

Progress reports

Implications of adopting a complexity framework for development¹

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I A different concept of development

Rihani and Geyer (2001) outlined a possible shift in the study and practice of development away from a linear, Newtonian formulation towards a nonlinear framework that views development as an ongoing complex adaptive process. They suggested that the transformation could provide a theoretical synthesis for diverse ideas that have recently emerged as assorted responses to past failures. This second progress report considers some of the implications of adopting such a framework.

Naturally, a move to a radically different framework alters the concept of development as currently understood. The main features of the revised concept are summarized below, as a first step towards determining the possible consequences of accepting the new formulation.

- Development is an open-ended evolving process that has no beginning, no end and no shortcuts (Rihani, 2002).
- Effective development proceeds as a cyclical activity that has three indivisible components: survival, adaptation and learning. Survival relates to the presence of a discernable stable pattern or structure, learning means the build up and application of relevant knowledge, while adaptation describes change that enhances performance and the probability of survival. Success, therefore, relies heavily on striking a balance between: malleability, but not so much that the slightest jolt would destroy the structure; and stability, but not so much as to prevent gradual adaptation (Kauffman, 1996: 73). The pattern has to survive long enough for the next evolutionary step to take place. Learning, however, improves the effectiveness of each adaptive change to enable the structure to cope better with fluctuating conditions

¹The views considered in this progress report are presented in more depth in Rihani (2002).

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(Kauffman, 1993: 173; Gell-Mann, 1994: 17; and Coveney and Highfield, 1996: 118). Gell-Mann's views are of special importance here as he covered in his deliberations the evolution of human communities.

- The complexity framework for development views a nation, or any community of people for that matter, as a complex adaptive system. Such systems acquire self-organized stable patterns, i.e. structures that emerge spontaneously without prior design, as the cumulative outcomes from local interactions between the internal elements of the system. The interactions have to be regulated by simple rules that command general acceptance, as haphazard interactions produce chaos without a pattern, and rigidly controlled interactions result in an unchanging ordered pattern that could not evolve. Self-organization is a key feature in the behaviour of complex adaptive systems. Bak and Chen (1991) considered the topic as *self-organized criticality* exhibited by certain phenomena existing at the dividing boundary between order and chaos. Coveney and Highfield discussed the subject from a number of perspectives, including its applicability within the social sciences (1996: 337), while Stacey (2000: 281) provided a useful overview of the different interpretations of complexity and self-organization advanced by some of the leading scholars in this field.
- The cyclical process of survival, adaptation and learning depends on the passage of time, as shown by Dawkins (1996). That applies equally well to the development of nations, as argued by Rihani (2002). Viewed from this perspective, development is seen as a long-term process rather than a sprint to a known end-state.
- Finally, a vision of development as a complex adaptive process implies recognition that the activity is neither orderly nor predictable. Analysis has to focus, therefore, on robust nationwide properties, or, as argued by Kauffman (1996: 19) in another context, 'one gives up on predicting the details'. Kravtsov and Kadtko (1996) advanced reasons for unpredictability in complex systems, but for the present purpose it is sufficient to say that uncertainty arises from the fact that system-wide patterns are the product of numerous local interactions.

II Redefinition of the development project

In brief, development is envisioned within the complexity framework as an uncertain, open-ended and long-term process driven by a large number of local interactions that generate self-organized stable patterns capable of adaptation. Self-organization is of fundamental importance in this context. A structure capable of effective adaptation could not be imposed externally, by a strong government, say. It is sustained as a stable feature by the energy provided by local interactions; that being the only means by which the system could overcome the forces that would otherwise push it into chaos as specified by the second law of thermodynamics. Hence, the right conditions could be provided to encourage self-organization to materialize, as explained later, but beyond that the process is largely spontaneous. Emergence is often used to describe this facet of the behaviour of complex adaptive systems (Lewin, 1997: 191).

The above point underscores the need for clarity in defining the level at which development takes place and, hence, the scale of the fundamental unit at which actions would yield most consistent results. As underlined by Dawkins (1989: 19) in the case of

natural evolution, a nation or community taken as a whole is relatively less important than local interactions between egoist individuals concerned primarily with their own interests, an interesting parallel with Adam Smith's invisible hand but arising from a complex systems perspective. In essence, according to the dictates of the complexity framework the most effective actions would be those undertaken at the lowest possible level. It is inevitable that certain interventions might have to be implemented on the nation-state scale, but there should not be a presumption that that is always the correct entry point.

Therefore, development in its revised complexity format would need to be addressed primarily at the local level. In effect, people undertake a trek in a 'fitness landscape' that is in a permanent state of flux, buffeted by domestic and external factors. The 'fitness landscape' and other topographical concepts are regularly deployed to describe the behaviour of complex adaptive systems (Coveney and Highfield, 1995: 11). In the case of the fitness landscape, if locations on a flat surface were assumed to represent differing sets of conditions, then at each place the height above, or below, the surface would indicate the level of fitness of a given entity to that set of conditions. The landscape, therefore, has flat lands of neutral significance, mountains representing degrees of fitness and valleys indicating lack of fitness. Variety provided by the large number of internal elements within a complex system ensures that some elements would suit a given set of circumstances better than others. The former will flourish in the 'mountains' while the latter struggle, and might even perish, in the 'valleys'.

Rihani (2002) used the above representational tool to consider the implications of adopting a complexity framework for development. He concluded that the main thrust in the development project would change from one in which whole countries are led to a well-defined end-state of 'development' through detailed plans and timetables, to a more amorphous task by which people are assisted in acquiring the tools that would enable them, as individuals and groups, to interact freely and effectively and to survive, and possibly prosper, under a wider range of conditions. Rihani (2002) demonstrated that at a strategic level this is what today's 'developed' countries did in the past and are doing now. They view detailed economic, political and social ideologies and theories as matters of convenience that are adopted and discarded pragmatically. In relative terms these issues are unimportant as long as local interactions, the national social capital, proceed effectively.

There is one other aspect that should be included to complete the picture as far as the development project is concerned. As Gell-Mann explained, 'complexity can either increase or decrease', but evidence indicates that 'the greatest complexity represented has a tendency to grow larger with time' (1994: 244) The inclination for the 'developed' to become 'more developed' simply reflects this persistent tendency. Obsession with statistics and the gap between nations, therefore, diverts attention from the more meaningful yardstick of how well or badly a nation is performing in the context of its own particular challenges and opportunities.

As presently conceived, the development project seeks to guide a nation, or community, 'in need of development' along a predetermined path, with clear signposts that have been charted by earlier pioneers, to a specified end-state of 'development'. The process is predictable and finite. Under the revised formulation based on complexity, by contrast, the development project would set out to improve a nation or community's performance within continually shifting conditions by means of

enhancing its members' fitness and capability. The process is ongoing and the outcome is not preordained. Initially, the main thrust might be to turn a 'nondeveloping' community into a 'developing' community. The next priority would be to allow a community that has entered the process to perform optimally within its particular circumstances. Both tasks rely heavily on the ability and freedom for people to interact locally as egoist individuals and groups. Where a community or nation might be in relation to other 'developing' countries, such as the USA or Britain, is of lesser importance in this conception. Although the complexity framework draws a distinction between states of 'nondevelopment' and 'development', it does not recognize a terminal point at which a community could be described as being 'developed'.

III Difficult but unavoidable policy decisions

The above recast of the development project would suggest that fleeting visits by missions from the IMF and the World Bank and dogmatic adjustment programmes comprised of a few steps to suit all nations, to cite only two examples from many, would produce haphazard results (see for example United Nations Development Programme (UNDP), 1999: 92, table 4.3 in relation to adjustment and income inequality). Essentially, these measures are too detailed and they tackle the task at the wrong level. Experience over the last 50 years supports this viewpoint. It is not surprising, therefore, that calls for a change in direction have come in recent years from the World Bank itself. The proceedings of the tenth Annual World Bank Conference on Development Economics held in Washington DC in April 1998, for instance, give a clear indication of dissatisfaction with past performance. Stiglitz, the Bank's Chief Economist at the time, emphasized the need for new models and instruments to pursue a broader agenda than in the past. He added that many cherished doctrines must be reassessed, including prescriptions based on the 'neoliberal model' of development. After his departure from the Bank, he augmented his previous remarks by launching a scathing attack on the IMF, its methods and its 'missions' (Stiglitz, 2000). However, the most authoritative statement on the subject appeared in late 2000 when the World Bank published its *World Development Report*. The ensuing vigorous debate led to the resignation of the main author of the report, Ravi Kanbur, and prompted one commentator to ask 'why it took 50 years to reach this point' (Brown, 2001: 13 and 157)

The answer to the above question is self-evident if one were to accept that so far development has been misdiagnosed as a finite linear process that obeys universal laws, and one that has clear beginnings and ends and easily identified causal relationships. Fundamental misunderstanding of the nature of development was bound to lead to the selection of ineffective policies and actions. Recognizing development as a complex adaptive process, it is suggested here, would overcome these conceptual and practical difficulties. A change along these lines would result in a strategic approach to development that addresses the factors that determine whether the process functions properly or otherwise; the nation is 'developing' as in the case of Britain, or 'nondeveloping' as in the case of Afghanistan, for instance.

What Britain does at the tactical level might not be appropriate elsewhere. On the other hand, it is vitally important to uncover the structural elements that enabled Britain to succeed and survive major reverses. Basically, certain countries adopted,

through trial and error, practices that allowed them to function optimally under a wide range of conditions (Rihani, 2002). As outlined above, recent studies of the behaviour of complex adaptive systems offered technical explanations of why some actions improve performance while others fail to do so. Discoveries in this field provide the opportunity to replace intuition, and trial and error, with a systematic approach that would enable communities to make more consistent progress. However, adoption of a complexity framework radically alters the meaning of development and the tasks involved in pursuing it, as described earlier. Acceptance of these changes would impose a number of consequential transformations without which no development would be possible (Rihani, 2002).

The most significant transformation in that respect concerns the elevation of people to centre-stage. Rather than reasonableness or correctness, this shift in the balance of power is an inevitable outcome from the recognition that local interactions are the driving force behind the emergence of self-organized stable patterns that are capable of effective adaptation. Ultimately, local actions determine whether a nation develops or stagnates.

The second transformation flows naturally from the first. If local interactions are paramount then people, as individuals and groups, must be *able* and *free* to interact, otherwise nothing happens. In essence, human development, primarily a focus on basic needs and human rights, would have to be given top priority over all else, including economic development. Rihani and Geyer traced the rationale behind this transformation and its wider policy implications (2001).

The third transformation again follows from previous remarks. Interactions between the internal elements of complex adaptive systems must proceed in accordance with simple rules if self-organized and stable, but evolving, patterns were to emerge instead of wasteful chaos or stultifying order (Gell-Mann, 1994: 329). Kauffman also considered the significance of regulation through simple rules of engagement in some depth (1993: 36). He reported that local capability and freedom to interact are essential for a state of complexity, as mentioned above, but he underlined the need for some control over the nature and frequency of interactions permissible to avoid unchanging order or rampant chaos. In social, political and economic systems, effective interactions can only take place within a regime of simple rules that command willing compliance from the majority of people (Rihani, 2002). Consequently, institutional and democratic reforms within a complexity view of development become urgent imperatives as opposed to optional extras to be implemented 'when conditions permit'. Basically, the revised framework signifies that the development process performs best under the third of Max Weber's grounds for legitimacy; traditional, charismatic and legal (i.e., regulation founded on due process of law).

The above transformations carry a vital message: the development process could not be initiated and sustained without a shift in focus onto local issues concerned with basic needs, institutional reforms and more enlightened democratic practices. However, one further transformation is required to complete the picture. Success within the complexity framework depends on substantial relaxation of present-day local and global rigidities. As mentioned earlier in the context of fitness landscapes, efficient exploration of the nation's fitness landscape relies heavily on copious diversity, readiness to experiment and sometimes make mistakes, and a pragmatic outlook that shuns inflexibility in all matters.

A number of scholars have discussed the healthy tension that must exist between harmonizing and universalizing factors on the one hand, such as science, technology and shared visions and aspirations, and the diversifying factors that enable communities, organizations and other complex adaptive systems to 'display the internal capacity to change spontaneously' (Stacey, 2000: 386–409 and Gell-Mann, 1994: 341). A glance at today's nondeveloping countries would show that they are generally not in a position to enjoy the benefits of this duopoly. Internally, they are riddled with political, social and cultural inhibitors to diversity; the madcap rules and regulations imposed by the Taliban on Afghanistan's population is one, admittedly extreme, example of efforts to stamp out nonconformity. Externally, they are at the mercy of a global system that insists on compliance with universal norms that perceive any deviation as a challenge that should be nipped in the bud; the trade rules dictated globally by the USA and a few leading economic powers through the World Trade Organization provides a good illustration of such influences.

IV Action in place of rhetoric

It would be reasonable to assume that the above transformations would also entail wholesale revision to present opinions on the actions required to make progress, but the impact in reality would be mixed. There is a straightforward explanation for this apparent paradox. Basically, frustration with past failures led to an extensive search by dedicated individuals and organizations for better practices. There was, for instance, the 'Independent Commission on International Development Issues' chaired by Brandt, former German Chancellor. The Commission agreed a Programme of Priorities with detailed tasks for the 1980s and 1990s (Sampson, 1980: 267–92). Then there was the report on *Our Common Future* produced by the World Commission on Environment and Development (WCED), chaired by Brundtland (WCED, 1987). Significantly, WCED lamented that the 'rate of change is outstripping the ability of scientific disciplines and our current capabilities to assess and advise.' That frustration was voiced yet again at the 1998 World Bank Conference on Development Economics, as outlined before.

In essence, studies such as those described above based their conclusions largely on empirical evidence and on the experience gained from the implementation of past policies and actions. Although the conventional wisdom on development was not questioned by the studies, it would not be rational to assume that all their proposals would not be appropriate within a framework founded on complexity. Hence, as described below, policy initiatives such as those that focus on institutional reforms and on basic needs would fit quite well into the revised conception. On the other hand, other actions might not be suitable. This feature is evident in other fields associated with development and the provision of services. For instance, the British National Health Service (NHS) is being radically reorganized to shift the balance in favour of local actors and actions (NHS, 2001). This accords closely with a complex systems view of healthcare, but there is no evidence to suggest that the Department of Health was influenced by such considerations in designing the new structure. The change is prompted mainly by past experience and the lacklustre performance of the present arrangements.

The usefulness of the complexity approach, as suggested by Rihani (2002) and Rihani

and Geyer (2001), lies in its ability to indicate objective criteria for the selection of initiatives that offer a higher probability of success. Current development efforts are founded on an implicit belief that benefits from economic development will trickle down to uplift the fortunes of most members of the population. A view of development founded on complexity would turn that argument on its head. It maintains that no development is possible unless most members of the population are in a position to drive that effort forward. Governments working alone cannot impose success. Empirical evidence presented by UNDP supports this conclusion (1999: 87, table 4.2).

It is, therefore, possible to identify the type of actions that would be most effective within a framework for development that views the activity as a complex adaptive process. The list presented below is neither exhaustive nor mandatory, but it includes proposals that could apply equally well to most situations.

1 Focus on basic social programmes

The basic social programmes were identified in 1995, at the World Summit for Social Development, as nutrition, primary healthcare, clean water and safe sanitation, basic education and family planning. The Summit called for 20% of Official Development Assistance and 20% of the budget of recipient countries to be earmarked for these priorities. This proposal, known as the '20/20 formula', has met with little success. UNDP (1997: 113), for example, estimated that only 10% of aid goes to the most pressing social needs of recipient nations (see also United Nations Children's Fund (UNICEF), 2001: 56). However, the fact that such a modest level had to be set as a target for foreign aid and for domestic budgets is highly significant. Put simply, according to the complexity approach, the development process could only function effectively in countries where the proportion allocated to basic needs absorbs a larger proportion of the available resources. This condition is not fulfilled in most of the countries that are desperately seeking development (UNICEF, 2001: 55). The contrast with the situation in the 'developed' countries is compelling. A report submitted by the British Treasury to Parliament in March 2000, for example, estimated that well over two-thirds of the 2000/2001 budget would be allocated to basic programmes and income transfer; 27.8% to social security, 14.6% to health, 12.4% to education and 15.7% to other sectors such as housing and transport. It needs to be stressed that this comparison refers to proportion of available resources rather than absolute values.

2 Emphasis on self-help, appropriate technologies and local coping strategies

Several authors, including Timberlake (1991), Rihani (2002) and, most telling, World Health Organization (WHO) (2000) have argued that progress on basic needs is not necessarily a function of economic development. In this context, Timberlake (1991: 40) wrote, 'African countries can expect the greatest improvement in life expectancy from health investments in maternal and child health services in rural and urban slum areas, costing less than \$2 per capita'. Similarly, WHO (2000: 10) reported that 'many deaths of children under 5 years of age could be averted for \$10 or less . . . but the average actual expenditure in poor countries per death prevented . . . is \$50,000 or more'. In effect, higher levels of spending do not guarantee positive results.

This is not a new discovery. A report to the Massachusetts state legislature in 1850 concluded that best results could be obtained through a focus on local primary healthcare: ‘immunisation and communicable-disease control; promotion of child health; improved housing for the poor; environmental sanitation; training of community-oriented health manpower; public health education; . . .’ (Evans *et al.*, 1981). As mentioned before, the Department of Health in Britain recently proposed a restructuring of health services that expresses almost identical views on the nature of actions needed to achieve results. Basically it is cheaper to prevent sickness than to treat it in hospitals and other specialized and costly institutions. In other words, the key lies in selecting initiatives that make sense locally rather than choosing options simply because they appear to be the most advanced technologically.

Advice and help from others who have made impressive progress in the past is useful, but a framework founded on complexity would alter the relative importance of the partners involved. It would also change the fields where advice would be appropriate. For instance, education as understood within the leading countries does not always deliver the skills necessary to tackle problems on a self-help basis within informal settings (Marshall, 1997). Although this should not preclude consideration of actions and policies adopted in the past by others, a decision to borrow ideas from abroad should be based on their worth in the context of local circumstances.

3 Focus on human rights and institutional reforms

People have to be able to interact, but they also have to be free to do so. Yet again, this condition is absent in most of the ‘nondeveloping’ countries. Interactions are reduced to a level that could not provide sufficient energy to give the nation stable self-organized patterns. And the difference again is not necessarily related to economics. Collier, for instance, observed that ‘democratisation is worth around half a century of income growth . . .’ (1998: 18).

Freedom to interact is often withheld by local regimes, but occasionally external forces impose similar restrictions. When the two combine the results are spectacular, as happened in Iraq since 1990 under the influence of an inflexible government and stifling UN sanctions. Infant mortality rates, for instance, doubled and there was a five-fold increase in under-5-years child mortality in the five years after August 1990 (*Lancet*, 1995, see also Clark, 1998 and Simons, 1998). Taliban fanatics inflicted a similar toll on Afghanistan’s chances of development when they decreed in 1996 that women should stay at home or work in a limited number of occupations. Overnight they managed to cut Afghanistan’s potential interactions by half and virtually guaranteed its continued nondevelopment status. Put succinctly, it is not possible for development, as a complex adaptive process, to take place in the absence of basic freedoms and rules that regulate, but do not inhibit, peoples’ fundamental rights to interact as they see fit.

4 Reduce militarism and conflict

A view of nations as complex adaptive systems helps to explain why development and militarism are mutually exclusive. Primarily, conflict and military spending divert resources from basic social programmes and compound the problem by bringing

repression and disruption of civilian populations into the bargain. The developing countries devoted about US\$135 billion to military purposes in 1996 (UNDP, 1999: 191). This level of spending should be seen in the context of the 1995 Copenhagen Summit conclusion that US\$30 to US\$40 billion a year, allocated properly, could have a dramatic effect on the well-being of the poorest communities in the world. Most significantly, the Stockholm International Peace Research Institute (SIPRI) reported that in 2000, as in previous years, Africa and South Asia continued to be the stage for most of the major armed conflicts in the world. They also experienced the steepest rise in military spending since 1998 (SIPRI, 2001: chapters 1 and 4).

In addition to misuse of resources, conflict, the arms trade and the associated activities of secret services and interest groups offer extensive opportunities for corruption, which is a major contributor to inefficiency. SIPRI regularly draws attention to the potential opportunities available in the arms trade for corruption on a grand scale (1997: 184). Modern dictators and despotic ruling dynasties are especially eager to participate in this system of wealth creation (Pilger, 1997: 115). The World Bank's *Development Report 1997*, argued that under these circumstances development 'hits a brick wall', as corruption is 'negatively correlated with investment and growth' (see leader in World Bank's Policy and Research Bulletin, July–September, 1997).

Addressing the above issues is extremely difficult as the arms business is massive, in both its economic and political influence. Exports of major conventional weapons by the top five supplying countries, the USA, Russia, France, the UK and Germany were valued at US\$13 billion in 2000, or over 86% of total transfers (SIPRI, 2001: 357). Significantly, four members of the UN Security Council, China being the exception, with supposedly a keen interest in peacekeeping, account for about four-fifths of weapons sold. Moreover, weapons sales are often used as a powerful lever in enforcing global conformity and in promoting national interests. The USA, for example, used this form of pressure to influence not only governments within the developing countries but those of Australia and the UK (SIPRI, 2001, chapter 5).

In essence, a framework based on complexity clarifies the situation unambiguously. The choices facing national governments, world powers and international regimes become simple: either democratization and development or militarism and conflict, but not both.

5 Help more by doing less

Whether a nation succeeds or otherwise, in the context of the complexity framework for development, depends largely on its own actions. Accordingly, international actors would have to limit their influence on, and interference in, the local affairs of other countries, and they would have to resist the impulse to treat every case of local diversity as a challenge to the global order. At the same time, nondeveloping countries would have to wean themselves off the idea that money, especially in the form of loans and aid from abroad, could solve their nations' problems. These transformations are far from easy to achieve. The ever-present lure of financial assistance, and profiteering by local elites, makes the process of seeking loans and aid virtually irresistible. Similarly, popular demands for more prosperous countries to take a hand in helping others to progress, and lobbying by pressure groups for governments of powerful countries to

take decisive action to promote the 'national interest' are difficult to resist. Nevertheless, that is precisely what is required for nations seeking development to start their own process of evolution.

V Concluding remarks

Indicators for a shift in policies and practices do not stem from the complexity framework alone. For instance, it has long been argued that economic trickle down, if it worked at all, proceeds at an exceedingly slow and uneven pace; as acknowledged by McNamara when he presided over the World Bank from 1968 to 1981 (Caufield, 1996: 122 and 144). In this respect, the case for putting human development higher on the agenda has been advocated forcefully by UNDP for many years. In addition, all international commissions on development have expressed serious misgivings about current practices. In recent years, calls for radical change have come also from those working at the top echelons of the World Bank. William Easterly, senior advisor in the Development and Research Group, is a good example. His highly critical account of past policies and actions in the economic development field caused quite a stir both inside and outside the World Bank (Easterly, 2001).

Conversely, the suggested revision to the order of priorities resulting from a move to a complexity framework would challenge well-entrenched beliefs. For instance, Clare Short, British Secretary of State at the Department for International Development, in a BBC interview broadcast on 6 August 2001, expressed the opinion that economic development is urgently required to pull the Democratic Republic of Congo out of its current state of disarray. It is not disputed that the country is in turmoil. It has a government shored up by Angola, Zimbabwe and Namibia and rebels backed by Rwanda, Uganda and Burundi. In a country made penniless by corrupt leaders and now torn into three semi-independent regions devastated by conflict, basic social programmes and human rights have become secondary issues. Despite all that, the world community, it seems, could only advocate economic development in response; a measure that has failed to produce consistent results for over half a century.

To sum up, a quantum shift in the study and practice of development is both necessary and in progress. However, formal recognition of development as a complex adaptive process confers two key benefits. Firstly, it presents a theoretical synthesis to guide the current strands of change into a more productive direction. Secondly, it provides objective technical criteria for determining the fundamental causes of failure of past development initiatives and the appropriate measures that could be adopted to reverse that situation.

An inevitable question readily springs to mind: are the policy transformations and suggested actions feasible? And what would the effects be on those currently involved in the development project, particularly at the World Bank? These questions raise equally fundamental issues that, it is hoped, will be tackled in the next progress report.

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