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Khan, Haider

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**Ecological Crisis and the Global South Internationalist Ecosocialism : A Strategy for
Comprehensive Sustainable Non-capitalist Development in the Global South**

Haider A. Khan

Distinguished University Professor

JKSIS

University of Denver

Denver, Co. 80208

hkhan@du.edu

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I would like to thank Prof. Abul Barkat for his valuable comments. All remaining errors are my own.

Abstract:

The main purpose of this paper is to explore a fairly comprehensive strategy for development as freedom beyond the ecological and other crises-filled capitalism in the 21st century. Accordingly, I try to find a way to integrate useful markets with the key characteristics of the Enabling Ecological Developmental State(EEDS) for the 21st Century in order to build a growing ecologically sustainable economy with equity in terms of capabilities. This will doubtless require a new global financial and ecological architecture. Relative Degrowth which involves sustainable people's capabilities enhancing growth in the Global South, and degrowth in the Global North is a necessary condition for such a postcapitalist planetary civilization. We aim for theoretical clarification as well as for aiding the strategies of popular democratic movements. A few tentative steps are taken here to serve this dual purpose. Proceeding from a critical capabilities perspective that is fully grounded in social reality of deepening *structural and ecological crises* of the Global Capitalist System, we discover that such a perspective leads to the need to include among the characteristics of the *Enabling Ecological Developmental State for the 21st Century* its capacity to build *an ecologically sustainable egalitarian development strategy* from the beginning. In addition, *democracy must be deepened* from the beginning. For the Global South including Eurasia, and particularly for Africa and Latin America, a new cooperative community of nations following their own rhythm to reach their own dynamic trajectories towards development as freedom will be possible if they cooperate regionally and globally on the basis of equal sovereignty and mutual respect. One precondition is to pragmatically unite for a common economic strategy. For this a decolonization of the mind in the global south is also necessary.

I conclude with some further thoughts on extending the model to an information theoretic based fractal model of development. A mathematical model of integrated financial and real sectors on abstract function space is presented in the appendix that can be extended for this purpose.

Keywords: Enabling Ecological Developmental State(EEDS), Stoffwechsel, Ecological Imperialism, Relative Degrowth, New Non-aligned Movement(NNAM), New International Economic Order, Global South, Democratic Internationalism, Egalitarianism, Ecological Crisis, Global Capitalist System(GCS), Counterhegemonic movements, Ecosocialism, Nonlinearities, Multiple equilibria, Entropy and Information Theory

1. Introduction:

For some time, it has been clear to critical analysts of the world system that a great historic transition has been underway with the rise of some national economies with various attempts at regional cooperation in the so-called global south (Khan 2004a,b; 2012; 2017; 2021). Is it possible to find ways for the Global South to launch a new non-aligned movement and create conditions for accelerated economic and political cooperation for enhancing the well-being of people in an ecologically sustainable new global order? It is the main thesis of the present paper that such an order will be a postcapitalist one, and the Global South including the expanded BRICS economies will need to be oriented towards ecosocialism in a relative degrowth setting.¹

At Doha in the 2012 meeting of UNCTAD, a fight broke out with respect to language in the final document that actually echoed back to a paragraph in the final document of UNCTAD XII in Accra in 2008. More specifically, paragraph 115 of that document read:

Developing countries should pursue development strategies that are compatible with their specific conditions within the framework of an enabling State, which is a State that deploys its administrative and political means for the task of economic development, efficiently focusing human and financial resources. Such a State should also provide for the positive interaction between the public and private sectors.

In the conflict at Doha over the ratification of the Accra accord four years ago the idea of an enabling State became a contentious issue. The neoliberals from the global North wanted a more neoclassical view, calling for an “effective State”. Such a state would work with private and NGO sectors in order to “help forge a coherent development strategy and provide the right enabling environment for productive economic activity”.

¹ Some recent contributions that are not directly focused on the Global South are Foster (2022), and Saito (2017 and 2023). Clark and Foster (2009) and Foster, Holleman and Clark (2019) address the question of imperialism in the anthropocene period. Khan (2023a) addresses the North-South issues related to ecological imperialism. Khan (2023b) draws the theoretical links between ecological damages, inequality and poverty and attempts to apply this theory to the Global South. Earlier works by Burkett (1999), Clark and York (2005), Burkett and Foster (2016), Foster (2000; 2009; 2020), Khan and Lippit (1993; 2007) and Khan (1997a,b; 1985) acknowledged Marxian contributions and developed them further. Khan and Lippit (1993; 2007), and Khan (1997a,b) following Marx and critical classical political economy, developed the concepts of ecologically adjusted surplus and ecologically sustainable quasi-stationary state. See also Schettino and Clementi (2022).

As is usually the case under such circumstances, the final document was a compromise. The relevant part of the Doha document read:

Each country has the primary responsibility for its own economic and social development, and national development efforts need to be supported by an enabling international economic environment. The State, having an important role to play, working with private, non-profit and other stakeholders, can help forge a coherent development strategy and provide an enabling environment for productive economic activity.

(Doha Mandate, Paragraph 12)

In retrospect, it does appear that the major achievement was the unity of G77 and China and despite the confusing incorporation of both sides, the idea of an enabling state survived the political storm. It is up to the progressive scholars to give the idea a more coherent conceptual shape so that it can guide social movements and policies for progressive change in the 21st century. This paper can be seen as an attempt to do this. The main purpose of this paper is to explore a fairly comprehensive strategy for development as freedom. Accordingly, I try to find a way to integrate useful markets with the key characteristics of the Enabling Developmental State for the 21st Century in order to build a growing ecologically sustainable economy with equity in terms of capabilities. Accordingly, I try to find a way to integrate useful markets with the key characteristics of the Enabling Developmental State for the 21st Century in order to build a growing ecologically sustainable economy with equity in terms of capabilities in Latin America. Finally, it becomes possible to see why the Global South and its allies in the civil society of the Global North need to build a New Non-aligned Movement(NNAM) firmly based on an anti-imperialist and ecosocialist understanding of key concepts such as *stoffwechsel*, ecological imperialism and a socialist Ecological Sustainability Principle(ESP).

In what follows, I first try to define ecologically sustainable development a bit more precisely. In particular, I ask what people-focused development means and how such development can be ecologically sustainable. It turns out that answering this question rigorously requires elaboration of Sen's concept of freedom as capabilities in an explicitly ecological, social and political direction. Then I proceed to ask what are some of the strategic questions we must ask when we wish to enhance capabilities in such a framework over time. This leads us to a view of an enabling ecological developmental state(EEDS) that includes many features from the East Asian Developmental State model; but it is crucially augmented by considerations of ecology, egalitarianism and deepening of democracy during the developmental process.

2. From Uneven Development, Ecological Imperialist Unsustainable Global Capitalist System(GCS) to Marx, *Stoffwechsel* and Sustainable Ecosocialist Development in the Global South as a Systemic Process:

In my other works in the reference section, I have covered systematically and sequentially the following areas that are dialectically interrelated:

1. Uneven Development in the semi-periphery and periphery
2. Real Competition and Uneven development in the semi-periphery and periphery
3. The East Asian Strategy of Capitalist Development in the periphery and semi-periphery.

4. Limits of the East Asian Strategy of Capitalist Development in the periphery and semi-periphery. What could at least a partial democratic socialist development be?
5. The ambiguous case of industrialization and innovation in PRC

In GCS, there can be much disorder at the micro level and yet there can also be the emergence of order at the macro level out of this disorder. This pattern of the capitalist order/disorder dynamics in the developmental economies can be explored theoretically by a series of real abstractions from the experience of developing economies within the uneven GCS development itself. This theoretical approach can explain some of the key stylized features of the components of the system. Some limits of policies and of the so-called developmental state capacities can also be identified through this analysis. The transnational dimension which was always important from the beginning of GCS has assumed an increased importance with massive cross-border trade and finance---part of so-called globalization--- along with transmission of negative externalities involving ecological damages in the age of monopoly finance capitalism. Our age has been called Anthropocene; but perhaps monopoly capitalocene is a better term. This is also consistent with Prof. T. Sekine, a student of the great Japanese Marxist theorist, Prof. Kozo Uno.²

In this connection, thanks to efforts by scholars like Foster and who have followed him, we know now that Marx was an early expositor of *stoffwechsel* in the social context as “social metabolism”.³ Starting with Marx’s engagements with the (industrial) agricultural practices and his critical study of Justus von Liebig’s work on organic chemistry and agriculture, we now have a fuller picture of Marxian critical tradition in ecology(Foster). This has been strengthened by recent MEGA additions (Saito). Today, we can extend many of these concepts starting with socially embedded ideas of *stoffwechsel* in the context of complex ecologically aware socio-economic systems theory. Khan and Lippit (1993 and 2007) worked in this spirit to introduce concepts of ecologically adjusted surplus and ecologically sustainable quasi-stationary state. In this paper,I put the latter idea in the global context as *relative* degrowth where the Global North must pursue a rigorous degrowth program with the differentiated Global South pursuing socially useful but sustainable green growth programs with the ultimate aim of degrowth as well.

² I am immensely grateful to Prof. Sekine for many conversations on this and other related subjects. His two volume explication of Unoist approach is a milestone. In one of his unpublished essays, Sekine-sensei relates Uno’s theory of stages of capitalism to the fossil-fuel based stage of global capitalist evolution. This approach is consistent with the order-disorder dialectic and uneven development discussed above.

³ In German the word “metabolismus” derived from Greek μεταβολισμός *metabolismós* is frequently used. As far as I know, Marx was the first social theorist to put it in an explicitly social context.

3. Ecologically Sustainable Development as a Complex Social- Economic- State Systemic Process inconsistent with GCS:

Writing in 1926, in a biographical essay on Edgeworth, Keynes underlined some of the problems of complex human systems:

We are faced at every turn with problems of organic unity, of discreteness, of discontinuity--- the whole is not equal to the sum of the parts, comparisons of quantity fail us, small changes produce large effects, the assumptions of a uniform and homogeneous continuum are not satisfied.⁴

Unlike Marx, Keynes was ironically unaware of the deepest contradictions---particularly ecological contradictions--- of GCS in his time. If anything, the developing part of the world economy today shows to even a greater degree the kind of complexity partly and imprecisely captured in Keynes's words above.⁵ Fortunately, systems theory---including critical ecological systems theory---and critical economic theory have both made some progress since those dark days. Although we are far from a genuinely complete theory of complex ecological economic systems, efforts are underway that have already borne some interesting fruit in several limited areas.⁶ A review of even partially successful set of country experiences such as are contained in Fosu(2013) can be seen as case studies that reveal many facets of complex developing economies --each with its own sub-systemic characteristics to be sure, but also sharing some common strategic features. However, as some including this author have pointed out, the capitalist models of development---statist or neoliberal--- leave a deep analysis of ecological contradictions out.

In contradistinction to this literature, the main purpose of this paper is to synthesize from a strategic critical ecological perspective--- to the extent it is possible to do so following Marx and more recent developments within the Marxian tradition--- the development experiences of the East Asia in particular and draw some appropriate lessons. The claim is that such an approach can lead to a theoretical view of an enabling ecological developmental state(EEDS) that includes many features from the East Asian Developmental State model but advances the theory from/within a critical framework. Therefore, in our theory, we go beyond the standard East Asian model. In particular, it turns out that the theoretical basis of the East Asian Developmental State model must be crucially augmented by ecological considerations together with an egalitarian deepening of democracy during the post-capitalist developmental process. Clearly, the systemic crises of accumulation and the deepening ecological crisis impose new challenges that the old East Asian Model did not and perhaps could not address(Arrighi 1994, 2007, 2010; Khan1997a,b; 2010;Khan and Lippit 1993,2007;Khan and Liu 2008; Li 2008)

Therefore, at this point in our discussion, some clarification of the key term "development" is necessary in order to avoid ambiguities and confusions. In the rest of this paper, I will be referring to three concepts of development that are implicit in much of the discussion in the political

⁴ Keynes(1971-9), Vol. X, p. 261

⁵ Keynes was not explicitly concerned with complexities of ecological connections. This applies also to the other economists of his time.

⁶ See for example, Khan(2004a,b, 2003a,, 1998,1997a,b) and the references therein.

economy of development literature ending up with our ecological framework with EEDS mediating between GCS, market systems in individual countries and requirements of ecological sustainability in the context of stoffwechsel in the 21st century. We begin with earlier uncritical theories.

The first is the idea of development as growth with some structural change or at least the idea that this type of growth is the most crucial necessary condition for development. The second concept is derived by adding explicit distributional elements to growth--- particularly inequality and poverty. Both these ideas are shared by many development economists---- for example, many of the authors of the chapters in Fosu(2013) ---at least implicitly. Fields was one of the earliest in being explicit in discussing all three---growth, absolute poverty and inequality--- and his thoughtful model in the Quarterly Journal of Economics (Fields 1979) article alerts the reader to the performance of a developing economy in all three areas and derives--- at least partly--- a logic of further necessary reforms following from his cogent analysis of the three aspects of development in this sense. Warr(2008) is a more recent example for the case of Thailand. He concludes:

Not all aspects of the Thai development strategy have been similarly successful. Inequality has increased at the same time as absolute poverty has declined. The underlying causes of this increase in inequality are still not well understood. (Warr 2008, p.)⁷

The third--- and the broadest approach to development discussed here--- is in terms of Sen's idea of capabilities and its further extensions. In this view, development is really an extension over time and space of freedom, particularly the positive freedom to lead a certain type of life an individual has reasons to value. Sen and his coauthors have, of course, used this idea, and following Sen, many others have done so as well (Sen 1992, 1999, 2009; Nussbaum 1995, 2000; Khan 1998, 2014). Yet, in so far as there is a normative aspect about development being a "(public) good" that is a premise for the whole project such a view is consistent with the analyses of the East(and to some extent Southeast) Asian Development. But we must add ecological considerations at the center here as well.

WIDER in Helsinki invited a number of scholars including this author to discuss development models and history. Here I will pick a few of the most important essays related to East Asian experience to motivate the ecologically oriented framework I emphasize here. These are all published in the volume edited by Fosu that came out from the Oxford University Press (Fosu2013).

Warr's essay on Thailand is quite explicit in mentioning both the positive achievements and the shortcomings of Thailand's record and its strategy which can fit into this broad systemic capabilities approach. For Korea, Keun Lee has gone further. In fact, Keun Lee's perceptive comments on the possible role of democracy in development extends considerably the terrain of discussion in the direction of the "development as freedom" perspective when he writes:

⁷ See also Warr(1993,1999,2005) for nuanced analyses of the various aspects of Thailand's development experience and Jomo(2007,1995) for Malaysia..

We see obvious advantages in democracy, amongst which is the convenient feature that citizens are not subject to arbitrary arrest and torture. Truly strong states get it wrong more often than they get it right. Thus the military dictatorships of Latin America left little in the way of legacy, whereas the military dictatorships in Korea and Taiwan (while not on anything like the same scale of brutality) left a powerful legacy of development. The difference lies clearly in strategic orientation and in institutional capacity in formulating and implementing a program of national industrial development. Our point is that this is an option available to the political leadership of any developing country today. On top of this, the key to the Korean or Asian success was institutional longevity. (Lee 2008, p. 13)

It would seem, therefore, that there is an implicit agreement that development is "growth plus" other things (Khan and Weiss 2006). While the list of "other things" may vary somewhat, none of the thoughtful scholars of development would want to equate growth and development. Yet, as the East Asian experience shows, generating high growth may be a useful means towards development. But one must also pay careful attention to what can be called "the political economy and the well-being consequences of growth". Consideration of these factors leads inevitably to the role of state. The East Asian experience suggests that the role of states in their developmental process was "enabling" but the transition from an authoritarian to more democratic forms of state was slow. In terms of class character, these states are still bourgeois with accommodations for popular interests that are the results of long and hard struggles by the masses from below.⁸ This suggests a change in strategic orientation for the progressives in the 21st century. Such an approach necessarily will need to take differences---particularly class, gender, racial-ethnic differences --- seriously in a critical theory of equalizing capabilities (Khan 2009, 2012a,b, 2014).

What precisely can be the character and role of such an "enabling" ecological developmental state in the 21st century? We try to answer this question in the next section.

4. Towards a Counter-hegemonic Global South: An Enabling Ecological Developmental State for People's Well-being for the 21st Century

At least since the classic work by Johnson (1982) on MITI and the Japanese economy, the role of the developmental state has received much attention. Woo-Cumings (1999) is a good collection of papers that explore various aspects of Developmental States. Meredith Woo-Cumings (1999: 1) presents the theory of developmental state as the explanation for the East Asian industrialization. Earlier, Chalmers Johnson had stated: 'it is a shorthand for the seamless web of political, bureaucratic, and moneyed influences that structures economic life in capitalist Northeast Asia' (Johnson 1982). Johnson in his book *MITI and the Japanese Miracle*, had coined this term for analyzing Japanese industrial policies. According to Woo-Cumings, the concept of the developmental state was originally used to analyze a plan-rational capitalist system like Japan, 'conjoining private ownership with state guidance' (Woo-Cumings 1999: 2). Johnson explains in his contribution to the history of the developmental state debate that 'one of [his] main purposes in introducing the idea of capitalist developmental state [...] was to go beyond the contrast between the American and Soviet economies' (Johnson 1999: 32). At least one part of the theory is drawn from the history and the theory of mercantilist intervention of the state in the economy. But in the fashion of Hamilton and List, the developmental state theory is applied to late capitalist

⁸ Prashad(2014) presents a history of the global South. More importantly, the last chapter of Prashad(2014) discusses critically the details of the emerging movements in the global South and their transformational potential.

development in the sense of building industrial capitalism within a World Capitalist System(WCS) where early starters are already in a more advanced stage of industrialization. Historically, in Bismarck's Prussia and in Japan during the Meiji era the developmental states carried the burden of starting and then sustaining the industrialization process. Scholars such as Reinert have traced the history of interventionist states all the way back to the Renaissance (Reinert 2007)

After World War II, Japan, Korea and Taiwan were particularly successful in building both the developmental state and industries that were export-oriented. The debate picked up speed after the work of Amsden (1989) and the World Bank Study of 1993. Wade (1990) studied the Taiwanese economy in detail from a "governing the market" perspective. Chang's study of Korean industrial policies were important to develop the thesis further. Khan (1983, 1997) discussed the technology policies of Korea and advanced a variant of a theory of state-market interaction in multiple dualisms within a developing economy. Khan and Thorbecke (1988, 1989) had applied a similar theory to study the choice and diffusion of technologies for Indonesia by using a social accounting matrix. Khan(2002,2003a,b,2004a, b) developed nonlinear models of "governing the market" and innovation and applied these to both Korea and Taiwan.

As many have emphasized (Amsden 1989; Chang 2008, 2007, 2003, 1994; Evans 1995, 1998, 2007; Ghosh 2009, 2010;Jomo 2007;Khan 1983, 1985, 1997a,b, 2002, 2003a,b,2004a,b, 2012a,b, 2013; Wade 1990;Weiss 1998), a set of encompassing institutions where the state is both an initiator of development policies and builder of development institutions is a crucial determinant of development success. The state is also a settler of conflicts before they became disabling as in many African and Latin American countries. This enabling state shows "embedded autonomy"(Evans 1995). It also analyzes state capacity as a special form of infrastructural power(Mann 1988; Weiss 1998) and states can use this power to lead structural transformation of the economy. Weiss calls such a state-business class relationship one of governed interdependence. In East Asia such interdependence has been important.

More specifically, a dynamic picture of the leading role of the enabling state emerges. Over time. The state provides disciplined support for export-oriented sectors through directed credit and other subsidies. The state also coordinates investment across sectors and within industries . It invests itself in areas where private risk absorption capacity is too low. This is important in building up a national system of innovation in particular. The state also steps in to manage sectoral and macroeconomic crises ensuring a relatively smooth accumulation process to proceed. However, the distributive conflicts were lessened for Japan, Korea and Taiwan through US-imposed land reforms after the war. In China on the other hand, an egalitarian society with a Gini coefficient between .25 and .28 in the 1970s became highly unequal from 1990s onward with Gini index over .45.

Given our capabilities perspective in section 2, we need to include among the characteristics of the Enabling Developmental State for the 21st Century its capacity to build an egalitarian development strategy from the beginning. In addition, democracy must be deepened also from the beginning. Khan(1998, 2008a,b,2009,2010, 2012a,b) has attempted to build a theory where *egalitarian distribution and deepening of democratic institutions* and practices along with the standard industrial, trade, monetary-financial and other developmentalist policy making of the state have

theoretical salience. Furthermore, given the deepening ecological crisis, this type of state will have to devise policies for *at least mitigating the ecological crisis*.

It is such a state that we can call an *Enabling Developmental State for the 21st Century*. Both technically and from a social perspective efficient but egalitarian innovation systems throughout but particularly after the middle income stage become crucial in terms of enhancing people's capabilities rapidly and widely. Khan(2012a) has therefore replaced the idea of a national innovation system(NIS) with that of an augmented national innovation system(ANIS). A thoroughly innovative Enabling Developmental State for the 21st Century will augment both efficiency and capabilities of people in an egalitarian manner. It is clear that the state of this kind cannot be formed unless popular forces can launch movements and programs of their own. Is there any hope of this being achieved in the next few decades? Prashad(2014) discusses the complex processes underway in the global South now---particularly in Latin America. Although by no means guaranteed, the achievements of people's movements in Argentina, Brazil, Chile, Bolivia, Venezuela and elsewhere give us some room for optimism(Peet 2007:Peet and Hartwick 2009). But the project has barely been started. A new theory of an Enabling Developmental State for the 21st Century that both nurtures and is nurtured by these movements will be of a kind that can play a counterhegemonic role. We are at the beginning of this process. Such a process already shows a multidimensional nonlinear complex system of WCS breaking down with a combination of ecological-economic, political, social and ideological crises. We cannot predict the forms resistance and transformational movements will ultimately take. However, the emerging self-organization of people's movements will undoubtedly take multiple forms ranging from anti-capitalist local resistances to national-regional-international political parties and broad-based social movements and new social formations.⁹

⁹ Thus, without falling into self-refuting relativism, there is a way to accept epistemic limits, resist imperial power-knowledge-discourse schemes and formulate positive pro-people programs that are internationalist but local and regional at the beginning and with time passing, ultimately global in scope. Prashad(2014) presents a good case for the local-regional-global sequence in the current context. I along with others have argued to accept the proposition that capitalism will not be able to solve the currently unfolding ecological crisis as well as the other crises endogenous to the GCS. If not the other crises, the ecological crisis itself, left unchecked, will destroy human civilization. Thus capitalism which is a complex exploitative system must be transformed into a more harmonious people and nature oriented system. It has to be understood that capitalism which has created the ecological and other crises, is a *global* system and ultimately can only be defeated by a *democratic global movement*. Thus although I am critical of their insufficient appreciation of the political economy of complex exploitative global capitalism, I accept much of the postdevelopment school's criticism of development as expressed for example by the work of Escobar, Rahnama and others. In fact, I have tried to make many of these cultural and ecological criticisms in addition to the critical political economy analysis of global capital, starting with Khan(1983) and continuing till now, without falling into the epistemological and ethical-political impasse of the postdevelopment school. See Khan(1998,2009) for a sympathetic critique of poststructural and postmodern turns and their application in postdevelopment thought, and an alternative critical positive construction of a dynamic democratic-participatory counterhegemonic development from below that can deepen with time. Richard Peet and Elaine Hartwick (2009) present a very fair summary of the various poststructuralist and postdevelopmentalist positions, ending with a thoughtful critique and defense of "critical modernism". It may be that when the new pro-people and deeply democratic dynamic system is more visible than it is now, we could describe the emergent features more fully and find a term which is more adequate than "development". I would like to keep that possibility open. On ecological crisis and capitalism in the 21st century, see Li (2008), Khan and Lippit(1993 and 2007) and Khan (1997a,b,1998, 2010).

We now ask the question: how do we conceive of an initial strategic plan that draws from the best experiences of the East Asian Developmental States and augments these with mainly egalitarian ecological and democratic elements for the 21st Century?

5. A Twelve Points Characterization of a Strategic Approach towards integrating useful markets with an Enabling State for the Global South for Development as Freedom in the 21st Century

Synthesizing the Experiences of the East Asian countries further reveals some common strategic orientations as well as the effects of changes in external environment and shifts in policies over time. This is consistent with the characteristics of complex economic systems which are nonlinear with multiple equilibria and path dependence. Over time, one may observe the emergence of structural shifts in some cases, stagnation in other cases depending on initial conditions, strategies, policies and external environment among other things. For the cases discussed in the vast literature, there are many specific variations within each. However, they also share to various degrees many specific features listed below. It must be kept in mind that in the 21st century, ecological sustainability with justice to the poor people and their needs, will have to act as a constraint. But this applies particularly to the duty of the developed countries to curtail their consumption in general, and of nonrenewable energy consumption in particular. The most important point---from ecological perspective taken here is the first one. All other points are conditioned by the ecological sustainability imperative.

- 1. Ecological Sustainability Principle(ESP):** This is fundamental to an ecological sustainability oriented development strategy within the Relative Degrowth context. The East Asian developmental model did not pursue this on the whole. It is time to think about strategies that honor the ESP by foregrounding the ideas of *stoffwechsel*, ecologically adjusted surplus, ecologically sustainable quasi-stationary state and related concepts. This applies in particular to strategic openness, heterodox policies, technological innovation and capabilities, inequalities and poverty reduction with special force.
- 2. Strategic Openness** to various degrees with Thailand being the most open and Viet Nam¹⁰ the least. But in all cases there is a strategic commitment to export promotion and further goals of moving up the value added ladder. It should be kept in mind however, that there can be a "fallacy of composition"(Cline1982, Khan 1983, Mayer 2002, Razmi and Blecker 2006) in claiming that all developing countries need to do is to pursue an export-led growth policy. Reciprocal demands may not exist sufficiently and the ensuing competition for export markets in developed countries may create winners as well as losers. Therefore, what may be needed in the future for other aspiring countries is a strategic approach including the development of national and regional markets and the creation of dynamic comparative advantage along with a number of other policies and institution building processes described below.

¹⁰ However, see Thoburn et. al.(2007) for an insightful and nuanced discussion of Viet Nam's trade-orientation and policies for the textiles sector.

3. **Heterodox macroeconomic policies for stability**¹¹--- Japan, Korea and Taiwan and many Southeast Asian countries such as Malaysia, Viet Nam and Singapore display more of a mix of heterodox policies. It seems that the rigidity of Washington consensus particularly in this area is rejected by the experiences of developing economies like Japan, China, Korea, Taiwan, and Viet Nam. In particular, use of fiscal policy, monetary policy and exchange rate policy together with trade and selective industrial policies can build an industrialized sustainable economy with good jobs and decent incomes for the people both in rural and urban areas. Further discussion of this last item can also be found under points 4 and 5 below ---Agricultural Development, and Industrial Development and Structural Change, respectively.
4. **Creation of institutions for productive investment**---this exists in all cases, but Korea seems to have gone much further than the others much earlier. Starting with the reforms in the 1960s, it moved through several successive stages and is now trying to find appropriate technological niche in a world that is moving towards a convergence of information, bio and nano- technologies by 2050. The role of state in the creation of these institutions is still very prominent. China has followed with its own plan for building an innovation system (Gabriele and Khan 2010).
5. **Agricultural development**--- Earlier, in the immediate post-WWII Keynesian-liberal and Social Democratic Spirit Japan, Korea and Taiwan carried out land reforms. China followed a revolutionary socialist path and land is still legally held collectively even with the current responsibility system. Among the poor Asian countries Viet Nam probably put through the most egalitarian pro-peasant development policies after its victory in the national liberation war in the 1970s. Warr(2008:p.12) describes the importance of agriculture in the Thai case:

The results of the analysis indicate that agriculture's contribution to economic growth in Thailand included impressive rates of TFP growth. But its main contribution occurred through releasing resources which could be used more productively elsewhere, *while still maintaining output*, rather than through expansion of agricultural output. It is seriously wrong to characterize Thai agriculture as 'stagnant', based merely on the fact that output growth is slower in agriculture than in other sectors. If agriculture had really been 'stagnant' economic growth would have been substantially lower because it would not have been possible to raise productivity significantly within agriculture or to release resources massively while still maintaining moderate growth of output

Viet Nam's reforms in Agriculture are evaluated by Thoburn(2008) in the following words:

Rice, indeed, is the great success story of the agricultural reforms. Vietnam changed from being a net importer of rice in the 1980s to the world's third largest exporter (after the US and Thailand) in the mid-1990s, though there has been little further export growth since the late 1990s, particularly compared to other products This lack of growth is not necessarily surprising or a sign of failure. In the late 1990s, when rice export growth was peaking, less than 15% of output was being exported In an economy where around 70% of households were both consumers and producers of rice, rises in rice output were important primarily for raising rural incomes and for food security, with the surplus available for export varying with fluctuations in domestic production.

¹¹ See Jomo and Nagaraj(2001) for a good discussion of heterodoxy in this context.

The state has played a role in encouraging new crops such as cashew, and later coffee Coffee is not straightforwardly a success story, though, as the expansion of Vietnam's coffee exports in the mid-1990s was a factor in causing a substantial fall in the world price.

6.Industrial development and structural change-- the strategic perspective in this important area suggests that the successful Asian countries to various degrees pursued a continuously unfolding and dynamic set of policies with much trial and error. The retrospective attempts to tell a coherent story have often led to an overly deductive picture where good performances supposedly follow from a few , usually neoclassical economic principles. The Malaysian case study is a good and convincing counterexample.

Jomo and Wee(2008:p.10) describe some changes in strategy and policy for Malaysia within specific time-sensitive contexts:

Over the years, the government has changed its industrialization strategy. In response to problems and new priorities, the government announced the Second Industrial Master Plan (IMP2) for 1996-2005 in December 1996 to replace the (first) Industrial Master Plan (IMP) for 1986-1995. In September 1996, the government had set up the Multimedia Super Corridor (MSC) to promote certain information technology investments. The government committed over RM50 billion for infrastructure development to support this initiative. At the same time, the government strengthened intellectual property laws to reassure foreign investors and provided more generous incentives for new investments in this area.

Thus, the policy changes of the mid-1980s appeared successful in reviving growth and industrialization. Confirmation of the new policy direction from the mid-1980s came with the 1991 enunciation of Vision 2020, favouring growth, modernization and industrialization. Although FDI began levelling off in the mid-1990s, increased domestic investments – inspired by greater domestic investor confidence – sustained the momentum of rapid economic growth until the 1997-1998 regional crisis. The gravity of the crisis and the difficulties of recovery were exacerbated by injudicious policy responses, compromised by cronyism, though there is little persuasive evidence that cronyism itself precipitated the crisis.

They also point out changes in the sixties and seventies as well in response to changing global economic environment:

The decline of rubber prices in the 1960s must surely have affected economic performance and policy. Malaysia's experiment with import-substituting industrialization under foreign (principally British) auspices was quite different from most other developing countries where state-owned enterprises played leading roles as well as Northeast Asian experiences where effective protection was conditional on export promotion. Malaysia's transformation from net oil importer to exporter in the mid-1970s, when petroleum prices rose sharply, allowed the government to spend much more, while the recycling of petrodollars later allowed it to borrow from abroad at low cost until the Volcker intervention of 1980 raised real interest rates and precipitated a global recession, bringing commodity prices down. (Jomo and Wee 2008:p.14)

The case study of Viet Nam also confirms the suspicion that there is much that is improvised and *ad hoc* during the earlier phases of apparently successful development cases. The lesson here is perhaps to avoid major resource allocation distortions(as documented by the Thai case also) and constant monitoring and policy revisions when existing policies do not work well.The political preconditions for this are in the background even in the Malaysia and Viet Nam papers which are more explicit in these regards than the other two papers.

7. Creation of technological capabilities--- here the Korean case stands out as a very apt illustration of creating technological capabilities throughout the entire growth and development trajectory in definite stages.¹²

As Lee(2008,pp.4-5) points out:

Among various aspects of capacities, emphasis should be on technological capabilities because without these, sustained growth is impossible. In this era of open market competition, private companies cannot sustain growth if they rely upon cheap products; they need to be able to move up the value-chain to higher-value added goods based on continued upgrading and improvement and technological innovation. Furthermore, private companies had better be “local” companies, whenever possible, including locally controlled JVs, not foreign controlled subsidiaries of the MNCs. MNCs subsidiaries are always moving around the world seeking cheaper wages and bigger markets. Therefore, they cannot be relied upon to generate sustained growth in specific localities or countries although they can serve as useful channels for knowledge transfer and learning.

The Malaysia paper by Jomo and Wee also recognizes this essentially strategic aspect of creating technological capabilities during medium to long run development. It is also clear from the Thailand and Viet Nam cases that strategic concerns with the creation of appropriate technological capabilities have been and continue to be very important. Khan(2002 and 2004a) has discussed the interventionist role of the state in Taiwan in this area.

8. Technological learning and innovation--- creating national innovation systems in particular requires the creation of specific institutions and technological learning over time. Ultimately, if development is to continue beyond the catching up phase, this may present the most crucial set of policy challenges. Here, the paper on Korea is an admirable attempt to sum up the lessons. There are specific features here to which Lee(2008,p.5) draws our attention:

Therefore, while the ultimate goal and criterion of development is to raise the capabilities of local private companies, the process needs pilot agencies to guide and coordinate the whole process. Such needs exist because key resources are so scarce, and thus had better... be mobilized for uses in sectors or projects with greatest externalities. As understood by Gerschenkron, who analyzed the latecomer industrialization of Germany and Russia, and identified latecomer agencies, such as large state-owned investment banks to drive the process in these countries, it is such agencies that can make up for gaps or lacunae in the country that is seeking to industrialize. All the east Asian countries built specific state-agencies that played a role of guiding the process of industrialization. In Korea the institutions established in the 1960s under the Park regime included the Economic Planning Board to set economic plans; the Ministry of Trade and Industry to support industrial policy and export; and the Ministry of Finance to finance economic plans.

Both state and civil society have to play important roles. At an earlier stage, the state necessarily plays a large and activist role . At a later stage, however, the creation of technological capability has to rely on a private-public partnership at both the precompetitive and the competitive phases of innovation(Khan2004a).For China, Gabriele and Khan(2010) present an analysis that points out the key role of the state in building an innovation system.

9. Direct Foreign Investment and Foreign Aid--- these factors have played a role for all East Asian economies but perhaps more so countries like Thailand, Viet Nam and Malaysia. Investment from abroad

¹² See also Lee(2006) for a contrast of Korean experience with the Washington consensus and Khan(2008, 2002,1998 and 1997) for a discussion of the Korean (and Taiwanese)case(s) in the context of a distributionally sensitive growth model for positive feedback loop innovation system.

has perhaps been more significant than aid per se. However, internal generation of investible funds and public sector support have also played a crucial role---particularly in Korea. DFI in manufacturing sector can be important as the Viet Nam (and also the Thai and Malaysian cases) case shows:

Sectorally, manufacturing has been the most important area for DFI, with 51% of accumulated registered foreign capital over the 1988-2006 period, followed by transport, storage and communications (9.6%), mining and quarrying (8%) and real estate (8%) . (Thoburn 2008, p.8)

Not everything has to be of the best practice genre for DFI to come in as Thoburn shows for Viet Nam:

Paradoxically, Vietnam scores badly on conventional measures of competitiveness and investment climate, yet is highly regarded by foreign investors who operate in the country. The World Bank's *Doing Business* survey ranks Vietnam as 104th out of 175 countries as a good place to do business. In contrast, the *VDR* for 2007 claims that Japanese inward investors see Vietnam as the third most attractive investment location in the world. It seems that Vietnam's stable macroeconomic environment, high quality and low cost labour, and low levels of crime are more important considerations for investors than the details of bureaucratic procedures which are often included in international surveys. (Thoburn 2008 p.9)

Foreign Aid-- particularly Japanese aid--- has played a role in the development of Thailand and Malaysia but in the Asian cases the leveraging of aid for domestic development has perhaps been more important than the actual quantity of aid.¹³

One must be aware that in many cases aid and DFI can also lead to external dependence. A developmental state cannot surrender its sovereignty in domestic decision making capability and flexibility to foreign experts in exchange for aid. Khan (2003a and b) points out some of the pitfalls in aid and DFI regimes. Ultimately self-reliant domestic institution building process is the key to sustainable development.

10. Poverty reduction strategies-- these are a varied set of policies that are necessary in addition to growth. Although growth is a very important component of such a strategic approach to poverty reduction, in all cases specific policies targeting both rural and urban poverty were undertaken. In case of Thailand and Viet Nam, it can be argued, such attention for some time to come is still a necessary part of a coherent pro-poor development strategy. This suggests a "growth plus..."(Weiss and Khan2006) strategy for development.

It must also be kept in mind that the move in 1999 by the IMF and the World Bank and other Northern Development organizations to make anti-poverty policies the core strategy for development is not credible. First, it was a political response to the crisis created by the

¹³ This is not to say that the quantity does not matter. Also for very poor countries today, aid can fill crucial financing gaps. See Khan(2003b) on these issues. However, surrendering domestic decision making capability and flexibility to foreign experts in exchange for aid is not strategically helpful. If there is such a pressure then it may be necessary to forego aid.

failing and (after the 1997-98 financial crises) disastrous neoliberal policies. Second, even without this political background, without overall sustainable development, anti-poverty policies are only palliatives. Poverty can only be ended globally when exploitative accumulation by dispossession can be ended.

In addition to the nine sets of factors discussed above, there are also somewhat random, historically contingent factors. The Jomo and Wee paper on Malaysia acknowledges the presence of such factors explicitly. But even a quick look at several other cases will reveal historically contingent factors ranging from momentous events such as wars and revolutions to more usual changes in domestic and international political factors and changes in policies that depended on crucial personalities such as that of President Park in Korea in the 1960s. As Jomo and Wee (2008, p.14) indicate in summing up the lessons from at least five different policy periods in Malaysia:

It is difficult to evaluate policy success or failure simply in terms of subsequent economic performance. Malaysia's very open economy has often been subject to circumstances not of its own choosing or making.

The decline of rubber prices in the 1960s must surely have affected economic performance and policy. Malaysia's experiment with import-substituting industrialization under foreign (principally British) auspices was quite different from most other developing countries where state-owned enterprises played leading roles as well as Northeast Asian experiences where effective protection was conditional on export promotion. Malaysia's transformation from net oil importer to exporter in the mid-1970s, when petroleum prices rose sharply, allowed the government to spend much more, while the recycling of petrodollars later allowed it to borrow from abroad at low cost until the Volcker intervention of 1980 raised real interest rates and precipitated a global recession, bringing commodity prices down.

The Plaza Accord of September 1985 led to the strong yen just as Malaysia's sovereign foreign debt became yen-denominated. The mid-1980s' recession precipitated a banking crisis, which led to the 1989 banking reform to the seeming success of earlier deregulation facilitated financial liberalization, culminating in the 1997-98 crisis. The late 1980s' regulatory reforms encouraged further limited private foreign borrowings from abroad before that, limiting vulnerability on that front. The East Asian economic recovery from the last quarter of 1998, following the Russian and LTCM crises, similarly does not allow proper evaluation of the impact of Mahathir's controversial measures of early September as he moved to politically eliminate his deputy.

The above observation underlines an important strategic consideration. We formulate this aspect as a two point strategic proposal in addition to the nine points presented above. We submit that for a capabilities enhancing enabling state of the 21st century with the multiple ecological-economic, political, social and ideological crises facing the planet, the following two items are indispensable:

11. Income and Asset Distributional Equality:

This is more of a challenge today than it was in post-WWII setting. Vibrant egalitarian anti-free market movements were widespread--even in the US. A combination of cold war policies and then a revival of Hayekian and other varieties of neoliberalism in the 1980s coinciding with the global crises of WCS made Income and Asset Distributional Equality an anathema among the mainstream. However, the greatest reversal was in China in the 1990s. Today Chinese leaders are at least partially rethinking this policy mistake.

But the greatest hope here comes from the people's movements from below all over the world and their partial successes in Latin America in particular. However, egalitarian goals need to be explicitly put on movement agenda's and concrete strategies and tactics devised. When in power, the energies of such movements then can be largely directed towards making the objectives more concrete and solving practical problems of implementation. Through learning feedback mechanisms, mistakes can then be detected and corrected and further appropriate modifications made. Such a process cannot be anything but deeply democratic. This is our final strategic point.

12. Deepening of ecologically committed socialist democracy through struggle and practice:

The theory of deepening democracy is derived from a history of struggles from below. In the uneven world of 21st century described by Prashad(2014) and many others, the struggles for democracy take many forms and will differ from one place to another. But the struggles for basic needs such as food, clothing, shelter, health care and education are important everywhere. With ecological destruction, movements to save the global commons are crucial. In both these movements the voices of women, minorities, workers and peasants are important. One group whose role needs to be underlined is the indigenous peoples of the world. Their increasingly progressive and leading role in places like Bolivia is exemplary. Movements everywhere can learn from them. New forms of deliberative democracy and advancing human rights for the people can be discovered only through these struggles. Even when state power is held by the minority dominant classes, such struggles can lead to some democratic deepening. Alternatively, they can lead to minority exploiting classes being forced to share some state power with the popular classes. Thus, even without complete hegemony and state power, popular movements can influence infrastructural aspects of state power in particular.

Schneider(2015) contrasts these two scenarios for contemporary India and Brazil:

India and Brazil have both emerged in the international political economy, but their paths to emergence show important variations. Indian democratic deepening incorporated a cross-cultural coalition of caste, regional and other identity-based groups, providing enhanced state capacity to embed itself in key sectors to promote their technological upgrading and international competitiveness. This type of capacity provided room for an intensive strategy of international insertion, assisting domestic firms to insert themselves into global value chains and pursue

strategies to capture more value. This type of insertion coincided with a national positioning as a voice for non-Western countries in the international system, leading to patterns of international behavior by which Indian governments sought to triangulate their position between Western and Non-Western powers, with India acting as mediator and voice of a more accountable and tolerant world system with greater respect for the sovereignty of poor countries.

Brazilian democratic deepening incorporated a cross-class coalition of working class and middle sectors, providing enhanced state capacity for public collective action borne out domestically in increased revenues and efforts to expand social protection. Internationally, this type of capacity provided room for an extensive strategy of international insertion, led by government assistance to national champions seeking to scale-up activities they dominated nationally into international markets. This type of insertion coincided with a national positioning as a voice for poor countries in the international system, leading to patterns of international behavior by which Brazilian governments sought first to build alliances among poor countries and then bargain more forcefully with rich countries, with Brazil acting as mediator and voice of the poor in favor of a more accountable and equitable world system with greater respect for the sovereignty of poor countries. (pp. 45-46)

Clearly, both in India and Brazil---perhaps particularly in India---the democratic deepening needs to go much further. But the successes, however limited in these two cases, underline the role of mass progressive movements from below. These also point to the need for organizing under a coherent transformational strategic perspective and tactical program.

6. Conclusions:

It is clear now that the GCS is a complex adaptive system that is highly crisis-prone. For the Global South in particular, Enabling Ecological Development States (EEDS's) with sufficient state capacities are necessary to overcome the constraints of GCS. Under hegemonic Global North, the Global South must develop sufficient capacity to break away from hegemony and domination. In extreme dynamical states there are possibilities for breakdown and under some conditions, a reorganization. However for such a transition to take place strategic counter-hegemonic movements with clear goals are necessary. This has been the main thrust of the analysis in this paper.

It should also be emphasized that strategically, the ecosocialist movement along with NNAM in the Global South must be internationalist and anti-imperialist at the same time. Likewise, the Global North ecosocialist movements must be internationalist and support the counterhegemonic ecosocialist movements of the Global South.

Two other conclusions follow logically in building an ecologically sustainable world by overcoming the ecological imperialism of the Global North. From the critical analysis above, we have identified both the necessary as well as the more contingent factors that have played a role in East Asia. We have also introduces the socialist Ecological Sustainability Principle(ESP), and additional crucial strategic factors for building ecosocialist transitional bridge such as egalitarianism and deepening of genuine people's democracy for the 21st century, building an enabling ecological developmental state and a strategy for development as freedom. The first is the need for taking a historically grounded pragmatic and diagnostic approach to the technical problems of development on the one hand. The second is that at the same time we must make democratic deepening and egalitarianism the strategic centerpieces of any progressive anti-imperialist egalitarian ecologically oriented social and political movements. It is important to make these last two factors the most salient identifying criteria for an innovative Enabling

Developmental State that integrates useful markets with developmental objectives to increase the human capabilities including commitment to ecological sustainability. It is at least theoretically plausible that in practice opportunities for implementing such a strategy with further ongoing learning will arise as a result of struggles from below that are unfolding. Adapted to specific historical domestic conditions, along these lines, Latin American countries can learn from and apply with critical acumen the useful lessons from the East Asian experience.

It is necessary to identify distortions from the perspective of deepening democracy and egalitarianism and correct these quickly. It is also equally necessary to identify market failures and other institutional failures. Instead of taking a grand, presumptive approach to development, the role of a mix of heterodox policies with the willingness to revise policies before the cost gets too high seems to be the best recipe for avoiding failures. However, compromising on democracy and egalitarianism will be strategic mistakes. Therefore, the people's movements must avoid these even if it means slowing down growth within acceptable limits for some time. In general, with careful participatory planning and implementation, deepening of democracy will not conflict with growth and other goals of development.

Clearly, in order to promote equitable growth and broad development we must build institutions that can supply social insurance and safety nets, and create a democratic space for voice and accountability. But there is no one-size-that-fits-all for any of these functions.¹⁴ Here the role of history of popular movements and institution building will be crucial. While movements in different parts of the world can certainly learn from each other and have ties of solidarity, each part will need to have specific strategic orientation and tactical and organizational forms for both building the movement and building the egalitarian and democratic institutions in every sphere according to its particular historical trajectory. No predetermined futures are foreordained for the Latin American in this complex 21st Century world.

But it must be admitted honestly that the GCS which has been crisis-ridden by its own contradictions throughout its history, has now created an additional, and under its own terms, an irreversible ecological crisis. The only sustainable future for human civilization is ultimately a noncapitalist world which is not the same as a purely nonmarket world. There is truly a race against time for creating such a world and for this reason, all movements that are potentially capable of contributing to the creation of a noncapitalist world are promising and worthy of support. Even a partial but thoughtful diagnosis of specific problems in particular regions relatively early on may suggest solutions which can be implemented before it is too late. This paper is written with the hope of making a modest contribution to the evolving counterhegemonic movements in our world by suggesting some pathways towards an egalitarian, deeply democratic and ecologically sustainable Global South.

For Africa and Latin America in particular, a new cooperative community of African and Latin American nations following their own rhythm to reach their own dynamic trajectories towards development as freedom will be possible if they cooperate regionally on the basis of equal sovereignty and mutual respect. One precondition is to pragmatically unite to end or at least balance through counterhegemonic movements, the oppressive US hegemony in Africa and Latin

¹⁴ See Chang (2007) for a number of thoughtful contributions on this topic among other things.

America. For this a decolonization of the African and Latin American mind---more generally, in the entire global south--- is also necessary. A new nonaligned movement in Asia, Africa and Latin America can then begin for dealing with the global North on the basis of equality and mutual respect.

From a mathematical point of view, the propositions developed in this essay can be formalized in a multisectoral model with integrated finance. Based on some formal work of Jumarie and others in mathematics of entropy, a dynamic relativistic information theory based systems approach to development can be developed. Although this current ongoing research preliminary, the combination of nonlinear multiple equilibria systems with entropy minimization in developing economic systems can be shown to exhibit a wide range of dynamics from stagnation to rapid growth and transformation. It is particularly applicable to BRICS economies like Brazil; but political preconditions for reorientation towards an enabling development state model must be recreated there. Other large and even smaller Global South countries may be able to follow the strategy outlined here if internal conditions and prospects for regional cooperation are favorable. Technically, a bridge to empirics via successive Social Accounting Matrices (SAMs) can be developed for empirical applications.

Appendix :

A Simple Model of an Ecologically Grounded Complex Financial Economy with Multiple Equilibria with Possibilities of Crisis and the Role for BRICS-like Financial Facilities

GCS is a complex adaptive systems that is crisis-prone. In extreme dynamical states there are possibilities for breakdown and under some conditions, a reorganization. However for such a transition to take place strategic movements with clear goals are necessary.

In order to give the reader some idea of the problem of formalizing global and Regional complex financial cum real economic systems (GRFS and RRFS) we summarize here the basic structure of a 'simple' non-linear model embodying distinct financial architectures which can be applied to analyze the BRICS-like financial facilities cum real sectors, and therefore applicable to India. At any single point in time, the model can be presented as a Social Accounting Matrix (SAM) and flow-of-funds representation of the socio-economic system. We will indicate the first m sectors as real and the next n as financial. There are p households and q other institutions including global and regional governance institutions.

The key distinction here is the explicitly non-linear nature of the economy-wide functional relationships. The key theorem shows the existence of multiple equilibria. Some further considerations of complexity and increasing returns prospects for development show that multiple equilibria are indeed the "natural" outcomes in such models. Thus, there would seem to be some role for domestic policy in guiding the national economy to a particular equilibrium among many. Likewise, such policy space in an RRFS within a GRFS can only be possible under some hybrid

GFA of which BRICS-like multi-regional financial architectures can be an integral and desirable part.

The virtue of a global economy-wide approach to technology systems is the embodiment of various inter-sectoral linkages within and across regions. In a SAM, such linkages are mappings from one set of accounts to another. In terms of GRFS and RRFS, the production activities can be broken down into a production (sub-) system and a set of institutional innovative activities leading to the creation of BRICS-like multi-regional financial architectures .

Although the existence theorems for these global cum regional multisectoral models provide some structure for the equilibria as sequences of fixed points in the socio-economic structure with evolving technology systems, it is not specified a priori which equilibrium will be reached. The problem of equilibrium selection thus remains open and depends on global, regional and national institutions. The idea behind a BRICS-like multi-regional financial architectures can now be stated somewhat more formally. It is to reach a sequence of equilibria for developing economies so that in the non-linear models of the entire economy the maximal fixed points that are attainable are in fact reached through a combination of market forces and policy maneuvers over time. It is also to be understood that path-dependence would rule out certain equilibria in the future. Thus initial choices of projects and institutions can matter crucially at times. It has been argued in the paper that BRICS-like multi-regional financial architectures matter precisely in this way.

A 1: The Model on a Lattice

Define X as a vector lattice over a subring M of the real field R . Let $x_+ = \{x \mid x \in X, x \geq 0\}$

A non-linear mapping N is defined such that $N : X_+ \rightarrow X_+, N_0 = 0$. Given a vector of exogenous variables d , the following non-linear mapping describes a simultaneous non-linear equations model of an economy, E :

$$x = Nx + d \tag{1}$$

for a given $d \in X_+$.

This non-linear system represents a socio-economic system of the type described previously. In order to specify the model further, the following assumptions are necessary.

1. X is order complete
2. N is an isotone mapping
3. $\exists \hat{x} \in X_+$ such that $\hat{x} \geq N\hat{x} + d$

In terms of the economics of the model, the non-linear mapping from the space of inputs to the space of the outputs allows for non-constant returns to scale and technical progress over time. The 3 assumptions are minimally necessary for the existence of equilibrium. Assumption 3, in particular ensures that there is some level of output vector which can be produced given the technical production conditions and demand structure.

Existence of Multiple Equilibria:

Theorem: Under the assumptions 1 - 3, there exists $x^* \in X_+$ so that x^* is a solution of

$$x = Nx + d$$

Proof: Consider the interval $[0, x] = \{\hat{x} \mid \hat{x} \in X_+, 0 \leq \hat{x} \leq x\}$ where \hat{x} is defined as in assumption 3. Take a mapping F .

$$F : x \in X_+ \rightarrow Nx + d$$

F is isotone and maps $[0, x]$ into itself.

Define a set $D \equiv \{x \mid x \in [0, x], x \geq Fx\}$.

By assumption 3, D is non-empty.

We now show $x^* \equiv \inf D$ is a solution to $x = Nx + d$. $x^* \equiv \inf D$; therefore $x^* \leq x, \forall x \in D$. F is isotone; therefore $Fx^* \leq Fx \leq x$ for each $x \in D$ implying.

$$Fx^* \leq x^*$$

From (2) we have $F(Fx^*) \leq Fx^*$. Thus $Fx^* \in D$; hence $x^* \equiv \inf D \leq Fx^*$ so, $Fx^* \leq x^* \leq Fx^*$. Therefore $x^* = Fx^*$.

This is an application of Tarski's and Birkhoff's theorem. The key feature to note here is that the equilibrium is not necessarily unique. It should also be noted that under additional assumptions on space X and the mapping N the computation of a fixed point can be done by standard methods (e.g. Ortega and Rheinboldt).

A 2: Multiple Equilibria on Banach Space:

In this section the results for multiple equilibria are extended to functionals on Banach Space. We can define the model again for monotone iterations, this time on a non-empty subset of an ordered Banach space X . The mapping $f : X \rightarrow X$ is called compact if it is continuous and if $f(x)$ is relatively compact. The map f is called completely continuous if f is

continuous and maps bounded subsets of X into compact sets. Let X be a non-empty subset of some ordered set Y . A fixed point x of a map $N : X \rightarrow X$ is called minimal (maximal) if every fixed point y of N in X satisfies

$$x \leq y (y \leq x)$$

Theorem: Let (E, P) be an ordered Banach space and let D be a subset of E .

Suppose that $f : D \rightarrow E$ is an increasing map which is compact on every order interval in D . If there exist $y, \hat{y} \in D$ with $y \leq \hat{y}$ such that $y \leq f(y)$ and $f(\hat{y}) \leq \hat{y}$, then f has a minimal fixed point x . Moreover, $x \leq y$ and $x = \lim F^k(y)$. That is, the minimal fixed point can be computed iteratively by means of the iteration scheme

$$\begin{aligned} x_0 &= y \\ x_{k+1} &= f(x_k) \quad k = 0, 1, 2, \dots \end{aligned}$$

Moreover, the sequence (x_k) is increasing.

Proof: Since f is increasing, the hypotheses imply that f maps the order interval $[\bar{y}, y]$ into itself. Consequently, the sequence (x_k) is well-defined and, since it is contained in $f[\bar{y}, y]$, it is relatively compact. Hence it has at least one limit point. By induction, it is easily seen that the sequence (x_k) is increasing. This implies that it has exactly one limit point \bar{x} and that the whole sequence converges to \bar{x} . Since f is continuous, \bar{x} is a fixed point of f . If x is an arbitrary fixed point in D such that $x \geq \bar{y}$, then, by replacing y by x in the above argument, it follows that $\bar{x} \leq x$. Hence \bar{x} is the minimal fixed point of f in $(\bar{y} + P) \cap D$. It should be observed that we do not claim that there exists a minimal fixed point of f in D .

We can also show that if $F : x \in X_+ \rightarrow Nx + d$ is an intersecting compact map in a non-empty order interval $[x, \hat{x}]$ and $x \leq Fx$ and $F\hat{x} \leq \hat{x}$ then F has a minimal fixed point x^* and a maximal fixed point x^{**} . Moreover, $x^* = \lim F^k(x)$ and $x^{**} = \lim F^k(\hat{x})$. The first of the above sequences is increasing and the second is decreasing.

A 3: Complex Dynamics and Out-of-Equilibrium Behavior---possible entropy and information theoretic extensions:

As is well known, nonlinear dynamic systems can display a wide range of dynamic behaviors. As Keynes perspicuously pointed out in the General Theory during the great depression, the capitalist economies with complex financial systems are unstable but within limits. However, as we know, dissipative systems with a big enough perturbation can move to a new basin of attraction with much disorganization during transition. Also, even with bifurcations, we do not know for certain which path it will follow. Furthermore, catastrophic singularities are also possible.

My argument can now be summarized in terms of , dissipative systems dynamics in a world of multiple equilibria none of which may be reached. Instead, a neoliberal global economy may simply go through cycles of instabilities. A large part of my argument, therefore, has been that the recent global crisis is an example of a large accumulated perturbation that has created instabilities giving us a foretaste of what may become a pattern in the 21st century unless a new flexible hybrid GFA with sufficient liquidity and enforcement power is constructed soon. The BRICS bank and financial facilities are moves that can possibly dampen further instabilities in the global financial system and help promote growth with equity particularly in the poorer countries in the global system. With the creation of enough BRICS-like multi-regional financial architectures after the failures and crises in the 21st century, the world will have a fighting chance to pursue appropriate capabilities-enhancing development strategies along with a deepening of civilized social democratic structures in the core countries.

Finally, based on some formal work of Jumarie and others in mathematics of entropy, a dynamic relativistic information theory based systems approach to development can be developed. Although this current ongoing research preliminary, the combination of nonlinear multiple equilibria systems with entropy minimization in developing economic systems can be shown to exhibit a wide range of dynamics from stagnation to rapid growth and transformation. It is particularly applicable to BRICS economies like PRC and India. A bridge to empirics via successive Social Accounting Matrices (SAMs) can be developed for empirical applications.

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