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A CONCEPTUAL FRAMEWORK FOR THE AUTOPOIETIC TRANSFORMATION OF SOCIETIES

The purpose of the research programme *Citizenship and ecomodernization in the information society – the futures approach* – is to study the social and ecological dimensions of emerging information society. Particularly we aim at assessing social impacts of new informational structures that are impinged on citizens. We also focus on analyzing the ways application of information technology influences on targets and realization of sustainable development. The study programme comprises of ten individual research project organized around above sketched themes.

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1. INTRODUCTION

The world is in a transient period of development. The term transient in this occasion means that the prevalent more or less stable world state or development stage is becoming destabilized and fluctuating relatively rapidly in a seemingly irregular fashion. The concept of development is thought to be composed of stages following each other in succession and of a transient period between them. From a human point of view every transient period bears a twin message, negative one of threats to be met and a positive and of new options and potentialities for proactive and visionary renewal to be challenged. Both of them may be made self-amplifying and autopoietic. People who settle the same world may live in different realities, and co-operation and support seems to be more difficult than pursuing one's own interest in isolated groups. At first glance, an attempt to find a common pattern to development of different human societies might thus appear more readily uninteresting than interesting and something commanding to over-stress minor similarities among people and neglect important dissimilarities between them. A good example of this fear would be the most problematised area of the world society, Sub-Saharan Africa with its artificial political divisions between nations, ethnic and tribal diversities, colonial heritage, political unrest and so on, differ in many ways from societal orders elsewhere. Many contributors have pointed out how contributions from the other sectors of society to the economic sector, as well as the economic sector itself, are different from what they are in other places of the world. (See note 1).

However, when we regard development as a pattern in a general complex framework, which allows its entities to get particular and context laden contents according to different societies, we see that the above mentioned fear of fallacy may be removed. The theory of complex systems with dissipative structures serves for that purpose in this article, and again Africa is a well-documented case of the approach (see note 2).

The point of departure is to look at a society and its change through two frames of reference. One is a synchronic model describing a society as a harmonized, threefold configuration of economic, social, and cultural sectors or orders. The other frame depicts diachronically the internal dynamics of a progressive society as it grows and changes its basic character over time. The historical sequence of transformation outlined within this frame consists of transformation from a society of basic needs (characterized by the dominance of the agrarian mode of production) to a society of tangible needs (industrial mode becoming dominant in production), and further from it to a society of intangible needs (service mode becoming dominant). The two ways of

viewing societies - synchronic and diachronic - are complementary, and together they help to understand why the standard theories of growth are inadequate to grasp development. Most importantly, these models together provide a coherent conceptual framework, which - it is hoped - will encourage the acceptance of some fundamentally important principles upon which sustainable development is based, namely:

1. Development for increasing welfare and creative partnership of all population groups is an interaction as well as growth process, which encompasses all of the three societal orders, i.e. the economic, socio-political and cultural orders.

2. Development is a complex growth process going through bifurcations or a transient period during which interactions between the constitutional sectors change essentially before stabilisation is reached. The stable forms of order include also a chaos state.

The conceptual framework underlines the importance of new policy imperatives at a time when there seems to be going on too many disconnected and diverse things at once, and when highly influential, entrenched dominant interests and associated institutions tend to either oppose or ignore proactive policies. The underlying concept - a holistic complex pattern of society and its development - is relatively simple at heart.

2. SYNCHRONIC THREEFOLD MODEL OF SOCIETY

There are different ways to satisfy the needs of citizens (as will be discussed later, needs are here classified as basic, tangible and intangible). The specific set of strategies available within a society depends on its internal factors such as its human resources and social or cultural aspirations, as well as on external factors such as natural resources and its comparative advantages in the world market and its relations with other societies.

Each production factor can be thought of as falling into one of three constitutional sectors. These are an economic sector, a social-political sector and a cultural sector. It may be symptomatic in this sense, that analogous with the concept of capital in economy, it has recently become usual to speak also about social capital and human capital especially in sustainable development discourse (Malaska et al. 1999, Jokinen et al. 1998). Every society can thus be understood as a productive threefold totality of the three autopoietic and interacting principles. Each sector produces something for the benefit of the whole, and each contributes to its own growth too. In a healthy society, each sector, or order as they are alternatively called, is relatively autonomous with a pertinent autocatalytic growth function but on the other hand they together form a balanced and harmoniously interacting unit, a dynamic whole capable of transforming itself. Because all societies are open to the outside environment to some extent, each sector receives inputs from and discharges outlets to the outside as well.

An examination of the economic sector will demonstrate the working of this model (see Figure 1). The intrinsic task of the economic sector is to produce means of material wealth and for material wellbeing. With natural resources and stimuli from the external environment and contributions from the social and cultural sectors it produces goods and services. The economic sector has many effects on the human and natural environment, including such inevitably negative impacts as degradation of ecosystems through pollution, erosion and deforestation. The produce, distribution, and consumption of products thus create a specific kind of material order and relation between nature and the society. Ideally, the exchange of economic sector with the external environment and with the social and cultural sectors aims at to maximize benefits and minimize harms and side effects.

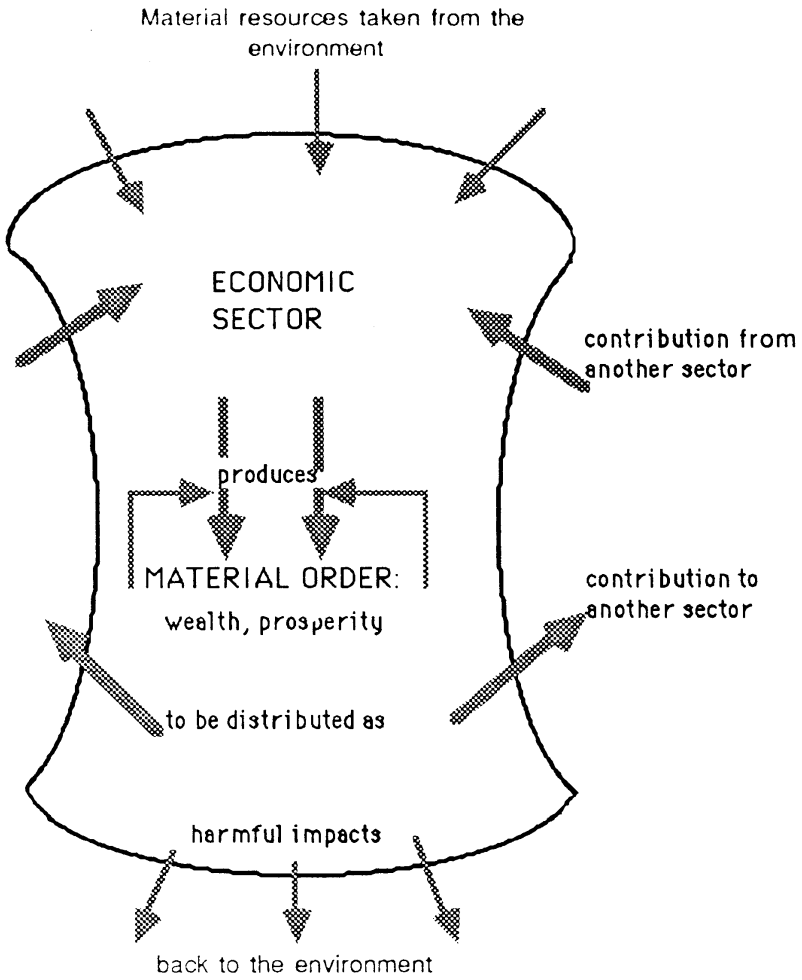

Figure 1. Model of the economic sector as an intrinsic part of the threefold societal whole.

The socio-political and culture-spiritual sectors operate in an analogous fashion. The socio-political sector produces societal order, which includes a system of justice, a system for the distribution of wealth and human rights, system of market economy or other form of economy, and other codes of conduct and institutions. The cultural sector produces spiritual order: values, ideas, arts and sciences, education, culture, inventions, patents, etc. These two sectors are likewise in an open exchange with their respective external social or cultural environments. Their contributions can similarly be beneficial or harmful in the external environments. Wars, criminal activities, and rigid concepts of national sovereignty are examples of harmful social products, while extremist, aggressive or isolationist ideologies are notable instances of cultural products, which can harm relations with other societies. Just at this time we can observe that many new forces are moulding the world in unprecedented ways (Malaska 1999).

Each sector feeds on itself for growth, but the growth relies also as a necessary condition on contributions from the other sectors (see Figure 2). For example, a stable,

socially just and democratic order and vigorous scientific research and development will promote a healthy economic sector, and in turn material prosperity generated by the economic sector is conducive to effective government and education. A proper autonomy within each sector is as important as harmonious interaction between the sectors, i.e. each sector has its own special principle of effective and creative functioning - what we may call its own sector-specific 'modality'. In a progressive society, the essence of the cultural modality is freedom of thought and action and creativity, the essence of socio-political modality is just and equal opportunity between citizens, and the essence of economic modality is disciplined solidarity and productivity. Not coincidentally, these correspond with the ideals of the French Revolution, *liberté, égalité, fraternité* (Steiner 1961).

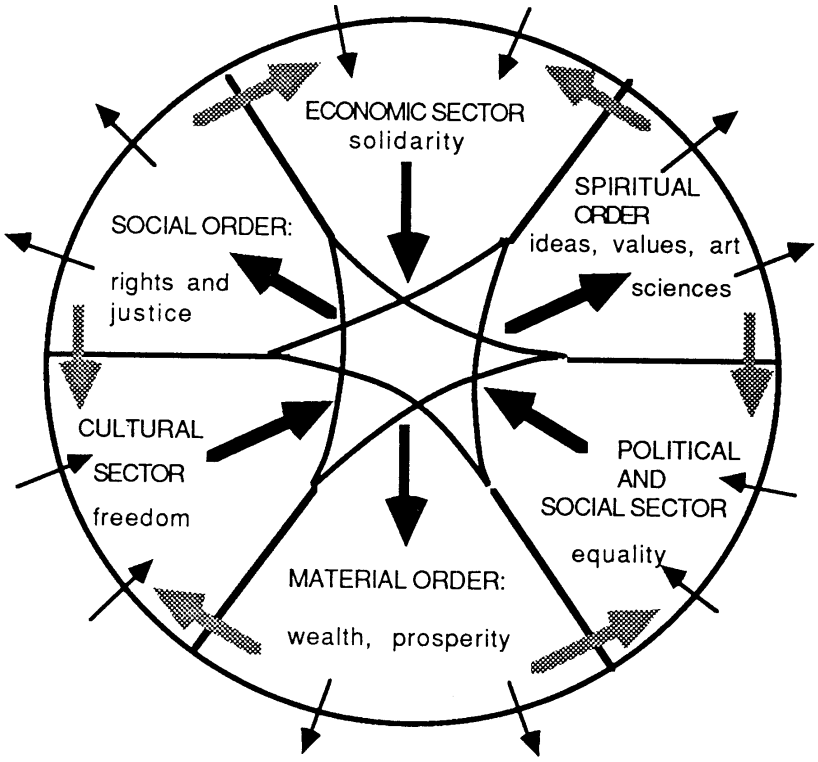

Figure 2. Model of the open, threefold society with its growth and interactions between sectors and produced orders.

This threefold model has important implications for societies in quest of self reliance. It suggests that a society as a whole will be capable of robust self-reliant transformation when the three sectors each function autonomously - i.e. according to their specific modality (solidarity, equality, or freedom) - yet interact beneficially with each other and with their respective external environments. In other words, the goal of self-reliance will be difficult to obtain if one or more sectors are not functioning, as they should. Imbalances of varying types and magnitudes can readily be observed in

every contemporary society throughout the world. It is not difficult to find a society, in which the principles of equality and freedom or human values have been trampled on in a quest for material welfare or political power, or an example of heavy-handed social systems, which put sharp ideological or religious restraints on their society's economic and cultural sectors. Elsewhere one finds theocracies in which the spiritual order harshly curtails people's socio-political and economic activities. And we can see for example how the weakness of African science and technology constitutes a major deficiency in the cultural sector and robs the social and economic sectors of necessary inputs (Lemma-Malaska 1991). The model encourages a sensible balancing of creative internal factors and to analyse harmful effects of and on the external factors. The economic sector, for example, can hardly fulfil its task of generating material well-being in developing countries under too harsh restraints imposed by world economy and its terms, nor in internally chaotic conditions.

The model indicates that obstacles to the harmonious functioning of society may exist in any sector, and originate from within the society and from without. It also illustrates how the proper functioning of each sector depends on its interactions with the other two. We may assume, therefore, that the links between the sectors and the overall health of the threefold whole are as important to the development process as the growth of any one sector. In this view, measures, which focus on aiding or reforming the internal economic sector alone can be expected to do little to foster autopoesi. Autopoietic capability will be difficult to achieve if recognition of the indigenous whole of the peculiar and particular features is not built in the development terms and programmes advised to the countries in transformation.

The principle that economic growth does not alone signify sustainable development is borne out in the global discourse (see e.g. Ekins et al. 1992; Malaska 1994). Widely spreading poverty in Africa since the 1970s as well as worsening global environmental problems are painful demonstration of it. The modest and steady growth of GNP per capita in the Sub-Saharan African economies in the 1950s and 1960s failed to make much of a dent in the overall conditions of hunger and poverty in the continent. Growth was accompanied by widespread food crises and economic stagnation or near collapse in the 1970s and again in the 1980s. Development appears as sustainable growth, but in Africa growth ended up to the collapse of growth. And poverty worsened with the heightening of the economic, socio-political, and ecological vulnerability of poor and marginal groups (Lemma-Malaska 1991).

3. DIACHRONIC MODEL OF TRANSFORMATION OF SOCIETIES

The centrepiece of this section is a dynamic model of societal transformation. The model is first presented in its general descriptive form, and then in the closing section some implications are outline for African case.

3.1. The Diachronic Model

The threefold synchronic model of a harmonious society, just considered, presented a snapshot image of societies, i.e. interaction structure between its constitutional parts or sectors. That model depicted the interrelationship of society's components but lacked any temporal dimension of the change. It implied that development policies must pay balanced attention to the economic, socio-political and cultural concerns, but gave little idea of how development priorities might change over time. Yet in reality the threefolding whole is assumed capable of transformation. Indeed, in today's world we can expect change to be the norm in the economic, socio-political and cultural spheres, as well as in their mutual interactions. Cybernetics teaches that in a changing environment any purposeful system, such as a human being or a human society, must be able and capable to renew itself and change its patterns of behaviour; rigidity bars the way to continued development. Thus the essentially static or synchronic model above requires a diachronic, dynamic complement.

The succeeding societies are classified in the model, in order of increasing complexity, as societies of basic needs, tangible needs or intangible needs (with many societies falling in some transition phase in between them). Moreover, history shows that a society with a greater complexity was previously less complex. The typical contemporary classification of societies as agrarian (or pre-industrial), industrial and post-industrial (see Bell 1975, esp. Tables 1-1 and 1-2) is here enriched by a classification system based on primary needs. The question of how and why one type is transformed into another is a much controversial and central topic. Clearly, a question such as 'What is a typical agrarian society like?' is of less interest in development debates than 'How do societies of tangible needs (industrial societies) emerge from societies of basic needs (agrarian societies), and how are they followed by a society of intangible needs?'

The general theoretical framework for this exploration of diachronic transformation is the theory of complex, self-organizing systems, far from equilibrium (see Nicholis and Prigogine 1977, 1989; Prigogine 1980, 1996; Allen 1984; Laszlo 1985, Grebogi-Yorke 1997). Contemporary studies in this exciting branch of systems sciences have revealed that all systems, including biological species or human societies, tend to follow similar patterns as they evolve. Scientist Ervin Laszlo summarized this discovery (Laszlo 1985):

- *In the most general terms, systems evolve when they reach a sufficient level of complexity, have flexible feed backs between their components, are exposed to a sufficiently rich and consistent source of energy, and when their normal functioning is disturbed.*

The factor of disturbance - termed 'fluctuation' or 'perturbation' in the thermodynamic theory - is the evolutionary trigger, and evolutionary leaps seems to occur "at the edge of chaos" (Kauffman 1995).

Each of the four logical factors for evolution outlined by Laszlo - increasing complexity, feedbacks between components, sufficient resource flow for a far from equilibrium state, and 'fluctuations' - has intriguing possible analogies in the diachronic development of societies. For example, the critical importance of the interplay between society's three components can readily be likened to the 'flexible feedback prerequisite'. The others will be further referred to below beginning with 'fluctuations'.

Evolution theorists emphasize, that the presence of disturbances is a particularly vital prerequisite for destabilizing the prevailing state and leading the system to a bifurcation, i.e. to transformation of the system dissipative structure (cf. Prigogine 1980, 1996; Nicholis et al. 1977, 1989). Laszlo notes (1985) that only the right sort of a trigger can propel the system into 'basic transformations':

- *The factor of disturbance must be of a specific kind and level. If it undershoots the critical level, the system's normal feedbacks buffer it out and evolution fails to occur. If it overshoots the critical level, the catalytic feedback cycles are disrupted and the system vanishes.*

The essential difference between natural systems (chemical, biological, ecological systems) and human systems (societies, enterprises, etc.) is that in the latter, the impulses causing primary fluctuations are initiated not only by chance but by man himself and can be made by him consciously. These sources of human origin include learning, innovation and invention, entrepreneurship, mobilisation of citizens and even rebellion; they can also include feedback through the ceaseless human devastation of nature and the environment. Technology development provides evidently some of the

main functional, compositional and structural fluctuations within the world system, in a positive and negative sense.

When the right sort of disturbance, occurring at a moment ripe for change, actually initiates a basic destabilisation of the prevailing order, the disturbance is said to have a 'nucleating' effect. It forms a nucleus around which evolutionary change expands to transform the entire system. The guiding hypothesis of the dynamic model of transformation is that, in the evolution of human societies from 'agrarian' to 'industrial' and 'post-industrial', *nucleation occurs around new needs to be satisfied*. The mode of production (agricultural, industrial, service.) is merely a manifestation of changing material orders, which correspond to the satisfaction of specific needs. That is to say, the conventional classification of societies (as agrarian, industrial, and post-industrial) does not refer to the most basic elements in transformational dynamics. It is for this reason that classification is proposed according to needs.

New needs, as they arise, are the key in fluctuations. They are to be regarded as intentional forces pulling and focusing the transformation process, whereas the prevailing material, social, and cultural orders, which generate the new needs and determine the factors of production distribution, and consumption are the causal forces conditioning and pushing the process. The development of societies proposed is inclusive rather than exclusive: the characteristic needs of the former state are also better satisfied in the new state. For example, as basic needs are primary in the first state, the emergence of tangible needs may precipitate the transformation to the society of tangible needs; in the new industrial society satisfaction of basic needs will remain relatively unproblematic and assured, while satisfaction of tangible needs will become the new societal preoccupation. It should be noted that the need bundle of the industrial society includes the bundle of the agrarian society as well. Basic needs do not disappear when the society turns to tangible needs - they become satisfied at a more advanced level but that means however merely fading in relative importance. Likewise, basic and tangible needs remain important in the society of intangible needs.

The process of shifting from one type of society to another involves several partly overlapping phases, and is far from mechanistic. Each society experiences an initial period of so-called *extensive growth,* in which it exploits more and more some state specific resources - land, labour, financial capital. The principle of extensive growth is 'getting more from more'. This type of growth leads only to quantitative, but not to qualitative advance of need satisfaction. The process of expansion of each sector is self-induced (auto-catalytic); that is, any change experienced is enhanced and accumulated, leading to further change in a similar direction.

At some point, a qualitative change in need satisfaction may occur which will require a different sort of change-impulse. The impulse may be termed cross-catalytic because it is a novel contribution originating outside a sector growth notably from the contributions of the other sectors. The process implies a change in the sectors due to the accumulated changes of the extensive growth period. The new changes bring along

a shift to a period of *intensive growth,* whose principle is 'getting more from less'. That is, the society acquires the ability to make more and better products for the satisfaction of the predominant need bundle without increasing the use of resources. The inputs of various sorts of resources per unit of product are reduced simultaneously - not a reduction of one resource input at the expense of an increase in another.

The final period of the transformation growth is called the period of *regenerative growth.* During intensive growth, surpluses of material and social wealth begin to accumulate corresponding to the savings in inputs and costs. Although some of the new wealth goes back into making the original mode of production more efficient, some of it goes to satisfying the need level of those in less favourable circumstances, and some of the wealth is used to satisfy new needs. These needs no longer have any connection with the original production mode; they cannot be satisfied under the old order. These needs are the key fluctuations, the nuclei or germs that stimulate the so-called 'regenerative growth' that takes the society into a new state. The principle of this type of growth is to exploit the new needs by enlarging production and consumption related to their satisfaction. Material and social production as a whole becomes increasingly organised around satisfaction of the new needs, and the society begins to orient itself away from the old preoccupations and modes of production. If the new needs are felt and expressed so strongly that regenerative growth is vigorous and sustained, then the transformation to the new state will be completed.

This diachronic model of the dynamics of societal transformation is illustrated in Figures 3 and 4, and detailed in the following description of the various states and processes included in the model.

3.1.1. The Society of Basic Needs

In the society of basic needs, agriculture in its broadest sense (cultivation, herding, forestry) is the dominant mode of production; agriculture produces the means of satisfying basic needs (food, drink, shelter, clothes, etc.). When the agriculture mode of production is predominant, basic need satisfaction is the predominant cultural value, the chief determinant of social organisation, and the focus of economic activity. The nucleation of development occurs around the basic needs.

The problem of the fulfillment of prime material, social and cultural needs is been solved in the most efficient way possible. In this process suitable production methods, infrastructure, concepts of work and livelihood, family composition, methods of upbringing and care, formulae for the possession and exercise of power and particular social values evolve. In other words, the entire society concerned, including its citizens, takes shape in an appropriate fashion to ensure the efficient satisfaction of its special needs. In addition, a power hierarchy is created among the various sub-orders of social activities, the apex of which is the dominant production mode of the society.

In agricultural society it is agriculture, centred on farmers and the individuals or organizations, which control land. The agrarian way of life, work, and rationale are set as criteria for almost all other activities in the society.

Livelihood, the concept of work, and the gender roles in the agrarian societies differ from those in other types of societies, as do the idea of family and the patterns of family life. In the agrarian society the family is a unit of both production and consumption, of maintenance and education, and therefore it tends to be large. Likewise ideas about these matters in the so-called 'developed countries' of today can be regarded as 'special products' of the industrial society, created by the particular requirements for advantage and effectiveness in satisfying tangible needs. And in the emerging service society these societal forms will become different from the present.

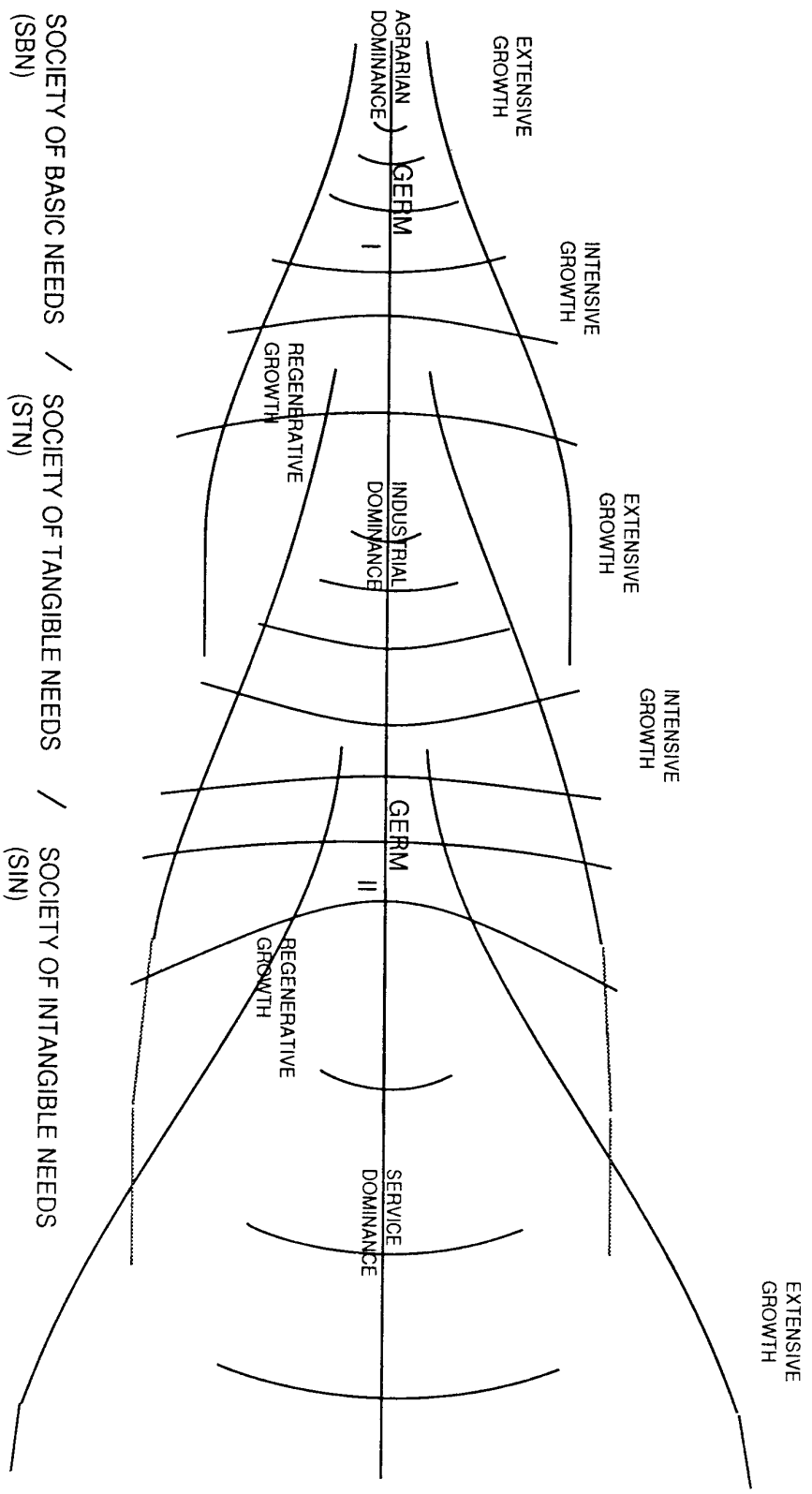

Figure 3. The transformational dynamics of societal change. Growth of the dominant sectors: agrarian, industrial and post-industrial (or service).

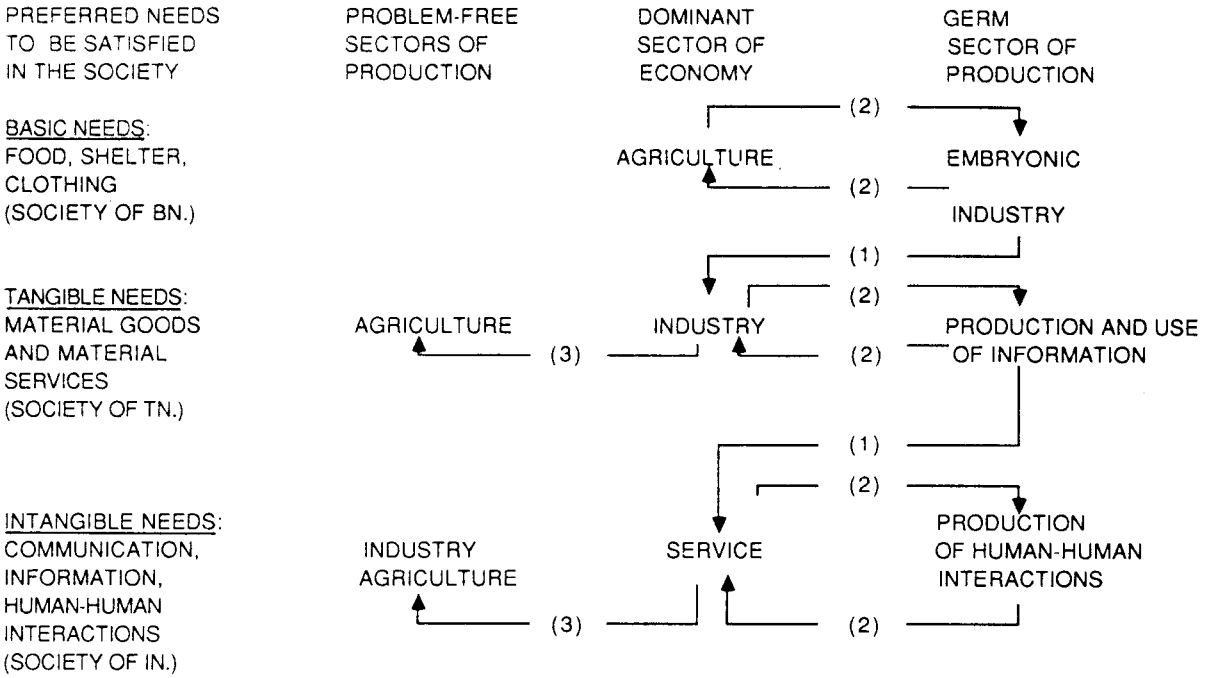

Figure 4. The processes of societal transformation.

a) Extensive Growth

Initially the most challenging problems of the society of basic needs are in increasing production by expanding its resource base, land area, number of cattle, and the like. Food, clothing, shelter as much as possible, as quickly as possible, to as many as possible are the main themes of development: a policy of extensive growth. The phase of extensive growth lasted for thousands of years in all regions of the globe. For the majority of mankind, the policy of extensive growth is fundamental to the improvement of the quality of life even today. However, for the industrialized and industrializing world it has not sufficed for decades.

At the stage of extensive growth of the society of basic needs the well-being of people can be measured in acres of tilled land, pastureland, or productive forest per capita.

b) Intensive Growth

Intensive growth in the society of basic needs is based on contributions from outside, which make agriculture more efficient although they are not part of it. Herein lies the cardinal difference between extensive and intensive growth. Extensive growth implies ever more agriculture. Intensive growth within agriculture means that more and more of the total production value comes from sectors outside agriculture. Gradually materials (fertilizers), tools (implements made in machine shops, machines driven by horses, etc.) and other manufactured products (for dairies, mills) are introduced into agriculture and utilized by farmers. Mechanization, chemicalization, improved breeding and treatment of plants and animals, and efficient division of labour contribute to intensification. It is no longer necessary to add to the acreage of cultivated land or the number of cattle at the old rate, because each acre and animal yields more than previously.

The real work of society is still done in fields, cattle sheds and forests, not in manufacturing. Outside contributions are justified only by the improved efficiency and versatility that they effect in real work and for real producers. The society of basic needs remains an agrarian society. However, through a continued increase in the use of inputs from outside its mode of production, it changes from a state of extensive to intensive growth. Simultaneously, this intensive growth creates a material base for new development. The whole of society moves towards a point of basic transformation as fluctuations and a nucleus of new needs are formed.

At first intensive growth accumulates new wealth only for the producers in the dominating sector, not for the rest of the society or for all of the consumers. Initially, accumulation is a means by which the landowners or owners of capital and agricultural workers achieve higher incomes. It may even occur at the expense of the rest of the population, as for example if production is intensified by the replacement of labour with machines. The importance of human work is decreased by increasing the inputs of surplus capital. This kind of substitution is always limited in its ability to foster robust, equitable development.

The material welfare measures of the period of extensive growth, such as acre per capita, must be replaced by a new yardstick for intensive growth - for instance by quantity of food produced per person.

c) Regenerative Growth

The period of intensive growth witnesses the birth of embryonic industry, which includes the manufacture of agricultural implements, clothes, and other goods from agricultural raw materials. This early industry, created in the first place to serve agriculture's needs for tangible goods, can become the nucleus or 'germ' of

regenerative growth - the tangible needs it fosters may acquire a momentum of their own.

Regenerative growth is the period of dramatic societal evolution, and it cannot be taken for granted. Only if the proper conditions prevail, including Laszlo's four factors of evolution, will agricultural society experience this type of growth. The existence of the germ of embryonic industry must be accompanied by a sufficient accumulation of complexity and surplus wealth in the material, social and cultural sectors. The accumulated wealth should be directed toward the new tangible needs. The germ of embryonic industry plays a twin role in this period. On the one hand it is an increasingly important external aid to agriculture, which makes basic needs satisfaction increasingly unproblematic; on the other hand industry is increasingly able to absorb the surplus of agriculture (production, labour, capital) and to take its place as the dominating force to further change.

Industry, fuelled by the needs of agriculture, eventually expands enough to absorb agriculture. The industrial way of organizing, producing and valuing penetrates everything in society, and agriculture resembles more and more a branch of industry. The society of basic needs becomes a society of industrial production and mass consumption of goods. The satisfaction of basic needs does not lose any of its importance; these needs will always, in a sense, keep their key position. However, the problems connected with the organization of the production and consumption required for their fulfillment have been eliminated. Nowadays the industrialized countries have no difficulties in producing and offering to their people any amount of varied food according to their needs. Over-production and those 'superfluously employed in agroindustry' are the main problems in the once dominant agricultural sector.

3.1.2. The Society of Tangible Needs

In the society of tangible needs, the industrial mode of production with its criteria for efficiency and functional requirements takes a determining position in society. It dictates and defines in turn infrastructure, the concept of work, living conditions, family composition, gender roles, the organization of education, health care, and, as noted, even agriculture. It wields power and sets values. The values of people in industrial societies are as industrial as the products they use every day.

For the maximum satisfaction of tangible needs, maximum consumption of commodities is required. Family units of the immediate family and the one-parent family ensure the greatest possible number of consumer units and maximum consumption by each of them. These units are the very insignia of the society of tangible needs, as the large family was of the society of basic needs; they are manifestations of the dominated industrial values of the society.

Goods are produced most efficiently by organized, large-scale industry, not by craftwork as was the case in the agricultural society. Industry and industrial progress during extensive growth facilitates the increasingly rapid satisfaction of the tangible needs of an increasing number of people. The world's industrial societies have already experienced a very strong period of extensive growth, which had momentous consequences and did not spare resources. At this stage, citizens of the industrial countries are all more or less resigned to the reality concept and the values it has created. The expansion of industry is all important to them and they are not yet prepared for any other kind of development.

At the extensive growth stage in the society of tangible needs, GNP per capita can be used as an indication of living standards. As long as productivity does not increase too quickly, GNP per capita is a good indicator of what the society values most highly - the flow of goods and use of resources.

The Intensive and Regenerative Growth Period of Industrial Production

In an analogy with the above intensification of agriculture, planners in the industrial world are asking whether there are any 'fertilizers' by means of which industrial production in general could move fairly quickly to the stage of intensive growth: to produce more from less, to conserve capital, labour, raw materials, energy, space and the environment while improving quality and service. These new kinds of solutions are already available for industry, and indeed industry in the most industrially advanced countries is on the verge of intensive growth. It has been pointed out that the verge is reached when the rise in overall productivity becomes ineffective in increasing the real production of welfare, but instead increases organizational costs and inflation. This happened in the advanced industrial countries during the 1970s (cf. Voge 1983). As a consequence, their societies are fast approaching a period of regenerative growth, a period of radical new development where new needs and the production methods they inspire will prevail.

The 'fertilizer' for industry in a period of intensive growth is information and new scientific knowledge and skills of communication and interaction. The nature of information technology is so general that it can be applied everywhere and at all stages of industrial activity - in design, organization, production, distribution and consumption or welfare production. New scientific knowledge and services, particularly services via the information technology infrastructure, satisfy the intangible needs emerging in industrial production. Intangible needs, in turn, constitute the germ or nucleus of further development in the society of tangible needs.

At first the intensification process appears to be making a non-industrial contribution to industry; that is motive and rationale for how its existence can be justified and how the reformers can earn their living. The objective of the process is to

accelerate total productivity in industry and thereby create additional wealth. It is possible to use the additional accumulated wealth both for further productivity improvement and for the satisfaction of the tangible needs of the less favoured. It can also be used to regenerate growth, that is, to open up possibilities for fulfilling new needs.

Moreover, the emerging orientation to intangible needs influences the mode of production, which becomes increasingly orientated to services, human interactions and information. As industry and agriculture become increasingly efficient and unproblematic, they are penetrated by the service functions; they become a branch of service business or economy, so to speak.

During the period of intensive growth, GNP per capita no longer gives a real picture of living standards and a new measure is needed.

3.1.3. The Society of Intangible Needs

It bears repeating that the process of transformation from an industrial mode of production and society of tangible needs to a post-industrial state follows a logic analogous to that of the transformation from basic-needs to tangible-needs societies. The production and use of information (with its associated services) are the nucleus of the transition. The new welfare accumulated during the extensive and intensive growth periods of the industrial mode of production can be channeled into the fulfillment of new needs. Information and information technology are important for the satisfaction of some types of intangible needs just as shovels and power engines were for the satisfaction of some tangible needs.

Information technology is thus a part of the material basis on which the opportunities to meet new needs are founded. However, the widely used term 'information society' is not adequate to describe the possibilities of the new type of society that will emerge. The conventional term draws attention to material factors of development and ignores other, more vital factors - notably the nucleating effect of intangible needs. The changes in our very needs and values are the more crucial issues.

The term 'information society' may be used in a restricted sense for the intensive growth stage of the society of tangible needs now under way in the most developed countries. However, there is a great 'gap of unfilled intangible needs' in the advanced societies, which cannot be filled by information technology. Both need-orientated and technology-orientated assessments of development point in the same direction, to needs that can be satisfied only together with other people in a variety of human relationships - at work, study, in families, and in other micro-societies. For this reason, a better term for the post-industrial society (which has yet to emerge) is 'the society of communication' or 'interaction', or, best of all, 'the society of intangible needs'.

In the society of intangible needs, new problems and new potentials will challenge people in ways that are scarcely imaginable now (Bell 1975; Masuda 1980). Questions of employment and increased international interdependence loom large, as does the frightening prospect of totalitarian social control. Material and social conditions could be created to cater to new types of family in the society of intangible needs. There will be more family types than exist now with an apparent need for new kinds of large families not held together by kinship. Their functions may be extremely varied, ranging from the supply of maintenance and care to the provision and development of close human relations. All of this could trigger off creative activity in people, which in effect is the only real resource for development in every type of society. The new science of complexity will be necessary for understanding these phenomena (Club of Rome 1984; Prigogine 1984; Zeleny 1984) and for constructing human governance of the societies which is not based on principles of totalitarism but freedom (Aulin 1982).

4. IMPLICATIONS FOR AFRICA

As a case study the dynamic model of societal transformation applied to Sub-Saharan Africa was seen to carry important implications for development strategies (Lemma-Malaska 1989). Most significantly, it underlines the principle that there can be no sustainable development without mass rural development. In its needs-based analysis, the model highlights the absurdity of dual-sector strategies which see industry as the leading, 'modernizing' sector: an industrial sector which is artificially stapled onto a population whose basic needs are far from satisfied cannot generate meaningful growth. This is not to say that industrialization is a monster in essentially agrarian Africa, for it is a proper way of producing tangibles. But the crucial question is, what type of manufacturing is required as a nucleus for development in a society of basic needs? The model gives a clear answer - manufacturing which serves the needs of agriculture. The recent historical record in Africa does not speak in such a readily intelligible way, but the encouraging experience of such states as Zimbabwe and Malawi suggests that agriculture-led growth based on increased welfare of the small-farming sector is the most appropriate path for long-term development in much of Africa.

To be specific, under current conditions 'growth from Africa's resources' means unleashing the latent dynamism of Africa's agriculture. The model of societal transformation presented in this essay was intended to demonstrate that intensification of agricultural production, as a means of increasing the welfare of the rural masses, is a prerequisite for long-term progress, including industrialization. Whether or not Africa can 'skip stages of development' (the model suggests that it is extremely unlikely), Africa's leadership ought to be able to skip some of the time-consuming process of trial and error which has burdened policy makers throughout the contemporary 'developing' world. Michael Lipton has broken down that painful process into four stages (Lipton 1976). His analysis, which leads to similar conclusions to our own, is a helpful review of the roles of agriculture and industry.

The first stage in the evolution of agricultural policy in a developing country is to advocate leaving farming alone, allowing it few resources, taxing it heavily if possible, and getting its outputs cheaply to finance industrial development, which has top priority. This belief often rests on such comfortable assumptions as that agricultural growth is ensured by rapid technical change, does not require or cannot absorb investment, and can be directed to the poor while the rich farmers alone are squeezed to provide the surpluses.

The second stage in policy for rural development usually arises out of the failures of Stage I. In Stage II, policy-makers argue that agriculture cannot be safely neglected if it is adequately to provide workers, materials, markets and savings to industry. Hence a lot of resources need to be put into those parts of agriculture (mainly big farms, though this is seldom stated openly) that supply industry with raw materials and industrial workers with food. That is the stage that many poor countries have reached in their official pronouncements, and some in their actual decisions. The farm sector is allocated resources not mainly to raise economic welfare, but because, and insofar as, it uses the resources to feed urban-industrial growth. Development of the rural sector is advocated, but not for the people who live and work there.

Lipton continues:

In Stage III, the argument shifts. It is realized that, so long as resources are concentrated on big farmers to provide urban inputs, those resources will neither relieve need nor - because big farmers use little labour per acre - be used very productively. So the sequence is taken one step further back. It is recognized, not only (as in Stage II) that efficient industrialization is unlikely without major growth in rural inputs, but also (and this is the distinctive contribution of Stage III) that such growth cannot be achieved efficiently or equitably - or maybe at all - on the basis of immediately extracting surplus. Stage III therefore involves accepting the need for a transformation of the mass rural sector, through major resource inputs, prior to substantial industrialization, except insofar as such industrialization is a more efficient way than (say) imports of providing the mass rural sector with farm requirements or processing facilities. For development to 'march on two legs', the best foot must be put forward first.

This phase of policy analysis is in excellent accordance with the dynamic model of transformation. Here we have both a summaries of the policy implications of that model, and a fair description of the strategies of states such as Zimbabwe and Malawi, which have made great strides toward food self-sufficiency. We join Lipton in rejecting Stage IV, which centres on the belief that poor countries should 'stay agricultural':

The counter-argument that neither the carrying capacity of the land, nor the market for farm products, is such as to permit the masses in poor countries to reach high levels of living without a major shift to non-farm activities seems conclusive.

It is in the nature of societies to transform, to acquire greater complexity as they are able to satisfy a widening range of human needs. There is no sense in abandoning the goal of industrialization as a desirable transformation for the long-term.

The title of this chapter contains the oft-repeated and usually vaguely defined term, African 'self-reliance'. How does the conceptual framework outlined in these pages

contribute to our understanding of the term? Reflections on that theme provide a fitting close to this chapter.

At first glance, African goals of self-reliance would seem out of place in a world, which - as Alexander King stressed in his preface to Africa Beyond Famine report - becomes more interdependent every year. Can Africans be accused of insularity if they wish to draw inward and concentrate on renewing their own strength? If we refer to the very deepest implications of our framework, the answer clearly is that Africa does well to cultivate its inner strength in order to re-emerge as a full partner in international exchange.

In an idealized future world, all global actors will have a well-balanced and progressive threefold structure. The main vitality of each society will come from within, yet we will experience a global economic order, a global social order and a global cultural order, all in harmonious interaction. And in such a world, every individual will find fulfilled within himself the threefold harmony of his own existence. From this utopian but nonetheless useful perspective, we observe that self reliance is not something, which occurs in isolation but in exchange. The forward momentum for personal or societal change must come from within (specifically from the satisfaction and reorientation of needs). But fruitful exchange with the natural environment and other societies is vital. A self-reliant society will be able to contribute, in partnership with other societies, to the global whole. But when the level of inner cohesion and strength is low, as in contemporary Africa, relations of exchange with other societies can easily be disadvantageous. Hence the desirability of protecting Africa from excessive economic, social and cultural exchange.

5. CONCLUDING REMARKS

Evidently, the proper unit of autopoietic transformation hardly is a single small country, but a larger regional grouping. In isolation each country can only try to push itself along the specific paths blazed by today's advanced industrial countries. In co-operation, by an effective sharing of production and trade, by social and administrative and cultural co-operation within a region, and with co-ordinated interactions internationally, the linked countries can strike out on their own path of transformation.

One might argue that the model gives too narrow a range of options, implying that all societies, everywhere, must follow the trail blazed by the Western powers and Japan in their march from the society of basic needs to the society of tangible needs and beyond. For example, many researchers have stressed that Africans harm their prospects for development when they borrow inappropriate blueprints from the North. Is the presented model another such import, to be treated with suspicion? Have not the development experiences of other developing countries proven that there are other promising paths to follow - paths that do not pin hopes for industrialization on prior mass rural advancement? The validity of such suspicions is sharply limited on theoretical and empirical grounds alike.

First of all, the logic of systems theory compels us to acknowledge that human societies (like other systems) require an accumulation of resources and an increase in complexity before they can evolve into a new form. There would seem to be no alternative for any countries than to intensify that mode of production, be it agriculture (in its broadest sense) or industry in the West, which organizes currently the majority of their work force and consumption and holds the keys to the sources of wealth.

Secondly, while there are certain special cases of countries whose path to industrialization falls outside the sequence outlined in the model - Singapore comes to mind - the exceptions bear little resemblance to the vast majority of other countries, and least to sub-Saharan societies. No one doubts that strategies of import substitution and export-led growth, the much-maligned two main alternatives to agriculture-led industrialization, can lead to 'industrialize' isolated enclaves among agricultural nations - urban industrial parks in the first case and cash-cropping islands in the second. It remains an open question, however, whether they will ever lead permanently to anything more than stagnation for the bulk of the populations (Hawkins 1986). Those two strategies will certainly play a role in the future, but the model suggests that their role in bringing about broad improvements in welfare will be peripheral.

A third point is that the dynamic model of societal transformation should not be taken as a restrictive, deterministic example of 'railroad thinking'. Linear railway thinking has been one of the most frequently employed methods in practical politics for describing and justifying a vision of the future. It operates on the simple belief that the (ordinarily envied) course of events, which has taken place in one country will be repeated in the country concerned after some follow up time. Development is likened to a railway track, along which the trains of nations move one behind the other at some intervals, passing in turn the same stations and the same scenery. The future for them resembles the past of those in front. In some cases such thinking can scarcely be regarded as anything more than an indication of the lack of creative thinking. In others, however, it may be the result of material interrelations and cause-and-effect chains between different countries.

The model sets a broad sequence of development stages; it implies that there are no short cuts to development, that each society must concentrate on the satisfaction of basic needs before putting its surplus of resources and wealth into industrial production. However, it nowhere suggests that the particular path chosen by a country must in a knowledge and skill content way closely match the path of another country. Complexification brings along continuous increase of diversification of skills and work share. There are many possible paths for societies to move toward more advanced and the complex states of multiple need satisfaction. It would be extremely unwise for any leaders to adopt an unimaginative type of railroad thinking instead of similar patterning thinking. Not only are the patterns set by Northern countries inappropriate in Africa because of the markedly different character and composition of the societies, but the historical context has changed drastically since the West's Industrial Revolution and at the onset of information revolution. One development economist has observed that the particular experience of historical growth in the West has limited value to the less developed countries (LDCS) on account of major differences in the initial conditions in six areas: resource endowments; relative levels of per capita income and GNP; climate; demographics; and prospects for both international migration and international trade (Todaro 1985). And now we have to add information and communication skills and industries. In each area, the West's starting conditions as it shifted into industry were more favourable than they are in LDCs today. On the positive side, the developing countries have the possibility of learning from experience of the developed countries. They have ready access to certain beneficial technologies and models, which the pioneers had to develop through slow processes of trial-and-error. The last benefit, however, seems to be outweighed in many cases by the market pressures to adopt inappropriate technology.

In summarizing, the purpose of this article has been to sketch a conceptual framework for a new consideration of developmental challenges, to stimulate and provoke further thinking and discussion, and maybe modeling. A mathematical modeling of the ideas of the threefold society and autopoietic transformation process

may well be reachable but has not been taken here. That work would belong to another study.

NOTES

Note 1

For historical surveys of neoclassical economists on Africa, highlighting the work of W. A. Lewis and H. Chenery, see John M. Staatz and Carl K. Eicher, 'Agricultural development ideas in historical perspective' in A. Hansen and D.E. MeMillan (eds.), *Food in Sub-Saharan Africa* (Boulder, Colorado: Lynne Rienner Publishers, 1986) and Michael P. Todaro, *Economic Development in the Third World* (New York: Longman, 1985). See also Gerald K. Helleiner (ed.), *Africa and the International Monetary Fund* (Washington, DC: International Monetary Fund, 1986).

Different concept of development is presented by Amartya Sen in his famous entitlement theory. Cf. Amartya Sen, *Poverty and Famines: An Essay on Entitlements and Deprivation* (Oxford: Clarendon, 1981). Sen analyses food crises in terms of entitlement bundles, which represent each individual's means for commanding food, such as cultivating one's own food, selling one's crops, or working for wages in order to obtain money with which to purchase food, inheritance, etc. A famine results from widespread entitlement failure, when for reasons such as drought or a market collapse, large numbers of people lose their capacity to command food. In this view, food security is a state in which one's various 'entitlements' guarantee access to adequate food. In a similar way, I define development as a process, which increasingly guarantees that each person, family, and community in a country, and the country itself, will be able to 'command' self-reliance in economic, social, and cultural sectors through whatever means they have at their disposal. This implies economic exchanges based on barter or purchase, as well as analogous exchanges in the social and cultural spheres similar the concept of complex development used in this article.

Note 2

The earlier somewhat different versions of the transformational dynamic model have been published as follows.

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ABSTRACT

The world is in a transient period of development. The term transient in this occasion means that a more or less stable world state or development stage prevailing is been destabilized and fluctuating relatively rapidly in a seemingly irregular fashion. The concept of development is thus composed of successive stages following each other and of a transient period between them. From a human point of view every transient period bears a twin message, a negative one of threats to be met and a positive one of new options and potentialities for proactive and visionary renewal to be challenged. Both of them may become self-amplifying and autopoietic. At first glance, an attempt to find a common pattern to development of different human societies might thus appear more readily uninteresting than interesting and something commanding to over-stress minor similarities among people and neglect important dissimilarities between them. A good example of this fear would be the most problematized area of the world society, Sub-Saharan Africa with its artificial political divisions between nations, ethnic and tribal diversities, colonial heritage, political unrest and so on, differ in many ways from societal orders elsewhere. However, when we regard development as a pattern of a general complex framework it allows to separate the logical forms of the entities from the context laden contents of different societies, and the above mentioned fallacy may be removed. The theory of complex systems with dissipative structures serves for that purpose in this article.

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