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Innovation systems and policy: not only for the rich?

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Abstract:

This article argues that the conditions for innovation by and for the poor have changed considerably in the last four decades in ways that can be related to the paradigm shift in technology and to the resulting changes in behaviour of the major corporations. It suggests that innovation studies and evolutionary economics should consciously and constantly pursue an understanding of such changes by fully incorporating history in the interdisciplinary mix. In essence it holds that evolutionary thinking needs to strike an appropriate balance between universal and changing truths, especially when studying innovation with a view to making policy recommendations.

Outline:

5.1. Looking at the question

Whether innovation systems and policies are not only for the rich was the question posed to me by the organizers of the symposium in honour of Bengt-Ake Lundvall. Its implication is clear: the general thrust of innovation has until recently been seen as mainly serving the interests of the rich countries. Could innovation systems and policy favour advance in the poor countries? Is there a reason to ask that question now? Probably yes. Would the answer be the same today as it was in the 1960s and 70s? Certainly not!

Could it be that this issue is not inherent to innovation or innovation systems themselves (or to capitalism), but that it changes with the stages of diffusion of technological revolutions and the nature of their paradigms? This is what I will suggest.

Such an interpretation would have consequences for innovation studies, for evolutionary economics and for innovation policy.

Going further in confronting neoclassical economics

In his quest for a radical shift in policy recommendations, Bengt-Ake Lundvall insists on the need to further confront neoclassical economics.[1] Indeed, the battle that innovation studies and evolutionary economics have been waging all these years could bear fruit in these troubled times. The stubbornness of the post-collapse recessionary trends is increasingly showing not only that free markets are not the answer to the crisis but also that "pure" economics is not enough to analyse it. Society cannot afford to continue looking for the key under the street lamp only. In these uncertain times we need interdisciplinarity.

As Chris Freeman argued in the introduction to the Dosi et al. book[2] and in many other instances, the interaction among economics, (science and) technology and institutions is indispensable for understanding growth and development. But he further insisted that those interrelationships can be best understood when incorporating history.[3]

Indeed, it is by means of opening the door to interdisciplinarity, that evolutionary economics and the innovation systems perspective have pro-

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1 Lundvall (2012)
2 Freeman (1988) p. 2
3 Freeman (1984 and 1995), Freeman-Perez (1988), Freeman-Louçã (2001).

vided much richer theories for understanding the uncertainties of the real economy and its diversified functioning. We can indeed be proud of the achievements in this area. But we still have an aspect where the battle has not gone far enough. In order to design effective policies, society needs to understand the big picture. In fact… the big *moving* picture.

We need to fully involve the historical view in the interdisciplinary mix. The search for eternal unchanging truths, as in Physics, is not adequate when studying social phenomena as complex --and as human-- as innovation, growth and development. This criticism can be levelled against neoclassical economics, but at least their work is consistent with their overall goals and criteria. But ignoring history is simply unacceptable in evolutionary economics. It would have been unthinkable not only to Chris but also to Marx and Schumpeter.

Technical change regularly and radically modifies the conditions for innovation and for development and we must be at the forefront of explaining such changes and of identifying the specific transformations taking place in each period. Only then can we be really useful as a science that serves to guide effective policy design (and to shape viable political goals).

Changing answers to the same question

So, is innovation only for the rich?
The old answers to this question were:

1. The Dependency School, in its various versions,[4] which basically held that Third World countries could not define their future but were technologically dependent on the interests and decisions of foreign investors from the advanced world and
2. The appropriate technology movement[5] that recommended the selection of adequate technologies, meaning better adapted to the endowment of the developing world, in the sense of being less capital-intensive and using more labour.

In both cases it was assumed that technical change was continuous and cumulative, that technology came from the North and that it was up to the developmental states of the South to face the choice of technique question as a policy matter. The context shaped the analysis, the theoretical answers and the policy recommendations.

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4 Singer (1949), Prebisch (1951), Gunder Frank, A (1967), Cardoso and Faletto (1968), Sunkel (1970), Amin (1976)
5 Sen (1960), Cooper (1972)

Today we are looking at dynamic innovation systems, policies for enabling innovation and catching-up, upgrading roles in global value networks, new pathways for development and so on.

Why have the answers and the policy goals changed? Because technical change is constant but not continuous. From the mid 1970s the world has been experiencing the Information and Communications Technology (ICT) Revolution and the resulting paradigm shift has radically changed the windows of opportunity for all participants. It enabled flexible production patterns and network organisations; it induced and facilitated globalisation, disaggregation of value-chains and outsourcing, it made possible catching-up (and even forging ahead) in the developing world and it opened new opportunities for innovation and for diversity across the whole production spectrum (tangible and intangible). None of these conditions existed in the 1960s and 70s.

Changing context; redefining problems

Moreover, it is not only the answers to the question that have changed; the content of the question has also experienced a transformation: Who are the poor when we ask "Not only for the rich?" Do we define them in the same way as in the 1960s and 1970s? Probably not.

We can indeed still count most of the old "Third World countries" among the poor in contrast with the rich advanced ones, but not all. First the Four Tigers and now the BRICS have broken the ranks of the laggards and caught up --some of them might even forge ahead. Does this mean that the Dependency school was wrong all along? Did the South Koreans and the Chinese choose labour-intensive technologies for their leap forward? Or is it that both the Dependency school and the choice of technique theorists were right when they assessed the situation in the maturity phase of the Age of Mass Production and stopped being right when the ICT revolution changed the context radically?

Already in the 1980s and 90s, Hirschman, Sen, Gunder-Frank and others were recognising that the ideas of development economics and those of the dependency school were no longer useful. However, they did not see the fact that it was because conditions had changed, that the ideas about how to handle technologies had to change too. The main lesson of history was unfortunately lost in that case.[6]

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6 Hirschman (1982), Sen (1983). Perhaps the one who most clearly argued that it was the times that were changing was Gunder Frank (1991), who then went on to a whole reinterpretation of history.

But we can go further in this rethinking. Should we maintain the definition of "the poor" as referring mainly to countries? Wouldn't it be important now to look at the poor and the impoverished in the advanced world also? Shouldn't we distinguish groups within the lagging countries as needing special attention as being left behind in some of the successful cases of catching up? Currently, within advanced, emerging and developing countries there are widening differences between the skilled and the unskilled, between urban and rural populations, between the emerging regions and the declining ones (where unemployment is rampant) and, within cities, between the rich areas and the slums.[7] Does technological innovation hold part of the explanation in these trends and can innovation policy do anything about them? Should the question of "not only for the rich" address these differences now? Adequate industrial, employment and welfare policies for the current times may need to involve explicit directions for respecialisation in the global space and a strong component of innovation policy.

In the advanced world, from the late 1940s to the 1960s, technology was obviously helping the poor climb to better lives. Charlie Chaplin rightly and brilliantly satirised the negative side of the assembly line, but outside working hours life did get much better after WWII. In those times, the excluded were indeed mainly in the Third World and those countries could be defined basically as "the poor".

Now the picture has changed. Technology and globalisation have been stripping masses of Western workers of their expected good lives. Can innovation help them? The idea that there is a technological frontier constantly advancing and driving growth may warrant rethinking if conditions require a reconsideration of the most socially relevant directions for innovation.

Similarly, the extremely rapid growth processes in China and India have notoriously been polarised, maintaining a high proportion of the population excluded from the benefits of development. Should this issue be confronted by innovation theory and policy? Do we need a more complex picture when addressing the opportunities for the poor? It would definitely seem so.

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[7] It may be worth noting that 70% of the people who live on less than $1/day live in middle income countries. See Sumner (2010)

5.2. The paradigm shift and its effects on the conditions of innovation for and by the poor (and the weak)

Let us begin by looking at the nature of the shift. What has changed since the 1970s? In what sense do the poor and the weak, be they individuals, firms or countries, find better opportunities for employment, wealth creation, innovation and potential improvements in the quality of life? What has changed, in fact, since ICT has been replacing mass production as the prevailing techno-economic paradigm?[8]

ICT, Innovation and market access by small firms in any country

There are some obvious changes that are directly attributable to ICT (information and communications technologies). Access to information is now infinitely greater than was ever imaginable before; networking has become easy and cheap at whatever distance, software and other intangibles are an increasing part of innovation and of the global product mix, computers and mobile phones facilitate not only software innovation but also product design and testing (through CAD); digital equipment can leapfrog the need for acquiring skills that took many years to master (this is, of course, a loss for many workers from printing to machine tool operators; paradigm shifts are processes of creative destruction on many fronts). These new tools mean that the possibilities for innovation and entrepreneurship are now open for individuals and small companies wherever they may be located.

Intangible innovation is very easy to transport to the point of use and the whole "app rage", however long it may last, has opened possibilities for many brilliant young people, in whichever country they happen to live. The open source movement has lowered the cost of software for individuals, schools and companies but most of all it has provided a collective learning platform for potential innovators.

The opportunities for innovating in tangible products have also multiplied due to the replacement of the mass production world of simple economies of scale for identical products by the coexistence of economies of scope, scale and specialisation within the flexible production model enabled by ICT. This has resulted in the hyper-segmentation of markets and the creation of a very "long tail" of specialised niche products where small firms can be very profitable[9]. This has been enhanced by developments in logistics and retail trade that facilitate the handling of relatively

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8 See Perez 1985, 1986, 2010a
9 Anderson 2006; Kaplinsky 2005

small quantities at reasonable cost. Both the Damart and Tesco type of purchasing networks and the "fair trade" movement have been built upon those new conditions.

Another possible consequence of this new flexibility is the --as yet hardly used-- potential for catering to differences in culture, religion or climate that had in practice been ironed out by the American (universal) Way of Life. The notion of different lifestyles delivering "equivalent satisfaction" could enhance the quality of life of many without forcing homogeneity. One could say that "frugal innovation" and organic products are an early manifestation of that potential.

Flexible production and global networks

Together with the segmentation of markets, ICT has provided the infrastructure and the tools for the giant global corporations. Not only is it now much easier to manage enormous and extremely complex organisations with units in many parts of the world but also to do so with a relatively flat structure and with a variety of arrangements, alliances, contracts, etc. with other companies, suppliers and partners. It is this profound change that has given impulse to the Asian leap in its various forms. The practice of outsourcing opened a whole range of possibilities for incorporating producers in all parts of the world. The much greater volumes that are now possible with changing models and varying product mix have had a massive employment effect. This is one of the factors underpinning the Chinese and Asian success on the basis of low-cost labour for the standard segments of fabricated products.

But as the process of learning to globalise proceeds, corporations have been experimenting with the use of local knowledge workers and local innovative talent in many countries. India became the flagship with the experience after the Y2K scare and soon the software industry was largely globalised.[10] Lately there are attempts to outsource some R&D (facing possible intellectual property problems that are not yet clearly defined) and to develop knowledge intensive suppliers, even in old mining enclaves.[11]

From the other side there are other new developments. Several Korean, Indian and Chinese companies have become global corporations themselves and are both investing by buying companies and outsourcing to both the advanced and the lagging countries. It is also happening in Latin America.

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10 Arora and Gambardella 2004; Friedman 2005

11 BHP Billiton in Chile has employed a SPRU PhD to develop local high tech suppliers for its copper mining activities. See Urzua 2011 and 2012

Natural resources: curse or opportunity?

There is a whole tradition from the 1950s inherited from mass production times to consider that development is only about manufacturing and that natural resources are not dynamic, apart from being subject to price scissors with industry.[12] On top of that there was the "Dutch disease" in the late 1970s[13] and the research that showed the resource "curse" of low growth due to corruption and other ills.[14]

With a bit of history, it would be easy to recognise that natural resources were seen as very important for development during the first globalisation, from the 1870s to WWI. The technological revolution that was then diffusing, the Age of Steel and Heavy engineering, was about chemistry and electricity, about transcontinental railways and world trading steamships, about metallurgy and major engineering projects. It was also about counter-seasonal world markets for meat, wheat and other agricultural products. In those times, natural resources were considered a blessing. Australia, Canada, the US, Sweden and others partly owe their processes of catching up to their resource endowment.[15]

Times are changing again. The growth of the emerging countries implies such a growth in demand that prices are likely to oscillate at a much higher average level[16] and it will be necessary to engage in a lot of innovation to guarantee supply as well as to serve the "long tail" in special materials, organic and gourmet foods and many other niche products.[17] This is happening already, together with innovations upstream in equipment, chemicals and other inputs. But most importantly, the competition for resources among the companies of the West and the East is likely to open unprecedented opportunities for the developing countries to negotiate better conditions. If energy prices are very high, this could lead to avoiding the transport of unprocessed materials and to locate some of the downstream processes in situ. These changes would also require innovations in order to solve problems of scale and mobility. Such incentives for innovation could underlie a dynamic growth process among natural resource producers.[18]

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12 Singer (1949) , Prebisch (1951)
13 *The Economist* (1977)
14 Sachs and Warner (1995)
15 Of course, it makes a huge difference if such resources are to be exported raw or to be used as a basis (or as a source of income) for technological development. A forthcoming article by Morris, Kaplinsky and Kaplan (2012) examines the new conditions and observes the increase in upstream innovation opportunities.
16 Dobbs et al. (2011) and Farooki and Kaplinsky (2012)
17 Perez (2010b)
18 Marin, Navas-Aleman and Perez (2010)

The environmental challenges as guide to innovation

Finally, there is the whole question of the environment. It is increasingly clear that both the planet and the economy need massive "green" innovation. The potential is there in technological terms. The ICT revolution is fully installed and can enable innovation across a whole range, from smart-grids to special materials, from redesigning products for durability and upgradeability to reducing the need for transport.

But "green" is not capable of being immediately profitable as many of the ICT products were at the beginning. The way to increase the economic viability of any set of these possibilities is to induce a clear common direction. Convergence and networking leads to synergies in suppliers and markets, increasing the profitability of the whole network. Markets alone cannot reach that outcome; an active government can.

The need to enormously increase the productivity of resources could lead, with the right policies, to redesigning products for truly long durability. This could give rise to 2nd 3rd and nth hand markets enabling the bottom of the pyramid to enter the consumption ladder sustainably and at a very low price. This could also revive maintenance as a massive source of jobs for the displaced manufacturing workers of the advanced world. Clear policies to favour the "green" direction in innovation through regulation, taxes, funding innovation, etc. are likely to be necessary in all types of countries.

The knowledge society and quality of life

Mass production needed the dumbing-down of the workers in order for management to define the "one best way". This was the price to pay for getting the high productivity that made possible turning the blue collar workers into middle income consumers. It was low quality of life at work and high quality outside work. By contrast, flexible production, to achieve best results, needs to use the creativity and imagination of all personnel.[19] The consequence could be high quality of life at work and at home, if knowledge and participation are adequately rewarded. This would be the best of possible outcomes and the foundation for a Lundvallian "New New Deal".[20] Of course there are still routine manual tasks and new routine mental tasks, but the trend could be towards a significant increase in satisfaction with work patterns. However, the global context may modify this. In the Post War mass production boom the Soviet threat

19 Lorenz and Lundvall (2011)
20 Lundvall (1996)

worked in favour of setting up the Welfare State; now it could be that the massive amounts of available cheap labour in Asia and other continents may lead business to differentiate the organisational models and the reward systems, depending on the context.

Nevertheless, even if the developing world might benefit only partially from high quality of life at work, there is no reason why it should not be a central part of social programmes everywhere.

Understanding the implications --and the options that open and close-- is important for policy criteria and also for being able to aim at viable goals, among the socially desirable ones. Should that be a task for innovation studies? I would think so. In any case, without such an understanding it would indeed be difficult to make effective policy recommendations.

In addition, examining the changes and making the contrasts has the huge advantage of acknowledging, by inference, that the current situation is also temporary and that we should expect it to change again in the future. This is a good vaccine against falling behind by sticking to the old recipes (be it in theory or in practice).

5.3. The big MOVING picture

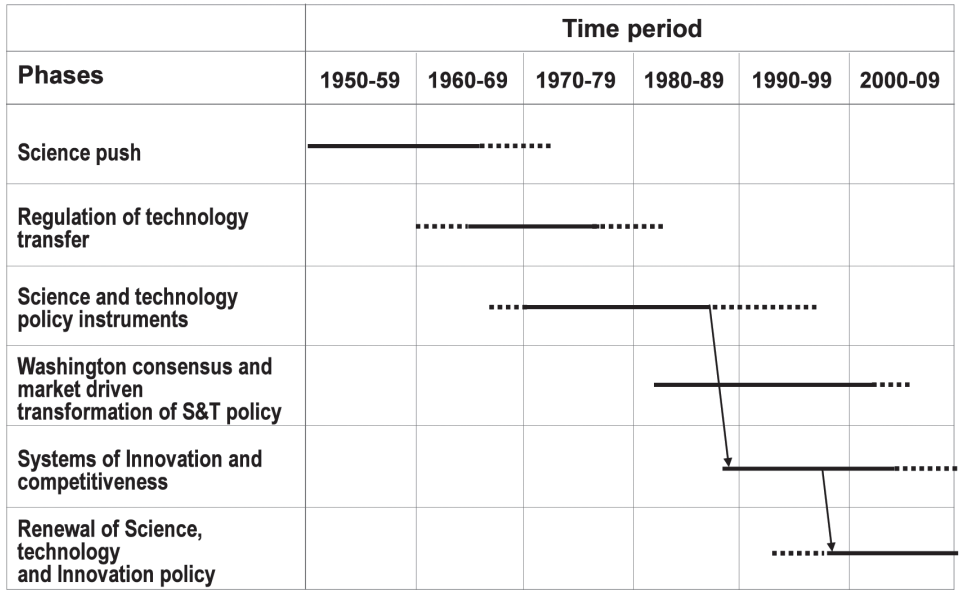
The process of change in the conditions for innovation by and for the poor has been long and complex. It took a lot of competitive pressures and overcoming of inertial forces to move from the world of mature technologies and giant inter-national corporations in oligopolistic markets, which characterized the late 1960s and 1970s, to the current world of even larger corporations spread across the globe and surrounded by a multitude of nimble small knowledge intensive companies. And it is taking a long time too for the mature world to realise that the emerging countries could threaten its lead in some areas of innovation and that its internal unemployment and income distribution problems will probably need to be faced with active policy.

Such profound changes in conditions have been typical of the diffusion of technological revolutions. If the radically new industries and technologies were just added to the existing stock, the transformations would not be so deep and wide-ranging. What warrants the term revolution is precisely that each set of major new technologies rejuvenates all the mature ones, opening important new innovation trajectories for all the pre-existing industries. The combination of a new infrastructure network expanding markets and of a new paradigm changing behaviours redefines industry structures and reshapes their regional distribution. The process of

diffusion of a new paradigm can radically change opportunities for the laggards (for better or for worse) and this in turn demands important changes in development and innovation policies.[21]

In a recent study of the Latin American experience in science and technology policy, Francisco Sagasti identifies five phases. Each follows a different set of fundamental ideas about technology, employs different policy instruments and sets up –or eliminates-- different institutions.

Figure 5.1. Chronology of the phases in Science, Technology and Innovation policies in Latin America



Source: Sagasti, F. (2011) Table 1 (our translation from the Spanish original)

It is worthy of note that, in spite of major differences in political conditions between countries (from military dictatorships to democracies) the changes in technology ideas and policy instruments described by Sagasti have been essentially simultaneous throughout Latin America. There are always, of course, countries that lead and countries that lag a few years, some that design and apply more sophisticated policies and others that copy and do a minimum, but the fact is that the whole continent went through a similar sequence. This suggests that the drivers of transformation were not internal; that all countries were experiencing the same set of external forces driving the changes and that the recommendations received – be

21 For a discussion of opportunities for development as a moving target see Perez (2001)

they from academics, consultants, UN organizations or whomever – seemed to be appropriate for the conditions being observed on the ground.

In the 1970s the advanced world was going through the maturity and decline of the main industries of the mass production paradigm (exacerbated by the drastic increase in the price of oil) at the same time as the irruption of the ICT revolution and the rise of Japan. The mature industries set up final assembly plants in the Third World in order to expand their saturated markets. This was favoured by a set of incentives offered by the import substitution policies, adopted by most underdeveloped countries seeking industrialisation. Since mature technologies, by definition, have exhausted their previous trajectories, there was little that could be done in the receiving countries except learning the routines and, as they all did, trying to develop their own science in the hope of doing new technologies the linear way.

But gradually, the ICT revolution began to transform the conditions for competitiveness and the mature corporations were forced to introduce not only computers in their offices but also computer-aided equipment in their plants and microelectronics in their products. By the 1980s it was understood, through the Japanese success, that major organizational changes were required in order to get the expected results from the new technologies. The Japanese model was then imitated in the offices and plants of the advanced countries. This created a problem for the many Tayloristic factories already set up in the developing countries and for the fact that some of the transferred products were becoming obsolete. In addition, the regulation of technology transfer was making conditions more difficult for the multi-national corporations. Selling the licenses and letting the locals take over was one of the solutions; using low-cost labour for exports from processing zones was another. The tariff barriers were no longer interesting. The opening of markets and the Washington consensus policies dismantled the model. In Latin America the inward oriented economies were unable to resist the pressure or adopt the new paradigm and the so-called "lost decade" set in; whereas the "four Tigers" in Asia jumped on the new bandwagons through intensive export-oriented learning and through rapid adoption of the new paradigm.

It is in the 1990s and 2000s that there is a revival of official interest in science and technology policies. Seeing the Asian success and relating it to technological learning efforts, the new ideas about science, technology and innovation policies within the notion of a national system of innovation began to spread. Technology parks and other "clustering" attempts became common; innovation funding and entrepreneurial incentives also propagated. Global corporations, although not investing much in Latin

America, did modernize their working practices in the remaining local plants and began to outsource to domestic suppliers within their value networks. The experience of Brazil as one of the BRICS established a different view of technological innovation opportunities which is being followed across the whole sub-continent.

So, we face a "chicken or egg" situation. Do the circumstances change the thinking about technology and innovation or does the thinking change the policies? The answer, of course, is that it is a constant feedback loop. Nevertheless, the usual practice is to say that "our knowledge of the processes is increasing", as if it had been possible to apply the current knowledge to design more effective policies in the 1970s, within the import substitution model, when technology was 'acquired' under strict contract clauses that prohibited any changes and when there were no innovative capabilities in the firms and no entrepreneurial models to follow.

Thus innovation studies and evolutionary economics face an object of study that is constantly being transformed by the very nature of innovation and by its capacity to go beyond technology to modify organizations, institutions, behaviours and ideas. It is truly an evolutionary process in need of dynamic theories.

5.4. Does (should) evolutionary economics also evolve?

This brings us to what was implied at the beginning of this paper as the "obsolescence" of the dependency school and of the original choice-of-technology discussions, in terms of the paradigm shift in the real economy. Could we analyse the successive changes in the focus of Evolutionary Economics, of Science, Technology and Society (STS) and of Innovation Studies in connection with the changing trends in the economy?

Neoclassical economics, because of its "Physics envy", tries to stay as stable as possible and to "accumulate" knowledge without abandoning its basic tenets, and yet it has gradually had to incorporate ways of softening rationality, ways of adding technology to its equations and other tweaks in order to update its models without explicitly recognising that the world is always changing.

Evolutionary economics is much more open to changes, not only due to its theoretical premises but also for the simple reason that it is much more rooted in reality and is constantly studying specific technologies, companies, sectors, etc. Could we possibly examine the shifts in emphasis that have occurred in the topics addressed in publications and see

how they relate to the real shifts in behaviour in the world economy? Could we do something similar for the shifts in emphasis in innovation studies?[22] In fact, it should be natural to expect a process of "creative destruction" in policy oriented knowledge as constellations of radical innovations transform context conditions.

The balance between permanent and changing truths

This is not to deny that there must be some unchanging basic truths. Simply, if the basic tenet is that innovation is the driver of economic growth, then a central task is to identify what we could call the "laws of change" in market economies, at the micro, meso and macro levels. That defines much of the theoretical work that evolutionary economics has undertaken.

Notions as fundamental as technological trajectories and routines, or the processes of learning or the fact that innovations are interrelated, that the agents in the economy are diverse and that the process of innovation is a system of interactions are all (or have become) indispensable for the analysis of any period. Yet even the Pavitt taxonomy,[23] assuming that the classification can be seen as a stable truth, is likely to change in terms of the industries that belong in each category.[24] And the same can be said about Systems of Innovation. The early formulation was very much defined within the national space, but globalisation has required analysing the new complex networks and interactions

Distinguishing between fundamental theoretical principles and changing processes should in itself be the normal approach for truly evolutionary economics. And that would be one of the differentiating features that would make it able to deal with an economy in evolutionary (sometimes revolutionary) change, in contrast with the immanent and unchanging constructs of neoclassical economics.

Understanding technological opportunities as a moving target and economics as the uneven realisation of those opportunities, be it for the rich or for the poor, would not only enrich our academic contribution to the Social Sciences but it would also fulfil a necessary void in the sort of expertise that policy makers require.

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22 Fagerberg and Verspagen (2009) and Martin (2012), could serve as an excellent initial basis for the process. See also Morlacci and Martin (2009)

23 Pavitt (1984)

24 A beginning of movement in that direction is found in DeJong and Marsili (2006) but the next technological revolution is likely to make more substantial changes to the sectors in each category

The constant awareness of the interconnection between changing technologies, changing economies and changing Economics would guarantee that we never lose the connection with real life and real processes. The modelling culture introduced by neoclassical economics[25] has numbed our most brilliant young people by turning them to loving mathematics instead of loving history, politics, social change and even technical change itself.

Bengt-Åke's plea, in his chapter in this book, for being more involved in policy and politics and for confronting capitalism as it is today as well as neoclassical economics, would be much more easily fulfilled by a scientific community with a keen consciousness of historical change and of the dynamic interrelations between changing technologies, changing institutions and changing economies.

What he sees as the need for making connections with the other social sciences would also be much more easily realised. At present, I think innovation studies would benefit greatly from incorporating the whole question of transitions. There are easy connections to be made with the Dutch school in this area.[26] They have made very valuable contributions in theory, in methodology and in case study work. They have also gotten directly involved with policy making and experimental processes of change.[27]

The challenges of the present moment in history

When we ask about the consequences of technology systems and policy for the poor and the weak, we are not then in an abstract limbo where time and place are of no importance. We are at a specific moment in the evolution of the market economies. I have argued that the major financial collapse of 2008, which morphed into a euro crisis, is in fact the result of a decoupling of finance from the real economy that requires the return of an active State, both in the advanced economies and in the lagging ones.[28] Overcoming the quasi-religious belief in the free market of the old "First world" and abandoning the Washington consensus in the old "Third world" (and in some parts of the previous "second") will require something to replace it that is not just going back to the policies that served their purpose in the mass production era.

No schools of thought are better placed than evolutionary economics, in general, and innovation studies, in particular, for providing the necessary new thinking for reshaping the economy, reversing the processes of

25 See Drechsler (2011)
26 See, for example, Geels and Schot (2007) and Geels (2010).
27 Grin et al. (2010)
28 Perez (2009 and 2012)

income polarization and taking advantage of the new potential for innovation. Joining forces with the Dutch Transitions School, with the Technology governance group in Tallinn (TUT) and with STS would enrich the capacity to go beyond technology policy and cover from industrial policy to welfare and education. Equally, the incorporation of the financial question in relation to innovation, as the recent Finnov project[29] did, would enhance the power of the interdisciplinary mix significantly. And as far as the question of the lagging countries is concerned, Globelics is, of course, an extraordinarily successful project in this area, which has created important networks among developing country scholars that would otherwise never have learned from each other. It would also make sense to join forces with IDS in Sussex University, in particular with the development economists working on globalisation,[30] and by strengthening the links already established in the STEPS project.[31]

Finally, there is another related consequence of the current period that generates tasks for innovation studies. Lundvall points out in his chapter, referring to the need for imaginative regulation of finance, that "today the major challenge is actually institutional innovation".[32] Indeed that is certainly so. But are we seriously aware of it and are we really facing the challenge?[33]

Up to now there is an unfailing tradition in all PhDs --and most journal articles in this field-- to end with "policy recommendations". From my experience as a policy maker I can say that they are rarely directly usable.[34] However, at this particular time the need for truly creative policy innovation is urgent. Yet, the process of policy innovation itself has rarely been studied as such, at least to my knowledge. There was a lot of attention given to the university industry-link from the 1980s and 90s but none to the university-policy link or to learning in policy making. Do we understand how the social sciences contribute to the effectiveness of innovation policy or to that of the related industrial, science, education or welfare policies? Edquist had already remarked in 2001 that the system of innovation perspective "lacks a component (theory) about the role of

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29 An EU funded project led by Mariana Mazzucato (now at SPRU). See for example Mazzucato (2011), Lazonick (2007), and others in http://www.finnov-fp7.eu/publications

30 For example, Schmitz, H (2004), Gereffi and Kaplinsky (2001), Gereffi et al. (2005) examine the whole question of the insertion of developing country companies in the global value chains. On the latter topic it would be crucial to make links with the Gereffi group now at Duke. See www.globalvaluechains.org

31 See http://steps-centre.org/

32 See Lundvall's chapter above, p. 50

33 There is an interesting paper in Research Policy by Flanagan et al. (2011) criticising innovation studies for not taking into account insights from policy studies and political science

34 See Radosevic (2010) for a critique of this practice as well as a thorough analysis of the state of the art in innovation policy. See also Bartzokas and Teubal (2002) proposing a more explicit policy orientation.

the State… about how innovation policy has actually been designed and implemented and which societal forces have governed these activities"[35]. This has been partially addressed since then,[36] but many questions remain in the area of institutional innovation. I would think this is a time for enriching policy recommendations with a deep understanding of institutional and policy innovation as an object of study in itself.

That would already be a way of consciously moving to a relevant area, not just following the changing historical context but anticipating it. It is not by chance that Nelson and Winter's seminal work in evolutionary economics, as well as Chris Freeman's, appeared in the 1970s[37] and that the concept of national systems of innovation evolved from the 1980s.[38] Truly creative social science identifies trends when they are just beginning to become visible. We could, of course, leave the job to historians of science. Yet, if we acknowledge the role of specific innovations and their diffusion in changing our object of study, then it we should be our task to intensify our recognition of historical change by looking at the evolution in the focus of research and in the ideas within our own disciplines.

Breaking with the tradition of cumulative knowledge is a hugely risky step in the current academic world. To build a truly interdisciplinary field is already a revolution. To turn it into a "moving science" seems like a complete upheaval of recent traditions in economics. Yet, this way of producing theory would stimulate young scholars to see the dynamism of technologies and of ideas, locating them in their context and judging them and their policy implications in a truly evolutionary way. It would also vaccinate them against copying the recipes of the past and would move them to anticipate the opportunities of the future.

The proposal is simple: to make sure that evolutionary economics evolves… consciously.

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35 Edquist (2001) p. 17

36 See for instance Nelson (2008) and the early work of the Aalborg group such as Gregersen (1992), Johnson (1992) and Gregersen and Johnson (1997).

37 Nelson and Winter (1977), Freeman (1974)

38 Lundvall (1985, 1988), Freeman (1987), Nelson (1993)

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