



Innovation for development: frontiers of research, practice and policy

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Carlota Perez is a leading scholar of the relationship between technical change, finance and development. She has studied the historical diffusion patterns of technological revolutions, their regularities and how they change the opportunity spaces for growth, innovation and development. According to her analysis, these changes occur in periodic surges of half a century or more and follow recurring patterns of diffusion. The dominant new technologies of each surge bring a paradigm shift that transforms the logic of innovation organisation and competition across the board. The current shift is from petroleum-based mass production to ICT-based flexible production in a globalised world. She holds that financial booms accelerate the changes, helping displace or modernise the old sectors and installing the new ones. Major collapses, midway along each surge, mark the passage from a turbulent and frenzied period of uneven growth and polarised incomes to a 'Golden Age', when the economic and social benefits of the new potential can fully fructify. In 2005, she opined: "The Nasdaq collapse of 2000 was not big enough to force the changes necessary to get there.... [T]he collapse has to be disastrous enough to make it clear to everyone that the time when the stock market drives the growth of the economy is finished." Art Kleiner (2005) Carlota Perez Thought Leader Interview Strategy + Business / November 29, We pick up that conversation with her in 2010 as part of the International Symposium on Innovation for Development, hosted by Wits University.

In your view, was the 2008 financial collapse big enough this time to unleash the global Golden Age of this technological revolution?

Yes, historically, Golden Ages have occurred after major bubble collapses and this is certainly a major one. The Victorian boom followed the railway mania and panic; the post-WWII boom came after the roaring twenties and the crash of 1929. In that case, there was the long interval of the great depression and a devastating war.

Technological Change and Innovation Lead the Way to a Global Golden Age

This time, after the NASDAQ collapse, we had another boom, more like a Gilded Age than a Golden Age, driven by financial innovations based on ICT. This second bust certainly seems to have been big enough to unleash the social and political pressures that lead to regulating finance and favouring investment in the production economy rather than in the casino.

Such pendular swings –from the control of finance to that of production and from unfettered markets to regulated ones– are typical of the way the market system works. Each technological revolution takes over as the main growth and innovation driver, but it has to wage a battle against the mature but powerful incumbents. Human resistance to change and the deadweight of organisational inertia have to be overcome, and that's the role of unrestrained free markets and deregulated finance. Once that job is done, which it clearly is now, the pendulum should swing in favour of the 'real' economy, with a reactivation of the role of the State in shaping market conditions. But we may still live through further bubble collapses before the political will is there to make the switch.

Where would innovation for such a Golden Age come from?

The potential for a global sustainable Golden Age is certainly available. Driven by the financial booms, information technology has radically transformed the infrastructure networks for communication, and this has opened a vast range of opportunities for innovation across all sectors of the economy. The paths have also been created for globalisation and the possibility of raising all boats across the world. The new techno-economic paradigm (the common sense logic for most profitable practice with ICT) is available for innovating in new and old firms, in advanced and in developing countries. In addition, the environmental challenges are signalling an obvious direction for innovation that could be unleashed by strong and stable regulation. A virtuous cycle of mutual market growth can be set up through full globalisation and regional specialisation among developed, emerging and developing countries. But not all growth and development potentials come to fruition.

Will the automobile petroleum-based engine of growth still dominate in the Golden Age?

It is clear that the use of electric batteries, fuel cells or other replacements or radical improvements for the internal combustion engine are already happening slowly, and the trend is likely to accelerate and thus reduce the proportion of petroleum-based engines. There are two environmental forces that are pushing in that direction. One is the question of availability of oil and the higher costs of getting to more difficult reserves. That will raise the price of oil and stimulate the switch. The other is global warming and the types of regulation or discouraging mechanisms that governments may put in place to reduce carbon emissions. Those forces will play out in the course of the next couple of decades. The profitability of alternative sources of energy and mobility options and the cultural changes that would be needed will crucially depend upon the price people have to pay for oil.

But your question begs another one. Why has the wasteful energy-intensive lifestyle of the mass production era continued in the developed world and been copied in emerging countries? We have certainly not seen the full use of the materials and energy-saving potential of ICT. This is probably due to having had cheap oil and cheap labour just as the ICT paradigm was taking full shape in the 1990s.

After OPEC raised oil prices in the mid-seventies, a vast movement towards energy-saving and alternative sources got underway in the advanced countries. New practices were established, such as labels about energy consumption in appliances, and smaller, energy-efficient cars became the fashion. Numerous start-up companies began innovating in wind, solar and other alternative energy sources. But, when prices dropped to the old levels in the mid-1990s, all those companies went bust and the next profitable thing was the gas-guzzling SUV. The whole change process was thwarted before it had taken root.

Something similar happened with the cheap labour from China and the ex-Soviet bloc countries. All the new practices to get creativity value from the expensive labour force in the advanced world were made less relevant when masses of extremely low-cost assembly workers could be used to continue the policy of great volumes of quickly replaceable products. And cheap fuel and high volumes made it possible to transport masses of raw materials and finished products all the way across the globe with minimum effect on prices. ICT technologies are cheap and powerful; they have the potential to transform consumption, production and transportation patterns in ways that will protect the environment for future generations and will contribute to healthier lifestyles. But that potential can go to waste, depending on the price of oil and derivatives. If prices are not high enough, either by market forces or by taxes or regulation, the change will not happen (whatever form it will eventually take).

How important are the emerging BRIC economies to this shift?

The existence of dynamic markets is one of the most important factors in bringing about a true recovery and a successful deployment of the new possibilities. The Golden Age of mass production after WWII benefited from the markets created by the need for reconstruction in Europe, from the consumption patterns associated with the move to suburbanization and the income redistribution achieved through the Welfare State.

A global Golden Age of ICT would count on the BRIC economies to gradually become the most important source of market growth for the world economy. This means that the choices they make will have enormous bearing on the shape of the future. It is clear that it will not be possible to incorporate so many millions of new consumers to the so-called 'American way of life'. We only have one planet! Our only hope for truly full globalisation is to redesign the 'good life' in ways that are environmentally friendly. But the new consumption patterns have to be desirable, and not a sacrifice. It is aspiration that moves people, not guilt or fear of an uncertain future.

These countries have three major innovation challenges: lifting the bottom of the pyramid, environmentally friendly growth and catering to diversity. I guess that the only one needing an explanation is the latter. The innovation and profit-making potential of the ICT paradigm thrives in variety, in contrast with mass production that required identical products for economies of scale. Information technology can help achieve very high productivity with a very diverse and changing product mix, through economies of scope. There are also profitable advantages in narrow specialisation. Therefore, it is not necessary to ignore cultural diversity or other identities for sustained growth. Increasing the quality of life no longer implies adopting the exact same lifestyle as the more advanced countries. There can be many different consumption pathways providing equivalent satisfaction. And many of these can flourish in the BRICs and then be exported to groups with similar desires and characteristics. It is a bit like cable TV. People complain that there are hundreds of channels and they only watch six or seven. The problem is that each person watches a different set of six or seven. That is the difference between narrow-casting and the old rigid broadcasting. We might think of it as 'cultural customisation'.

Are financial crises necessary to force entry into the new phases of the cycle? If so, should regulatory rules be tightened, or will this slow movement towards the Golden Age?

Unfortunately, financial crises are indeed necessary, just as financial booms are necessary for the installation of a technological revolution, its common sense paradigm and its infrastructures. Without the 1990s boom, we would not have a transcontinental fibre optic network for the World Wide Web to be truly global. The same rapid coverage with enthusiastic asset inflation happened with canal mania in the Industrial Revolution and with railway mania in the mid-19th century.

And after the financial booms have done the job, the financial panic and the recessionary consequences create the climate for establishing the regulation, the financial architecture and the fiscal and other policies that will facilitate the full deployment of the installed growth and innovation potential.

So regulation not only does not make obstacles to the Golden Age, it is a precondition for it to happen.

How will social values change in the Golden Age? Will the Golden Age be associated with greater economic justice, increased equity and less structural imbalance among regions?

The definition of a Golden Age (as opposed to the Gilded Age prosperities, like in the 1990s and 2000s) is precisely that it spreads the benefits of growth widely across society, rather than concentrating them at the top of the pyramid. The 1950s and 1960s were such a time and, in a different way, so was the Victorian boom in the 1850s and 1860s in the UK. So once we can call it a Golden Age, it is because it is fulfilling those criteria. But if the necessary political changes are not made, the potential can be dwarfed and deployment can be also a Gilded Age. That is what happened during the Belle Époque around 1900. And that is the risk we are running now.

Without being cynical about it, the policies of income redistribution and development are both for the benefit of peoples and regions and for the widening of markets. It is a positive-sum game that is often misunderstood by both sides of the equation. The Welfare State in the advanced countries not only guaranteed the well-being of the majorities but also guaranteed growing markets for suburban housing, automobiles, processed food, electrical appliances and so on. It also made sure, through unemployment insurance, that the mortgage and instalment payments would continue during recessions, and we would neither see countless repossessions nor a flood of cars, refrigerators and TV sets being returned.

This time, we need to extend both social justice and market power across the globe. The productivity potential of this paradigm is several times greater than that of the previous, and the markets will have to be that much greater. The question is how much wisdom we can expect from our political and business leaders this time. Remember that the resistance to the New Deal in the US was ferocious until the cooperation between government and business during the war served as a forced dress rehearsal of what concerted growth policies could offer.

Any recommendations for Africa, and South Africa in particular?

The process of globalization is far from finished, but it is already clear that Asia has become the assembly factory of the world. However, there is a whole range of processing industries connected with natural resources that is far from being globalised. Africa, Latin America and Central Asia could become the world suppliers of specialised and processed food, materials and energy.

The changes that the ICT revolution has brought about in production patterns and market segmentation have modified opportunities radically. No longer is it obvious that 'manufacturing' is the more advanced sector technologically. It is obvious that services have become increasingly sophisticated, thanks to information technologies and Internet, but it is becoming clearer that the more important differences between products in terms of technology and profitability relate to the continuum that goes from the standard basic product to the very specialized niches, whatever the product. It is the technological distance from a desktop computer to the iPad or from basic steel to so-called 'boutique' steels, from aspirin to retroviral drugs, from additives for soap to additives to make oil flow smoothly, from blue jeans material to special cloth for modern sail boats, and even from mass-grown vegetables to certified organic ones. The new kaleidoscopic nature of markets has opened a universe of opportunities for multiplying the customised niches, adding technology and achieving differentiation of the product or of the business model (like Starbucks for coffee).

And once you innovate in these areas, you are bound to require innovation in equipment, software and multiple specialised services, which will strengthen the general competitiveness of the country. Of course, the idea is not to abandon the commodity part of natural resources. That will be the volume and the 'bread and butter' portion of exports. The idea is to innovate on the basis of the resources the country has and knows how to handle. By identifying and targeting niche markets, there can be a gradual improvement in the export mix, both in value and in non-price competition.

In addition, the life sciences and the materials sciences, which would be behind specialised innovation in natural resources, happen to be the key to biotechnology and nanotechnology that are the most likely candidates for the next technological revolution.

The combination of this with the three innovation challenges mentioned above (the poor, the environment and diversity) could lead to a very powerful strategy in South Africa and similarly endowed countries.