

The lessons we have learned about technology and development

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In the 19th Century, when the US and Germany were “developing countries” trying to catch up with England, it was absolutely clear to them that **development** was about the **social acquisition of technological capabilities**. This idea was obvious until about the middle of the 20th Century and presided over the efforts of all the other European countries as they industrialized.

But then, it was forgotten.

After the Second World War, when import substitution policies based on operating mature technologies were widely implemented, the accent moved to **investment** and technology came to be seen as a “good” that could also be acquired with money.

Today, as the “knowledge society” takes shape in the world, we need to go back to the oldest and the most fundamental lesson about development:

Successful development strategies are –and have always been- successful processes of technological development

They have implied intense efforts towards mastery of technology; they have essentially been successful learning processes where the **absorption** of foreign technologies has played a central part.

Their acquisition, by whatever means (migrations of skilled people, purchase of equipment, foreign direct investment, reverse engineering, etc.) has been a key element. Learning until achieving enough mastery to modify, adapt, improve and eventually radically innovate them has been the path covered by those countries that have managed to catch up.

Recently, the experience of Japan and the Four Tigers of Asia forcefully reconfirmed this old lesson: There is a deep and fundamental connection between catching up -or forging ahead- and mastery of technology.

The main policy implication of this crucial lesson is that **the question of technology must be placed at the core, not at the edge, of development strategies.**

Technology must no longer be seen as a simple **ingredient** in development, nor can it be the province of specialists in Science and Technology (though they still have a huge job to do).

Technology must be one of the main concerns of the top leaders of the development process, both in government and in business, and in civil society, for that matter.

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Another lesson we have learned from a more recent past is that **fast growth and development are not equivalent.**

Growth can be achieved under very different circumstances and not necessarily on the basis of mastery of technology. That was the case with the import substitution policies followed by most developing countries during the late fifties, sixties and early seventies. Rates of growth in many countries surpassed 7% a year for several years. Even the subsidized export

promotion policies that followed in the mid seventies, were often behind further growth successes, without leading to irreversible processes of development.

Here, in fact, the results are clearly split between those countries that were only extending the import substitution model (such as most of Latin America and Africa) and those that were really striving for international competitiveness and world class productivity and quality (such as the Four Tigers in Asia). The latter were able to continue on to a next phase of successful entry into globalized markets; the former lived through the terrible “lost decade” in the 1980s.

It is important to note that the crucial difference was **technological capabilities**. It was **not** the degree of liberalization **nor** the speed of State disinvolvement **nor** the depth of macroeconomic adjustments (which many countries applied with meager and even catastrophic results). The real distinction between success and failure regards **the direction and intensity of the technological learning**.

Therefore, and this is very important for us to understand, fast growth processes do not all lead to catching up. **Periods of fast growth do not necessarily lead to development** and are **not necessarily irreversible**. But those periods can be crucial in creating platforms for later advances.

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Another much more difficult lesson to extract and to accept is that **successful growth and/or development processes**, that happen roughly in the **same period**, tend to be **similar in their basic elements**.

As we mentioned before, import Substitution Industrialization was applied with quite a measure of success in dozens and dozens of countries, with enormous variety but with essentially the same model from about the mid fifties to the early seventies. The same sort of simultaneity applied in the seventies and until the early eighties regarding export promotion and the so-called industrial redeployment. From the late eighties and into the nineties, learning to live with globalization has been the name of the game, this time with even more widely differing results.

What this means is that **development opportunities are dependent upon worldwide phenomena** that affect all countries at the same time. It means that there is a strong link between what is going on in the core countries and the possibilities for initiating or continuing development processes in the periphery.

Except in the case of the erstwhile socialist countries of the Soviet System, successful growth and development processes have been **positive sum games played between the interests of the core industrialized countries and those of the industrializing periphery**.

In other words, development opportunities are **generated** by the conditions in the core countries and are **taken advantage of** by those developing countries that find **the appropriate strategies** to do so.

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Put very simply:

Development opportunities are a moving target.

So, in terms of development strategies, what worked yesterday will not work today, what is working today will not be effective tomorrow. Though, as experience also shows, what was learned yesterday can serve as platform to launch the next effort to advance in the development ladder.

Successful development or growth strategies, be they of countries or companies, of regions or industries, are designed to respond to specific opportunities as they appear. And such opportunities, if we look at the historical record, only last about a decade or two.

Under those conditions, the only safe and permanent recipe is: “**Don’t stick to yesterday’s recipes!**”

The explanation for this is the way that technologies are deployed in the core countries. They evolve by **successive technological revolutions**.

Such revolutions have profoundly transformed all industries and markets, about every half century. They not only bring dozens of new industries and thousands of new products, but they also change the whole logic, **the whole paradigm**, for the organization of production and markets modifying and modernizing every other industry.

The connection between **globalization** and the **information technology revolution** is perfectly clear today for most people. The fact that even such traditional industries as clothing or fishing have been radically redefined is also typical of **a change of techno-economic paradigm**.

And yet, it is the deployment of these waves of industrialization that **pushes** industries from the core to the periphery as they mature. So they become an **industrializing force**.

But, it is precisely that maturity, that exhaustion of profit and market potential, that leads to the surge of the next technological revolution at the core. This turns into a force for deindustrializing –and also reindustrializing- the periphery.

So the lagging countries are pursuing not only a moving frontier but one that **shifts in direction** every five or six decades.

No wonder, achieving development from behind is such a difficult and infrequent phenomenon!.

And yet... **it happens!**

In fact, there are always opportunities and there are always possibilities of intelligently taking advantage of them.

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What are the tasks today? How do we confront the **present opportunity**?

In this brief presentation, we can only refer to one central aspect: the need to significantly increase **the technological absorption capacity** of each society by adopting the **adequate organization**.

For this purpose, the first and foremost task is to recognize and understand **the nature of the present paradigm**.

Each technological revolution offers a vast wealth creating potential which can be geared to the ends of the various agents and actors if, **and only if**, the adequate organization is put in place.

The old hierarchical pyramid, with its centralized controls, its rigid routines and its habit of stifling creativity cannot take advantage of the potential for adaptability, flexibility, variety and continuous improvement that characterizes the new technologies and the new organization.

The structure of the global firm, with its strong strategic center, its network structure, the high autonomy of its decentralized units and its capacity to adapt to multiple market segments, is the basic model to study and to follow.

No. Have no fear! The old pyramid was as good for General Motors as it was for a university, a hospital or a government ministry. It was simply, up till very recently, the most effective structure we knew to achieve a complex task. Now, that has changed for all. Networks are simply superior.

So the first thing we need to do is to stop the sterile debate about State or markets and **start reinventing the modern “strong State”** capable of promoting development, improving the quality of life and overseeing the proper functioning of markets.

We need a multi-level State organization actively embracing both **globalization and decentralization**, which are in fact the two sides of the new coin. A national State capable of serving as an effective broker between the supranational, global level, and the subnational, local levels. It is quite likely that the previous proactive role of the national State might be better served in these new conditions by local governments. At that level and in hundreds of localities, consensus building and local specialization can be better focused for pursuing wealth creation, technological development and the enhancement of the quality of life for the population.

The slogan of the ecologists **“think global, act local”** is probably the appropriate one.

The other indispensable direction in terms of technological absorption capacity refers to **human capital**.

Again, we need to clarify the sense of the present transformation to identify the course of action.

The most essential –or perhaps the most relevant- meaning of the expression **“knowledge society”** is not the speed or the volume of production of knowledge. The truly different dimension refers to the **diffusion** of information and knowledge. It is the **widespread access to all citizens** that really matters. And it is not necessary to access all knowledge but those elements that can serve as the basis for the creativity of each individual, of each social group.

This means of course a profound educational reform. What is required is not only –and not mainly- more schooling or more training, but a different manner of teaching and a conscious way of preparing for constant change. What is needed is not only learning to answer questions, but mainly learning to ask them. We are moving from a Tayloristic model where discipline and obedience were a good preparation for life, to a model where, creativity, problem solving, teamwork, analysis and innovation are what make a capable person to shape the emerging world.

We have of course merely scratched the surface of the tasks at hand. We chose to briefly mention the changes required in the preparation of the citizens and in the collective structures of government.

Since our topic was technology, we could have been more conventional and discussed the criteria for specialization, the choice of sectors, the conditions for joining or not joining global networks... and so on.

But we began by remembering that technology should be at the core, not at the edge, of development strategies. **And we really meant it.**

In our view, the most important contribution that those who understand the new paradigm can make today is to **provide criteria** for the direction of change in the social and political spheres.

It is that understanding which can empower society and its leaders to make the most of the wealth creating potential provided by the present technological transformation.