certain indicators has been carried out so far. This is largely because it is obvious that one must have a dynamic approach: While the number of hospital beds may be thought to be important in period one, it may be schools, public parks, or other leisure facilities in period two. Yet, it seems necessary, from what was said above, to get the weights needed not as ex-post figures from traditional income statistics, which may lead to simple projections but not to real ex-ante planning.

To find a (minimum) solution for these problems the reflections on *critical points of environmental quality*, on *existential minima, limits of tolerance*, and on *ranges of security* (zero pollution standards, life-quality standards, maximum population density, environment-neutral techniques) can be brought into the picture. Whenever these standards are over- or under-exceeded the evidence of *danger to environment* must be acknowledged. This procedure has been discussed in several of the reports concerning the United Nations Conference on the Human Environment in Stockholm, in 1972 or in the proceedings for the "Tokyo Resolution" [38] [33, p. 319] [37].

What is at issue here is to determine a sophisticated system of standards which shows from what point onwards the burdening of the environment has to be forbidden or reduced to a tolerable degree. It is obvious that this system of standards will have to be differentiated regionally. While, for example, a certain amount of sulphur exhaustion gases can be tolerated in a region with only a low degree of agglomeration of industries and population it may under no circumstances be allowed within highly agglomerated regions. This approach, we have to admit, may be only a modest answer to the environmental problems under discussion. Nevertheless, it has a great advantage against seemingly more formal criteria such as market prices.[20] Minimum standards which can be controlled scientifically may

[19] Cf. [21]; an English version may be found in *White Papers of Japan, 1969–1970*, ed. Japan Institute of International Affairs (Tokyo, 1971).

[20] Cf. [19, pp. 49–79]. Concerning the Civil Minimum Plan for Tokyo Robson said: ". . . this is a pioneering effort which deserves to be followed by similar plans both in Tokyo and other great cities. The Civil Minimum Plan deals largely with matters forming part of the physical environment, but the intention throughout is to give *human values* first place in the administration and planning of Tokyo Metropolitan Government" [26, p. 2].

bring about necessary information about actual constellations of social stock and about pre-conditions of how to save them, thus establishing the basis for a real ex-ante planning of the environment. They provide for the first outlines of a concept of *substantial rationality* concerned with specific needs of the people.[21]

Most of the indicators in use for economic and regional planning are of a quantitative and aggregated type; this is true for the GNP-concept as well as for some of the social indicators discussed above, such as the number of medical doctors per one thousand inhabitants. There are others, as for example the determination of literacy (which, at first glance, seems to be of no relevance for the problems in question). As is well known, this indicator does not show how many books or pages someone can read, but instead passes a no- or yes-judgment for each person concerning the "ability to read," being a qualitative measure.[22] More interesting than asking for the number of medical doctors (or of dwelling units, public parks, etc.) per one thousand inhabitants (1), may be to know (2) what percentage of the population in a certain region can expect reasonable professional help from competent doctors when needed, or (3) how big a percentage of the population is in good health. (Of course, methodological problems will arise when defining what "reasonable help," "competent doctors," and "good health" is.)

Let us assume that due to increased air pollution the disease-rate doubles within a region. The government may consequently decide to double the number of medical doctors in order to guarantee the same efficient medical treatment as was the case before the incident. The three indicators mentioned above will give three totally different results: (1) The first one tells that the number of medical doctors per one thousand inhabitants was doubled, a fact which appears to be a sign of progress; (2) the second one notes that a patient has the same probability of getting appropriate medical treatment as before; (3) the third indicator, however, will show that the population falls ill more often in spite of all doctors.

In other words: It is necessary for a welfare-oriented development policy to select an additional set of qualitative indicators that gives information on the rate of fulfilment of certain basic social needs. Each indicator just takes the values yes or no for each individual. By summing those scales of performance in a community, on a regional or national level one gets percentage figures on how many that have adequate fulfilment of each need—thus getting data for measuring and planning development. These values could be compared interregionally and intertemporally. Quite a number of social needs—housing, health, security, leisure, recreation, mobility, etc.—could be studied rather easily this way, and a weighted average of all the percentage figures for the different needs could be calculated, thus providing a general (additional) index of "development" and the base for an environment-oriented regional and national economic policy.

[21] The advantages of the enumeration of stock-variables should be summarized again: they describe socio-economic realities, inform about future developments, reduce the uncertainties of planning, enable to check flow-variables and allow for a connection of flow- and stock-variables via the capital coefficient.

[22] For the following, cf. [7] [2].

Summing up, the special features of such qualitative indicators are as follows:
—being percentage data they will always range in the interval between zero and 100 (and thus do not give the impression—as the GNP does—that unlimited growth is possible or desirable);
—they are based on qualities, or social basic values, which can be found in all regions and countries (and do not depend on the evaluation of products and services that may differ substantially from region to region and period to period);
—they are not affected by over-fulfilment of needs among the "upper ten thousands" (a fundamental problem of aggregate measurements in income statistics).

V. SUMMARY

The treatment suggested to the problems discussed should now be summarized. In order to lay the methodological foundations for an environment-oriented economic and regional policy, the traditional principle goals (as Gross National Product or Regional Income) should be revised or supplemented: because "bads" and "goods" are produced simultaneously and negative goods ought to have negative prices; because social and natural stocks are decumulating, environmental disruptions are accumulating, and accumulation and decumulation are not continuous functions of utilizing certain factors of production but rather show overload- and threshhold-symptoms. Welfare, therefore, will increasingly be determined by stock-variables more than by flow-variables.

To cope with the environmental problems methodologically the following approaches for economic and regional planning were presented: (1) a compensatory approach, modifying the GNP concept because of its structural inflators and deducting for environmental disruptions; (2) a stock-variable approach, which supplements the flow-variable approach; (3) a qualitative social indicator approach, supplying scales of fulfilment of basic social needs.

Whether or how to co-ordinate these approaches should be carefully studied by those who are responsible for national and regional economic policy and those who inspire it. This is even more necessary if we assume that Kenneth E. Boulding's vision of the economy of the future may come true on the regional level much quicker than on the national or world-wide level, following the rapidly increasing environmental disruptions (cf. [3]): While in the "cowboy economy" consumption is regarded as a good thing and production likewise and the success is measured by the amount of the throughput from the factors of production (a part of which is extracted from the reservoirs of natural resources and noneconomic objects and another part of which is output into the reservoirs of pollution)—in the "spaceman economy," by contrast, throughput is not a desideratum, and the essential measure of the success is not production and consumption as such but the nature, extent, quality, and complexity of the total capital stock, including in this the state of the human bodies and minds included in the system.

We must see, however, that this idea, namely that both production and consumption may be bad things rather than good things, ". . . is very strange to economists,

who have been obsessed with the income-flow concepts to the exclusion, almost, of capital-stock concepts" [3, p. 10]. Therefore, in order to create a *new rationality*, an enlarged common sense, we will have to look for approaches to development diagnosis and development planning that do combine quantitative and qualitative indicators, economic and social methods, the result of which may be opposed to traditional reasoning and behavior of the traditional enterprise and the traditional state. Effects from individual actions on overall economic development have to be studied, but this is not sufficient. Additionally, we will have to investigate the implications certain goals and concepts have on development. This is not, of course, an easy task.

REFERENCES

1. *Asahi Evening News,* August 31, 1970.
2. BAUER, R. A., ed. *Social Indicators* (Cambridge, Mass., London, 1966).
3. BOULDING, K. E. "The Economics of the Coming Spaceship Earth," in *Environmental Quality in a Growing Economy,* ed. H. Jarett (Baltimore, 1966), partly reprinted in *The Environmental Handbook,* ed. G. de Bell, prepared for the First National Environmental Teach-in (New York, 1970).
4. DAHMEN, E. "Environmental Control and Economic Systems," in *A Challenge to Social Scientists, Proceedings of the International Symposium on Environmental Disruption,* ed. S. Tsuru (Tokyo: International Social Science Council, 1970).
5. *Der Spiegel,* Vol. 24, No. 38 (1970).
6. DISCH, R., ed. *The Ecological Conscience: Values for Survival* (New York, 1970).
7. ERIKSSON, B. "Qualitative Parameters for Measuring Development," mimeographed (1971).
8. FREY, R. *Infrastruktur: Grundlagen der Planung öffentlicher Investitionen* (Tübingen, Zürich, 1970).
9. GALBRAITH, J. K. *The Affluent Society* (New York, 1959).
10. GALBRAITH, J. K., and VOGEL, H. J. "Die Krise der ökonomischen Stadt," *Die Demokratische Gemeinde,* Vol. 23, No. 12 (1971).
11. JACOBS, J. *Death and Life of Great American Cities* (New York, 1969).
12. JANSEN, P. J., and TÖPFER, K. "Zur Bestimmung von Mängeln der gewachsenen Infrastruktur," in *Theorie und Praxis der Infrastrukturpolitik,* ed. R. Jochimsen and U. E. Simonis (Berlin, 1970).
13. JOCHIMSEN, R. *Theorie der Infrastruktur* (Tübingen, 1966).
14. JUDY, R. W. "Economic Incentives and Environmental Control," in *A Challenge to Social Scientists, Proceedings of the International Symposium on Environmental Disruption,* ed. S. Tsuru (Tokyo: International Social Science Council, 1970).
15. JUERGENSEN, H. "Grundlagen einer produktivitätsorientierten Industrialisierungspolitik," *Wirtschaftsdienst* (Hamburg, 1964).
16. KADE, G. "Oekonomische und gesellschaftliche Aspekte des Umweltschutzes," *Gewerkschaftliche Monatshefte,* Vol. 22, No. 3 (1971).
17. ————. "Umwelt. Durch das Profitmotiv in die Katastrophe," *Wirtschaftswoche/Der Volkswirt,* Vol. 25, No. 40 (1971).
18. KAPP, K. W. *The Social Costs of Private Enterprise* (Cambridge, Mass., 1950).
19. ————. "Economic Development in a New Perspective: Existential Minima and Substantial Rationality," *Kyklos,* Vol. 18 (1965).
20. ————. "Environmental Disruption and Social Costs: A Challenge to Economics," *Kyklos,* Vol. 23 (1970).
21. *Kokumin seikatsu hakusho: 1969* (Tokyo, 1970).
22. LEONTIEF, W. "The Problem of Quality and Quantity in Economics," *Daedalus,* Vol. 88, No. 4 (1959).
23. MISHAN, E. J. *The Costs of Economic Growth* (London, 1967).

24. ————. *21 Popular Economic Fallicies* (London, 1969).
25. MÖBIUS, K. "Das Umweltproblem aus ökonomischer Sicht," *Kieler Diskussionsbeitrage zu aktuellen wirtschaftspolitischen Fragen* (Kiel) No. 14 (1971).
26. ROBSON, W. A. "Second Report on Tokyo," mimeographed (Tokyo: Metropolitan Government, 1969).
27. RUBNER, A. *Three Sacred Cows of Economics* (London, 1970).
28. SCHULTZ, U., ed. *Umwelt aus Beton oder: Unsere unmenschilchen Städte* (Reinbek, 1971).
29. SIEBERT, H. *Regionales Wirtschaftswachstum und interregionale Mobilität* (Tübingen, 1970).
30. SIEVERTS, T. et al. "Modelle zur Veranschaulichung von Stadtwachstumsprozessen," in *Theorie und Praxis der Infrastrukturpolitik,* ed. R. Jochimsen and U. E. Simonis (Berlin, 1970).
31. SIMONIS, U. E. "Auf der Suche nach einem neuen Indikator für wirtschaftlichen Wohlstand," *Gewerkschaftliche Monatshefte,* Vol. 22, No. 8 (1971).
32. *Statistical Yearbook of the Federal Republic of Germany* (Stuttgart, Mainz, 1972).
33. "Tokyo Resolution," reprinted in *A Challenge to Social Scientists, Proceedings of the International Symposium on Environmental Disruption,* ed. S. Tsuru (Tokyo: International Social Science Council, 1970).
34. TSURU, S. *Essays on Economic Development* (Tokyo, 1968).
35. ————. "In Place of Gross National Product," in *Japan: Economic and Social Studies in Development,* ed. H. Simonis and U. E. Simonis (Stuttgart, forthcoming).
36. TSURU, S., ed. *A Challenge to Social Scientists, Proceedings of the International Symposium on Environmental Disruption* (Tokyo: International Social Science Council, 1970).
37. United Nations. *The Proposed Balance Sheet and Revaluation Accounts of the System of National Accounts* (New York, 1969).
38. ————. "Conference on the Human Environment, Panel of Experts on Development and Environment," mimeographed (Geneva, 1971).
39. *United Nations Development Decade, Proposals for Action, Report of the Secretary-General* (New York, 1962).
40. *United Nations, Problems of the Human Environment, Report of the Secretary-General* (New York, 1969).
41. UZAWA, H. "Discussion Paper," in *A Challenge to Social Scientists, Proceedings of the International Symposium on Environmental Disruption,* ed. S. Tsuru (Tokyo: International Social Science Council, 1970).