

The Concept of Sustainable Development: From Rio to Ethics

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ABSTRACT

The traditional concept of sustainable development arising from the Brundtland Report and as a process model of development in South Commission Report, are critically examined. The Earth Summit's rulings on sustainable development are critically examined in regards to their neoclassical features. Comparative economic and epistemological grounds are invoked to question the functional viability and the theoretical foundations of the enunciations made by Agenda 21 and by the supporting outlooks of the United Nations and Bretton Woods institutions on sustainable development post-Rio. These theoretical and critical investigations are then made to evolve the concept of sustainable development toward an ethical orientation within an endogenous framework of ethics in economic theory and the development process. A comparative examination of recent studies on sustainable development for Malaysia post-Rio is made in light of the globally interactive world view of the polity-market model reflecting endogeneity of ethics. Such a process is introduced as the central view of endogenous ethics prevailing in a substantive meaning of sustainability.

INTRODUCTION

The international community of socio-economic planners, academicians, politicians and decision makers has fast moved toward a common plea for a different order of development. This perspective projects the lot of humankind and the environment in the fold of an order of justice, human betterment and preservation of the abundant capital of yesterday – a stock that has been made scarce by the material aggrandisement of the human species. This perspective of development is different from the old regime of economic growth. Its focus on human welfare is seen as a mix of economic and non-economic priorities. Such priorities are, social justice, alleviation of poverty, preservation of bio-diversity,

attaining of balanced growth in tune with the appropriateness of technological change, and the realization of both communitarian as well as global participation in the socio-economic decision-making process confronting all human problems.

Opposed to the regime of economic growth, the call of the new perspective of development is for structural change in the mode and process of utilization, preservation and enhancement of the life-sustaining human, material and resourceful capital for the present and future generations. This concept of development thus becomes intertwined in a great nexus of inter-relationships, interactions and integration among human communities, the environment and the futures. The concept of development as a process is thus truly seen as a driving force of cause and effect born out of these interactions and regeneration of present and future potential.

THE CONCEPT OF SUSTAINABLE DEVELOPMENT COMPARATIVELY

The concept of sustainable development takes its flight from this process idea of development. It is not an altogether new concept of the state of the human world and its relationship with the environment and futures. The difference of the new arrangement is its renewed consciousness and force toward unifying the much beleaguered humanity on this common front of survival. Subsequently, the institutions and financial resources of modern nations are enabled to police such common goals. The concept of sustainable development thus requires a comprehension both in terms of its philosophical and instrumental meaning to put the vision in the right track.

The understanding of sustainable development as a process has been taken up in the recent literature. Some of these are taken up here to draw from them the common points on how sustainable development must be viewed and addressed.

The Brundtland Report defines it as follows: (World Commission on Environment and Development 1987).

In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony and

enhance both current and future potential to meet human needs and aspirations.

The South Commission defines it as follows: (South Commission 1990)

It is a process which frees people from the fear of want and exploitation. It is a movement away from political, economic, or social oppression. Through development, political independence acquires its true significance. And it is a process of growth, a movement essentially springing from within the society that is developing.

Following the Rio-Earth Summit, the concept of sustainable development is spelled out by Agenda 21 in terms of its intent (United Nations Conference on Environment and Development 1992):

The only way to assure ourselves of a safer, more prosperous future is to deal with environment and development issues together in a balanced manner. We must fulfil basic human needs, improve living standards for all, and better protect and manage ecosystems. No nation can secure its future alone, but together we can – in a global partnership for sustainable development.

But Agenda 21 focuses on the organization of industry, businesses and national governments in respect to their commitment to sustainable development. Hence, there is a strong economic growth orientation in its prescription for sustainable development. This emphasis is centrally shared by and emanates from the perception of the United Nations toward socio-economic development. The United Nations 1992 Report on the State of the World Economy states (United Nations 1992),

Without a more dynamic world economy, the current liberalization efforts of developing countries will not bear fruit. Outward oriented development strategies largely rely on buoyant international trade and, hence, an expanding world economy to achieve their objectives. There is today much concern about the lack of resources for such urgent needs as the reconstruction of the east, a concerted attack on poverty and human development in the poorest countries, and environmental investments of all kinds. If the growth of world output returns to the levels of the 1980s, total output would grow by about one trillion dollars a year. There is, in fact, no other way to resolve the economic and political crises multiplying in the world community than to give priority to the restoration of growth... Restoring a more vigorous and dynamic climate of growth in the world

economy must be the principal objective of international economic co-operation in the years ahead.

The United Nations, perception of a growth-centered sustainable development regime is brought into mainstream economic approaches to development as well. Pearce et al. view sustainable development in terms of sustaining a real per capita growth of GNP without adversely harming the environmental and social requisites of development (Pearce et al. 1989).

A growth-centered perspective of sustainable development is to be found in much of traditional approaches to economic reasoning and policy development. Tobin and Nordhaus' idea of the measure of economic welfare (MEW) is one such perception. Here, the common denominator for the measurement of economic growth is taken to be consumption. Hence, social 'bads' and 'regretables', such as, waste or expenses incurred in pollution, environmental decadence, maintaining a police force, militarization etc. are deducted from the balance sheet computation of the GNP to yield the net national product. This gives the MEW (Nordhaus & Tobin 1972).

The traditional neoclassical approach to steady state growth models provided the concept of warranted rate of growth. This rate of economic growth is always proportionate to the rate of savings (Solow 1970). Now to the extent that savings remain totally mobilized in productive investments, the rate of economic growth represents the corresponding full utilization of labour and capital with differentiated technological change being allowed for. Along this golden path of expansion of output, the full utilization of factor inputs must keep the capital-output and capital-labour ratios (hence, capital-labour ratio) constant. In the language of sustainable development, such a growth-centered regime of output expansion means that any targeted 'warranted rate of growth' of output is conducive of economic development, since capital and labour are always fully utilized in such a regime (Burmeister & Dobell 1970).

In the current perspectives on sustainable development with socio-economic conditions in them, the above types of steady state neoclassical growth models fit the United Nations' perspectives on sustainable development. Likewise, through complementarity of perspectives, objectives, plans and programs of Agenda 21, those of the Bretton Woods development organizations, and the economic

orthodoxy of the industrialized nations, all such sustainable development concepts get subsumed in mainstream economic doctrines. Thereby, the institutions and policies toward structural change cannot but be driven and be regenerated by this same traditional economic reasoning.

The Canadian *Projet de Societe'* points out, that by following this traditional economic reasoning, UNCED has failed to generate a methodology that would help realize its noble socio-economic goals and objectives. UNCED has also failed in the areas of inducing commitment for global participation for sustainable structural change, particularly at the grassroots levels; in dealing with the social context of trade and debt for the developing countries; and in developing strategies that would ensure sustainability (National Stakeholders, Assembly 1993).

The conclusion one then derives from the above sections on the conceptualization of sustainable development with an outlook toward its instrumentality, is that the epistemological issues of sustainability for global social, economic, political and environmental change, have remained unaddressed. The result then is obvious. All programs and approaches, in spite of the noble goals and objectives of the Rio-Earth Summit, relapse into isolated and individuated perspectives of change and human futures. The underlying malaise that causes this relapse into methodological individualism to occur is that which relates to the misconception of structural change.

THE EPISTEMOLOGICAL CONTENT OF ECOLOGICAL ISSUES

The epistemological meaning here is of the following nature (Spooner 1982): The concept of ecology, which can be seen as 'relationship between human society and its natural environment' and the 'study of that relationship', invokes an interactive process-oriented approach to ecological problems. This is as much a philosophical discourse of long standing as it is a scientific undertaking toward developing an axiomatic and methodological treatment of ecological content in the social, economic, political and scientific dimensions of understanding and dealing with ecological problems.

The lack of this epistemological essence in the current discourses on sustainable development comes from the divisiveness between the disciplines on specific issues at hand. This divisiveness causes intellectual individuation and intellectual hegemony, self-interest, loss of purpose, all leading to bareness in intellectual inquiry for the greater moral and material goals of the sustainable view. Pluralism steeped in such intellectual divisiveness between the disciplines, suppresses and loses track of the greater reality of the common human goals on which the moral-material world views is founded. The medium of the epistemological view is then the interactive milieu leading to integration among disciplines and role players.

The lack of this epistemological essence to sustainability enters mainstream economics of the classical, neoclassical schools and their latter days developments. This appears as debility caused by the existence of methodological individualism and non-process elements in them. The resulting methodology turns out to be one that either forces a stereotyped scientific solution to human problems, or remains mute to the underlying processes that interact to determine the exchange mechanisms of human dimensions. Such a methodology of mainstream thinking is found to be true of politics as of economics. Regarding this, Buchanan remarks (Buchanan 1975), "Economic exchange among persons is facilitated by mutual agreement on defined rights."

Yet the epistemological problems of neoclassical economics arises from its assumed 'predictive' nature of market exchange. "Economics, the science of markets or of market exchange institutions, commences with a well-defined structure or set of rights and offers explanatory, predictive propositions concerning the characteristics of outcomes along with conditional predictions about the effects of imposed structural changes on such outcomes." (Buchanan 1975) Shackle writes as follows on this same structural debility of neoclassical economics in it being unable to determine real equilibrium conditions either in the general or partial equilibrium sense within the milieu of market exchange (Shackle 1972):

Equilibrium is a solution, and there is, in the most general frame of thought, no guarantee that a problem which presents itself, unchosen and undesigned by us, will have any solutions, or that it will not have an infinity of solutions. In either case, there is no prescription of conduct.

In recent times, the infertility of economic theory to answer the question of a process description of structural change has been stated by Clower, who writes in the following words (Clower 1993):

...in some generalized Poincare phase portrait of the economic system there exists no stationary point, but there does exist a region of stability within which all trajectories are strictly Brownian (what Keynes and his contemporaries might have referred to as "neutral" equilibria, and modern systems analysts would describe as "noncontrollable"); outside this region of stability, all trajectories are governed by attractive forces.

AGENDA 21 AND CLASSICAL/NEOCLASSICAL ECONOMIC PERSPECTIVE

In the context of sustainable development taken up in the classical and neoclassical paradigms, it now becomes clear, that the methodological orientation of a process world view remains mute in these economic theories. Consequently, neither the substantive conceptual issues nor the institutional and policy premises of sustainable development can be launched as a positive agenda in these received doctrines. Among these items so boldly enunciated by Agenda 21 are addressed in the following (Keating 1993):

1. the global social problems of poverty alleviation, human settlement, responsible consumption and population growth;
2. the environmental problems of desertification, deforestation, agricultural decadence, biodiversity, toxic wastes;
3. social problems related with women, youth, indigenous peoples, non-governmental organizations, industry and the environment;
4. the methods of attaining the goals and objectives of Agenda 21 through participatory actions at the national and world developmental levels using all available financial resources for this purpose, education and communitarian actions.

These are indeed noble goals and objectives, and they do strike a note of the kind of interactive model of structural change, which we noted, must be the new epistemological look at sustainable development. Yet as we notice from our critique of the economic approach to these issues, there is an intrinsically methodological impossibility in received economic reasoning to address the above-mentioned issues. Consequently, the policies and institutions that

emanate from the neoclassical approaches to economic development also defy appropriate attention that these key issues demand.

Within the classical and neoclassical approaches, we note that the Agenda point of address number 1 gets drawn into the framework of a growth model, best attended to by a variant of the steady state growth models. This approach is principally endorsed by the United Nations, the Bretton Woods institutions, the formula of privatization launched by the industrialized economies in Eastern Europe, the European Community, and is emulated in the Pacific Rim by the Newly Industrializing Countries.

Consequently, one finds the attention to problems of poverty being taken up in the framework of the economic efficiency vs. distributive justice tradeoff characteristic of the resource allocative mechanism of neoclassical school. It is likewise the cause and effect of optimizing methodology of economic growth models with or without technological change endowed to it. This tradeoff, otherwise also germane in the marginal substitution perspective of the neoclassical resource allocation problem, is a methodologically inhering one. About this Phelps points out, that attention to distributive justice (the one that must emphasize the poverty problem) is impossible in neoclassical economic theory (Phelps 1989).

The relationship between population control and consumption patterns is viewed in an inverse fashion in neoclassical economics. Thus, a growing population in the developing countries is made to blame for the enigma of excessive consumption pattern. This is of course a grossly incorrect picture of this socio-economic relationship. The industrialized countries with their relatively small population are found to be the most wasteful consumers of food and energy (Silverberg 1991). Of the estimated population size of 5.5 billion today, the rich North has 1.2 billion and the South the remaining 4.3 billion. Yet, the North consumes 70 per cent of total world energy, 75 per cent of the metals, 85 per cent of the woods, 60 per cent of food. The military is found to be the most destructive environmentally, with the US military arsenal producing over a ton of toxic waste every minute. The F-16 Jet while taking off consumes 3,400 litres of fuel in less than an hour (New Internationalist 1992).

With the South, the problem of consumption is not distinctly linked with population size. The total food production in the world far exceeds the needs of total population. Yet inadequate

distribution and inequitable political regimes with self-centered motives, bar food sufficiency/security among all nations.

The ecology has a carrying capacity that can be progressively enhanced by technological change. Major economic and socio-political issues, such as education, entitlement and self-reliance at the grassroots are suppressed by undemocratic governments and western political machinery of narrow self-interest. World trade and commodity pricing systems are inherently unequal and unjust in the neoclassical perspective of export-orientation. These retard economic welfare at the grassroots (Makhijani 1992).

In the classical and neoclassical paradigms of sustainable development, growth orientation necessarily induces a tradeoff between consumption and population by means of the optimal population concept. The consequence is then shown to be poverty. Thus, the incidence of poverty and population increase are found to be complementary in their inverse effect on consumption benefit in the neoclassical model of growth and development. This is true both for a closed and an open economy in the neoclassical view (Kenen 1985).

Next, while addressing Agenda point number 2, the classical and neoclassical theories of economic growth applied to sectorial conservation necessitates, that there be large adjustment costs in the process of replacing 'unwanted' biological states. The Heckscher-Ohlin model of variable factor proportions must necessarily mean, that certain factors, most often labour, are being displaced in older sectors (Tisdell 1989). Yet a natural reallocation of this displaced labour does not take place as envisaged by the neoclassical model. The impoverishing effects of lost incomes, economic opportunities and human capital, obstruct the transition to a state of economic distribution, even though economic efficiency may be attained in the long run. The result then is an impossibility in generating the much needed sectorial interlinkages for sustainability.

Attaining economic efficiency and distributive justice through biological diversity across sectors can alternatively be seen as a phased in transformation and not substitution of the 'unwanted' industries. This is possible by technological change and product diversification as much as it needs a policy-induced device for just pricing of traded goods. The IMF compensatory finance, for instance, does not bail out here, as the declining industries are viewed unfavourable under the World Bank structural adjustment

criterion. Thus, both domestically and internationally, the intersectorial framework, perpetuates the view of substitution between economic efficiency and distributive equity.

With the displacement of real resources intersectorially, the complementary factors of production get adversely affected. Here we find the Agenda point numbers 3 and 4 impossible to attain within the classical and neoclassical frameworks of economic reasoning. The bail-out of the displaced disadvantaged ones, such as indigenous people, women, poor, young and those evicted by war, occupation and aggression, is seen to happen either through increased social security payments or through reallocation in productive alternatives. But sheer social security payments and human settlements do not realize sustainable development. This is due first, to its debt-creating effect and the inherently consumptional nature of such transfer payments that does not contribute to real development (Adelman 1986). Second, national self-reliance so much needed to inculcate communitarian participation, sharing of power and grassroots entitlement, is not realized in a state of material subservience to transfer payments and relief goods.

The alternative to transfer payments is to mobilize human factors towards productive sectors. But in the neoclassical economy, this once again engenders allocative costs. We have seen these to be the cause and effect of protracted sectorial imbalances. The result is now transmitted to the imbalances of the factor markets as well. A costly allocative mechanism of such neoclassical type, is the kind of equilibrium state against which Shackle wrote. It is the result of the intrinsically non-interactive, non-process milieu of economic reasoning. Within it, the powers to enact remain vested either with large agents (governments, superpowers, development organizations) within unreal power benign atomistic markets.

A process model of sustainable development, although so much projected by the noble goals and objectives of the Rio Earth Summit, remains unrealizable in the continuing subservience of the agents to received economic reasoning. The consequential plans of actions subsequently, also share this debility.

We have seen, that this impossibility is caused by the intrinsic substitution-principle underlying marginal cost pricing, optimization of economic objective functions, and the resulting resource allocation mechanism. Of such economic substitutions so adversely

affected, is the tradeoff between economic efficiency and distributive justice, nationally and globally.

By the very implications of the neoclassical factor and product markets interrelationships, such substitutions cause displacements in the other markets by product or factor substitutions occurring in any one. Sustainable development as the process precept of realizing the moral and material complementarity in the presence of structural change, is methodologically unrealizable in the classical and neoclassical frameworks.

ALTERNATIVE ETHICAL EXAMINATION OF SUSTAINABLE DEVELOPMENT PARADIGM

We now recognize that the principal criteria for sustainable development require endogenizing of ethics in the development process as cause and effect of the system. Ethics treated exogenously or neutrally, as in the neoclassical paradigm and its offshoots, neither realize the process character nor the methodological depth of sustainable development. Hence, we must be searching for a sustainable development methodology with endogeneity of ethics as cause and effect in that process system. We must also be formulating a precise methodological approach to the sustainable development alternative in the spirit of the scientific character of this non-neoclassical alternative. We must be searching for a truly interactive-integrative process model. Indeed, the combination of interactions-integration feature in an ethically endogenous process model of development inexorable leads us to a grand knowledge-based model of development theorizing (Choudhury 1993).

We will now show that it is only in the process oriented ethically endogenous model, the neoclassical marginalist substitution idea is replaced by the universal idea of complementarity. The principle of universal complementarity is across all resources, factors and goods. The methodological foundation of this principle is based on the notion of process oriented decision making among agents in the economy who alone, and not the optimal conditions of neoclassical solutions, are responsible to induce ethical considerations in their choices. The motivation and the possibility to be ethical in decision making inducing sustainability is caused by the underlying knowledge formation process of the discursions that proceed. For

instance, such a discussion and the textual reference for it would be the concept of common good as well-being. In this way, with the presence of ethical reference in the underlying text of discussion alongwith the cause and effect that exist between such texts, policies, programs and behaviour, the principle of universal complementarity must reject neoclassical marginalist substitution. Growth as efficiency goal determined by market agents, distribution as ethical goal determined by policy and program, and environment as service determined by textual reference to sustainability, are now all simulated by interactions among the agents, who codetermine their enlightened interests. The neoclassical marginalist substitution tradeoff cannot now exist.

ENDOGENISING ETHICS IN A SUSTAINABLE DEVELOPMENT MODEL

The need for endogenizing ethical and moral effects in both the policy and socio-economic variables, is the central focus of sustainable development as an ethics-centered approach to global development. This aspect is what differentiates the ethics-centered approach to sustainable development from those of mainstream economic philosophy. Here, first, it is necessary to identify the central areas of concern for sustainable development. Second, it is necessary to enact suitable policies, approaches and institutions to realize the sustainable development goals. Third, these policies/institutional instruments are to be such as to induce, not enforce, changes in the socio-economic milieu. The result then would be a natural process of integration amongst policies, institutions and the market system, inducing social transformation out of an interactive process. Our claim here is that the ethically endogenous approach to sustainable development provides this alternative world view.

DEFINITION OF SUSTAINABLE DEVELOPMENT IN INTERACTIVE PERSPECTIVE

The concept of sustainable development in the interactive-integrative world view can now be defined. It means the balanced and simultaneous realization of consumer welfare, economic efficiency, attainment of social (distributive) justice, and ecological

balance in the framework of a discursively evolutionary knowledge-based, socially interactive model defining the polity-ecology process (P-E Process). Note that the market system is taken up as a subset of the grand ecological order.

The polity-ecology process views an interactive preference mapping discursively evolving as interactions continue on specific issues between polity and the ecological order. In this interactive system, preferences of polity represent guidance, policy recommendations and directions that are developed on the basis of a given textual reference. For instance, in the global environment program, such a textual reference is made to the Agenda 21 documents and the policy recommendations developed are those at the Rio-Earth Summit. When preferences of polity impact upon the ecological order, of which the market is a specific subsystem, they aim at transforming the preferences relating to consumption, production and distribution. The response of the agents of the ecological order to the preferences of polity, form the interactive preferences of the two subsystems, polity and ecology. Such responses to the primal actions by polity are then post-evaluated in a decentralized and democratic venue of polity alongwith the representative agents of the ecological order, to establish a final response. This comprises possibilities on either continuing, rejecting or revising the earlier policy-programmatic actions by polity on specific issues. The completion of each such circular relation from action to response through the polity-ecology interaction, generates knowledge in the total system. Thus each interaction equates to an ordinal assignment of knowledge parameter during the final stage of post-evaluation followed by continuity of the circular process of cause-effect interrelationships between polity and micro-agents of ecology. Hence, both the process description as well as the methodology of P-E Process replaces the optimal, power benign and non-interactive essence of neoclassical economic theory.

The P-E process gains its roots on the premise of the unification epistemology. This is the realization of the unifying and explanatory truth in the universal order. Such a reference point of the P-E process becomes the textual epistemology replacing the Kantian epistemology of a priori reason alone, in phases 2 and 3 of the P-E process mentioned above. The interactive model is a systemic one in the substantive sense, that it converts and

regenerates ethics as endogenous phenomena of the system and propels them forward.

THE DYNAMIC NATURE OF THE INTERACTIVE POLITY-ECOLOGY MODEL

The presence of knowledge parameter in the interactive model, which evolves by discursion among the agents of change, makes such a model dynamic not simply in terms of time dependence, as is the case with neoclassical models of sustainable development. Rather, the more interesting dynamic nature of the P-E model is due to the presence of knowledge parameter as a continuously simulative learning variable in it. It is this simulative parameter that bestows institutional power to the P-E model and induces it to the anthropic touch between ethical text and materiality.

In the P-E model now, if environment is seen as a service variable, then it must generate a common good – a well-being. The most important well-being by cause and effect in this order being knowledge evolving from agent-specific and institution-ecology interfaced discursions, environment of generating the knowledge. Examples in this regard are, social justice, employment, conservation, participation, entitlement and empowerment that must become embedded as the common good emanating from the action of the environment not as a fungible – a treatment of the neoclassical order. Rather, this concept of the environment must be a knowledge-creating instrument, a service inducing well-being as a global common (Agius 1990).

In this type of a knowledge-centered treatment of the environment as an ethical common, the price variable is much more than a simple social price of neoclassical category used to explain market failure and measure a second best resource allocation situation. Price is now a monetary representation of ethically provided good in the above sense. But such a price is never fully measured in market exchange. The ethical induction in resource allocation cause a fast changing preference field. Prices thus become dynamic categories of temporary allocations, which are subsequently and perpetually induced by preference changes in the institution-market interfaced discursive process. Two kinds of dynamic effects induce such price movements and preference changes. These are conjointly time and knowledge induction.

The knowledge-centered dynamic treatment of ecological problems being dually dynamic, even a cursory examination of an environment-related optimization problem shows that solutions are much different from those pertaining to classical maximization. The same conclusion would hold for optimal control problems. But in such neoclassical type optimization problems, the presence of mere time variable will yield simple forms of the Hamiltonian equations. In the knowledge-induced simulational system along-with the time variable, the Hamiltonian becomes a complex higher order differential equation problem.

Examine for example the following simple problem of classical optimization. Let us consider a utility function, $U(.,.)$, in work, w and time, t . Thus, $U = U(w, t)$. In the classical optimization problem under circular interrelationships between w and t in the context of agent-specific discursion, we must have, $w = f_1(t); t = f_2(w)$. Now the classical maximization problem is, Max. $U = U(w, t)$, subject to, $w = f_1(t); t = f_2(w)$.

The Lagrangian for this problem is,

$$L = U(w, t) + \lambda_1(w - f_1(t)) + \lambda_2(t - f_2(w)).$$

Optimizing L with respect to w and t yields,

$$dL/dw = (\partial U/\partial w) - \lambda_1 \cdot \partial f_1/\partial w + \lambda_2 = 0;$$

$$dL/dt = (\partial U/\partial t) + \lambda_1 - \lambda_2 \cdot \partial f_2/\partial t = 0.$$

On solving for λ_1, λ_2 from these equations, we obtain,

$$\lambda_1 = (1/D)[(\partial f_1/\partial w)(\partial U/\partial w) - \partial U/\partial t],$$

$$\lambda_2 = (1/D)[(\partial f_2/\partial t)(\partial U/\partial t) - \partial U/\partial w],$$

where, $D = [1 - (\partial w/\partial t)(\partial t/\partial w)] = 0.$

Hence, $\lambda_1 = \lambda_2 = \infty$. This is absurd for determinancy.

Instead, in a simulational system, only iterative results are worked out by assigning recurred values of t and w as the knowledge variable, say Θ , varies. We then have the following constraints for a simulation problem, the optimization problem being rejected:

$$w = f_1(t, \Theta),$$

$$t = f_2(w, \Theta),$$

$\Theta = f_3(\Theta')$, where, Θ' denotes recurred values of Θ as discursion proceeds; that is, as simulation is performed. Such recurred values of Θ are then fed into f_1 and f_2 , as Θ -values reach stability in f_3 . The values are then fed into $U(w(\Theta), t(\Theta))$ to yield simulative values of such knowledge-induced well-being functions. Note that U in this case cannot be a utility index of the neoclassical vintage, for there is no marginal substitution between w and t as Θ induces w and t in continuum. Θ can be instrumentailized by environment as a service yielding well-being.

Indeed only by the Θ -variable is it possible to link the present with the intertemporal order, as present behaviour and structural change in sustainable resource allocations would subsequently determine the future (t) linkage with activities such as, w – work, employment, income distribution, price stability, conservation, entitlement etc., all of of which are ethical preferences of the present determining common welfare for the future generation via induction by simulative Θ -values.

The Θ -values are also causes and effects of important policy variables and programs on sustainable development. While no monotonicity assumption in the trend of Θ -values can be assumed, yet policy impacts are desired to yield an increasingly positive relationship between leisure (t) and work (w), such as, causing recreation industry to grow while involving creative and productive economic activity. When such monotonicity is attained, then total cost (private plus social costs) decline. Hence, control of production and consumption diseconomies are the direct result of positive knowledge formation in the interactive P-E system.

In the neoclassical methodology, the codetermining aspect of interactive models does not apply. It is well-known that in the example of internationally provided public goods, of which environment service is a case, there is an extensive degree of cheating behaviour. The first mover in any cooperative pollution cleaning project is found to bear proportionately higher cost. This is a kind of tradeoff of alienation rather than complementarity in internationally provided public goods. Hence there is a contradiction to the nature of cooperative projects in such neoclassical

behaviour. Total costs remain high in the Hobbsian choices that agents make in such models (Frey 1986).

We have thus shown that in the sustainable development case, all models are essentially of the dynamic type, be these neoclassical or ethico-economic ones. However, only in the case of a presence of knowledge variables in the ethico-economic type can there be a meaning given to sustainability and complementarity. These features are explained atemporally by knowledge discursion at the present time and intertemporally by the conjoint interactions between time dependency and Θ -values. Subsequently, issues relating to policies, programs, institutions, ecology, pricing, allocation, growth and distribution, are all taken up in the context of this knowledge-induced discursive order. Such a relationship indeed is true global sustainability.

In the same note thereby, the macroeconomic problems of growth and distribution are linked with issues of pricing and behaviour linked with P-E interactive preference dynamics. Consequently, the concept of general equilibrium in the context of sustainability in an ethico-economic framework invokes evolutionary equilibria. Because such equilibria cannot be stable in the global and long-run sense under the impact of interactive preference dynamics, therefore, the nature of general equilibrium by interactions among all pertinent variables in such a case, is an evolutionary one as well.

APPLICATION OF THE P-E PROCESS TO THE CASE OF SUSTAINABLE DEVELOPMENT APPROACH IN MALAYSIA

In Malaysia there has been vigorous address to the topic of sustainable development and the environment currently. In general the view presented by both the private sector and intellectuals in the country to the UNCED sponsored Agenda 21 is negative. We present here some of these views and then bring to bear the P-E Process on these studies (Bruening 1994; Kee 1994; Arshad 1994; Tuang 1994).

Bruening delineates the example of a forest system as a comprehensive model of sustainability and shows that in it the mode of production of forestry products and services are such as to sustain a cyclical transformation of waste into reuse, maintain a tradable stock through recycling and diversification of the forest

system. The forest system is thus introduced into a complex of diversification recommendations. Among these are the need for education of the international political and consumers on the forest system; development of agreements and socio-economic consciousness on the forest system; national consciousness on the need for diversification of political, technological and attitudinal preferences towards the forest system. The concept of sustainable development relating to the forest system is then seen to link up with the formulation of relevant policies in the framework of the development plans, implementation and evaluation. The author argues that extraction of timber-based forestry leads to a reduction of the multitudinous (PEP as referred by Breuning) functions of the forest system in Malaysia. This PEP system is shown to comprise things like spices, oils, honey, fruits, seeds, medicines, dyes etc. However, he argues that conservation of the PEP system could itself serve as a re-circulatory process for timber conservation. The external impact of forest sustainability is then shown to serve as continued tradability to the world at a time of high demand.

Kee shows that a large number of international agreements on sustainability and the environment in UNCED has not resulted in clear directions. He points out the case of biological diversity agreement, which was not signed by the United States for its interests on pharmaceutical property rights. There was also uncertain response by the US on the matter of climate change in favour of preserving its own lifestyles. Such a lifestyle centrally reflects consumption patterns in the North. It has proved to be most wasteful and harmful for global sustainability. On the side of financial resources of meeting the US\$600 billion necessary to implement Agenda 21, the industrialized countries have made no commitments beyond the 0.7 per cent of their GDP that they are obliged to pay as Official Development Assistance. The General Environmental Facility was established not as a financing source but simply as a participatory decision-making one. Thus, the existing problem of tied ODA from the North is now compounded by a further constraint on developing countries to direct ODA into environmental facility solely. Thus, Agenda 21 and post-Rio have proved a fiasco for the manifold agreements reached at UNCED.

Arshad argues that trade should be used to generate export revenues to import such environmentally friendly technologies from the west that can then generate complementarity between

trade and environment in a sustainable development framework. Treating the environment as a good yielding services, against the goal of attaining output growth in a technologically induced resource allocation between growth (output) and environment service, the author argues that as technology and incomes would increase from complementarity between the two goals, a win-win situation would be attained between trade (equated with economic growth) and environment. There would however be a need for implementing various policy measures, such as, taxes; including the cost of falling terms of trade in agricultural goods in the prices of these tradables; establishing an environment fund out of export revenues and so on. Thus an extensive distortion on market prices reflecting the resource allocative between economic growth (trade) and the environment services, is generated.

Tuang points out that an innovative way of reducing industrial waste would be to reduce it at source rather than at the end point of production. He suggests an environment management system that would internalize such an innovation and environmental consciousness in the firm. The environmental management system would then appear as a cyclical flow of interactive and integrated flows of decision making, starting from a package of environmental policies, to the development of an environmental management system, included in which would be a relevant software system. This would then be linked with a plan engendering managerial communication on the environmental policies and plans. This in turn would set within an executing framework, followed by control, evaluation, adjustment and continuity. Effective human resource development and managerial control are seen to be the guiding features of the environmental managerial system. The costs and benefits of the entrepreneurial environmental managerial approach would be recorded in the financial reporting and audits of the firm.

These studies in the Malaysian context bring out innovative ideas and approaches based on the principle of integrating the environmental good in the mix of economic, social, sectorial and managerial systems. Some form of an interactive system is thus seen to be inevitable to realize such complementary ends. Such studies may be then seen to be addressing a 'partial equilibrium' approach as opposed to a 'general equilibrium' approach concerning the environment, in which the complete system of interactions must lie.

In Breunig's paper we need the consumption and distributional considerations along with production to complete the treatment of the forest system as a sustainable one in the holistic sense. Without this, the effects generated from the side of production cannot attain their evaluative feedbacks. The ideas of private and social costs and benefits and of the objective criterion for simulating the complementary goals of the environment and the economy in both the national and international context, cannot be known.

In Arshad's paper we note the remiss to understand the impossibility of his neoclassical methodology toward addressing the issues of interactive decision-making. This problem becomes all the more difficult in the neoclassical framework of analysis when pitted against the political and social realities of international agreements and decision makers.

Now the point of resource allocation to attain a win-win situation between economic growth and environmental service in either a nationally privatizing economy or in the international trading order, is perturbed by the kinds of imperfections mentioned by Kee. Such an allocative point becomes non-market oriented in light of the inherent interactions embodied around the perturbed point. What one recognizes then is a random field around such allocative points. Prices in such a situation are not market prices and values generated from the polity-market (P-E) interactive order. They are essentially augmented by values and ethics that now become endogenous in the market order due to the P-E interactions. No stable long-run optimal production possibility curves of neoclassical economics explaining price formation in perfectly competitive or imperfectly competitive systems, can be determined in the presence of interactions in the endogenous P-E order.

Tuang's managerial system addresses the managerial efficiency concept in reference to the environmental good. Yet sustainability requires externalizing of the efficiency and distributive equity concepts to the rest of the economy and society. The entrepreneur then becomes a necessary agent of such a globally interactive process. The environmental managerial system is then required to incorporate such 'general equilibrium' considerations in the context of global interactions, nationally and internationally.

Thus, among these studies one notices a partially interactive approach in the light of the P-E Process addressing the problem of

sustainability. The P-E Process is ethically endogenous interactive-integrative in a global sense (general equilibrium). Within this, partial equilibrium approaches are seen to operate according to the same methodology and world view in their limited spheres but having the necessary connectors for linking up functionally with the global framework. In the context of sustainable development, it is the 'general equilibrium' picture that manifests the holistic order. The partial equilibrium systems depict discontinuous forms if they are not appropriately linked by functional relations with the whole.

In the above-mentioned studies for Malaysia, this connective functionalism can be realized in several ways. Breunig's model of the forest can alternatively be taken up within the model of agriculture as a model of sustainability. In this case, the missing link of consumption both as perishable good and felicity-generating services, and distribution created by diversity of use, can be taken up. The forest system is then treated as a subsystem of the agricultural model.

In the other papers, a global kind of decision-making model of the environmental managerial type of Tuang's can be applied to address the interactions among government and private sector in regards to resource allocation (Arshad), with the international community (Kee) and between all of these and society at large (extension of Tuang). The resulting approach and methodology are then non-neoclassical in essence, explanation and results. Optimization, stability and full-information assumptions of the axiom of economic rationality are replaced by interactive-simulation methods in P-E methodology. The sustainable development as a topic provides an ideal example of this application.

CONCLUSION

In this paper the comparative approaches to sustainable development combined with rules of ethical polity on this issue, point clearly to the kinds of monotonically positive interrelationships that can exist between consumption, production, distribution and replenishment or conservation of resources in a progressive knowledge-centered regime of development. The precepts of ethical endogeneity brought out in the knowledge variables in terms of their comprehension and applicability in the socio-economic order. The merging and subsequent evolution of the

environmental design shaped by the model of balance, harmony, justice and purpose, provides the impetus to the unification epistemology in the P-E process. The combination of all these, namely, the ethical epistemological text, which forms knowledge and is followed by specific goals of integrating man-society-nature relationships; and the exercise of appropriate instruments for attaining these objectives, together comprise the endogenously ethical world view of sustainable development. The models discussed here are all dynamic ethico-economic general equilibrium systems. They are paradigmatically different from neoclassical models of sustainable development in both the micro- and macroeconomic sense.

The last part of the paper deals with an application possibility of the globally interactive P-E Process to the case of sustainable development for Malaysia. Recent papers in this area were examined.

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