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Technological dynamism and social inclusion in Latin America: a resource-based production development strategy

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This paper sets out a strategy for invigorating development in Latin America by taking advantage of specific opportunities in the current context and the advantages offered by the region. It briefly analyses the characteristics of globalization and the techno-economic paradigm of the information and communications technology revolution in order to identify new opportunities in terms of markets, positioning in global networks and technological options. From this perspective, it argues that natural resource-based process industries can complement the specialization of Asia in assembly industries. Given the low rate of employment in the former, it proposes a dual strategy that includes promoting “bottom-up” wealth creation by taking advantage of the new flexibility in technological diversity, transport and trade. The idea is to stimulate policy debate and experimentation and signpost some avenues of research.

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I

Introduction

This essay looks at current trends in globalization and in the diffusion of the information and communication technology (ICT) revolution and of its paradigm in order to propose a vision of a successful and socially equitable future for Latin America, based on the common features of its countries while encompassing all their variety. The hope is thereby to provide the basis for intensive research and for a serious and wide-ranging debate on the matter.

The proposal is rooted in the author's work on the diffusion of technological revolutions, the way technology and technological capabilities determine growth potential and the effect of the world technological context in creating and modifying windows of opportunity for the development of countries and regions.

Rising raw material prices in the mid-2000s unquestionably fuelled a resumption of higher growth, but technological capabilities did not expand to match and profound social inequalities persist; indeed, they are deeper in many cases than in the 1970s. The region is becoming aware of the need to create a solid foundation for a more stable source of economic growth and social development potential.

Given the strong Asian bias of the current globalization process, it is very important to identify areas of technological potential where Latin America has a comparative advantage vis-à-vis Asia. In highly simplified terms, one can say that Asia is a very densely populated continent with a relatively low natural resource endowment, while Latin America is very rich in natural resources but has a much lower population density. These conditions give Asia the advantage in labour-intensive fabricating (assembly) industries, while in Latin America they favour the resource-based processing industries. Since the region is extremely varied in resource endowment, this general direction should allow and in fact demand differentiated specializations.

Acquiring capabilities in the resource-based industries associated with biology and materials has the added advantage of positioning the region

in the technologies that are likely to be part of the next technological revolution: biotechnology, nanotechnology, bioelectronics and new materials. A focused effort will be needed, however, to ensure such preparation takes place.

Process industries are usually non-labour-intensive and tend to need a high proportion of skilled and highly skilled personnel. This means that although such industries can contribute to economic growth and the enrichment of human and technical capital (both crucial for catching up), they cannot do enough to reduce the gulf between rich and poor, eliminate unemployment and overcome poverty. Neither is it possible to rely on the "trickle-down" effect, which historical experience has shown to be so questionable. This suggests the need for a two-pronged approach to development: top-down and bottom-up. Accordingly, the present proposal involves what could be called a "dual integrated model".

The aim of the top-down part of the strategy would be to achieve competitiveness in world markets, reaching the technological frontier in certain areas and processes and even forging ahead of it, sometimes in alliance with global companies. In turn, the bottom-up half of the strategy would act directly at the municipal and local level in every corner of the territory by identifying, promoting, facilitating and supporting wealth-creating activities geared to whatever market was most suitable: local or regional, national or global. These would tend to be specialized "clusters" targeting niche markets based on local advantages.

As we shall discuss below, both halves of the dual strategy are enabled by the new global conditions. The bottom-up half would be aimed at reducing poverty and the top-down half at activating and strengthening the engines of growth in the economy, thereby providing the resources to make both halves viable.

This dual strategy cannot be achieved by the market alone, but neither can it effectively be imposed by government, particularly in the current paradigm, which requires constant innovation and flexibility in the face of changing contexts. Such a model can only function properly as a socially shared vision, with the various agents of change acting autonomously in the agreed directions under the coordination of an active government with an appropriate and effective

□ This paper is based on a study prepared for the ECLAC Programme on Technology Policy and Development in Latin America.

institutional framework. Its implementation would require a process of consensus-building involving business, government, universities, the media and society in general, followed by the appropriate policy measures to induce and facilitate market behaviour in the agreed directions.

The premise of this interpretation and indeed of this article as a whole is that, other than for countries competing in the very front ranks, all successful development strategies are positive-sum. The technological and economic changes taking place in the core countries of the global system and the leading corporations of the main industries determine the context in which catching up takes place. Only through a clear understanding of their changing interests and needs, and of one's own advantages and assets, can opportunities be identified and development ladders constructed and climbed. The cases of the four "Asian tigers" and now of China and India show that belonging to the periphery is no longer a situation of static "dependency" but rather a potentially dynamic one.¹

Even at best, of course, catching up takes time, persistence and effort and demands active learning to make it possible to relate to the most powerful on a basis of genuine mutual advantage. These processes are also difficult, unequal and often unfair, but no good short cuts have as yet been found (Bell, 2006; Pérez, 2001, pp. 126-128).

While this discussion is based on the author's work on patterns that recur in the spread of technological revolutions, it is not possible in this brief paper to present a summary of those patterns or to review the

meaning of the various concepts and terminology. It is hoped that the succinct explanations provided will be sufficient for current purposes.² Furthermore, it is useful to advise the reader that this is mainly an essay rather than a research article, a proposal argued from a particular world view rather than an empirical analysis of context or viability. It is meant to open, rather than close, a necessary debate.

The following section will examine globalization as an intrinsic element in the ICT paradigm and will single out three processes of hyper-segmentation that are powerfully shaping the field of opportunities. It will then present an overview of the dual model, identifying the general directions of specialization for resource-based processing industries in the light of both the urgent need to combat poverty and the rise of Asia. The next three sections analyse the three key hyper-segmentations (of markets, value chains and technologies) in detail, considering how each of them defines opportunity spaces in both the directions of the proposed strategy. The succeeding section shows how resource-based specialization can also prepare the ground effectively for successful participation in what looks like being the next technological revolution (probably based on life and materials sciences). After this comes a brief discussion of resource-based development theories and the reasons for thinking that current conditions might offer a window of opportunity for embarking upon this development path. The final section argues for the need to revitalize the role of government in building consensus and proactively facilitating both components of the strategy.

II

Globalization and its determinants

The ICT paradigm and the global corporation

Every technological revolution offers enormous potential for wealth creation and social well-being. Each is clearly superior to earlier ones in terms of

effectiveness and productivity, not just because of the new technologies involved, but also because of the new "techno-economic and organizational paradigm" which is its accompanying best practice. Each successive wave brings with it distinctly new

¹ In the author's view, dependency theory was a valid explanation for the conditions that prevailed throughout the mass production era, especially during the 1950s, 1960s and 1970s. The context has changed radically since the information technology revolution and consequent globalization, and now requires analysing anew.

² Interested readers are invited to consult the author's web page (www.carlotaperez.org) and the publications cited in the text.

principles, methods and organizational forms and criteria. Entrepreneurs, companies, governments and societies benefit more or less from that potential depending on their capacity to adopt and adapt the paradigm to their specific purposes.

Many of the practices involved in the ICT paradigm are gradually becoming accepted and commonplace to the point of being regarded as obvious organizational “common sense”. Decentralized networks with a guiding centre are replacing closed, centralized control pyramids; continuous improvement and innovation are replacing the previous practice of stable routines and planned change; the notions of human capital and of the value-creating powers of knowledge and expertise are displacing the view of personnel as “human resources”. Although there is still resistance to some of those shifts, none has been more subject to debate and extreme positions than the shift towards globalization.

Globalization is an intrinsic feature of the ICT paradigm; complete liberalization is not (Pérez, 2009). It is true that the characteristics of ICTs make national boundaries permeable and expand the potential scale of production, thus enabling and requiring markets of planetary scale. But “free market” policies understood as letting all markets run loose—unregulated, unguided and unrestricted, both within countries and globally—are no longer effective.

Globalization is not about the disappearance of the nation State or of national governments, though it is likely that these will eventually yield some powers to supranational institutions and devolve others to local governments. Globalization is about making the most of regional, national and local differentiation, both in production and in markets. Perhaps the motto of the environmentalists, “think global, act local”, best captures the meaning of the whole globalization process.³

Identifying likely windows of opportunity requires an understanding of the nature not only of the ICT paradigm, but also of the new global corporations. They are the real agents of globalization and their interests are the key to designing positive-sum strategies.

³ If there is a case in the world where the State maintains control of foreign investment through all sorts of limits, restrictions, regulations and negotiations, it is today's China. Not only does it drive a hard bargain over its markets and low-cost advantages, but it dictates where in its territory and in which sectors foreign companies are to operate and lays down conditions for local participation and local learning. This was also the case in South Korea and many other successful countries.

There is a profound difference between the old multinationals (MNCs) and the current global corporations (GCs). The former were the final phase of the mass production paradigm and a way of dealing with maturity and market saturation; the current GCs are the organizations that use the new ICT paradigm to best advantage.

The name “global corporation” is self-explanatory. A corporation of this kind is no longer structured as a parent company with affiliates in multiple markets, nor does it aim merely to take advantage of lower production costs in various countries. It has a different structure and works to a different logic. It is the optimum form of the new planet-wide network organization driven and facilitated by the ICT revolution. This affects the company itself profoundly.

Reaching for global markets is a direct consequence of the effort to apply and take full advantage of the potential and characteristics of ICTs. A new higher level of productivity can now be achieved through networked organizations spanning the globe. The Internet infrastructure, with its satellites and transoceanic fibre optic cables, provides smooth and instant communication across the world and allows the whole planet to be assessed for comparative advantages. Thus, firms can gauge the conditions for outsourcing, offshoring, insourcing, joint-sourcing and other options and estimate the qualities and costs of engineering, production, transport and transaction “as if” the economic space were open and unlimited, whilst taking full account, however, of the political and policy conditions in each country.

The coordination capabilities provided by ICTs enable levels of organizational complexity and size that go well beyond the maximum achievable by the old multinational or transnational corporations with their pyramidal structures and slow information systems. Not only is it now possible to guide, monitor and control a truly giant organization, but territorial coverage and structural complexity are relatively easy to handle with ICTs and are likely to become much more so with further adaptive innovation.

The process of globalization has brought with it the hyper-segmentation of three key areas: value chains, global markets and technological capabilities. Each of these areas becomes a complex network with differentiated components. The result could be termed “integrated decentralization” or “systemic componentization”, where each component has a very high degree of autonomy within an inter-functional and interactive structure.

In the structure of each corporation, there is a segmentation of its value network (including suppliers and clients) into components and subcomponents which can connect in a variety of different types of relationship—as part of the core structure, as stable independent contractors or allies, or indeed as temporary suppliers tapped only when the need arises. In turn, each of these components is supported by its own network of relationships on the basis of a high degree of autonomy, which in these structures is considered indispensable to ensure flexibility and competitiveness. The components may be territorially scattered in multiple countries, yet they form a single “global value network” leveraged and coordinated by the global corporation.⁴

This same capacity for handling complex networks also facilitates the hyper-segmentation of markets,

allowing a highly diversified product profile and great adaptability to a wide variety of specific and even ultra-specialized demand.

Once the value network has been segmented into its simplest subcomponents and markets splintered into innumerable niches, technological capabilities can be singled out and very deep and innovative specialization can allow small knowledge-intensive units or companies to thrive inside or outside global corporations. At the other extreme, some traditional artisan methods can also occupy premium niches.

These characteristics of the globalization process open specific windows of opportunity for the companies and countries of Latin America. These opportunities will be analysed following discussion of the overall strategy proposed, and in relation to it.

III

The global context and the advantages of possessing natural resources

A dual approach for a dual reality

There are two realities that must be confronted by whatever strategy for development is adopted by Latin America. One is the nature of the competition with China and other Asian countries in global markets. The other is the continent’s highly polarized income distribution and the unacceptably high proportion of Latin Americans living in poverty.

The direction taken by the current process of globalization seems to have given Asia the role of “workshop of the world” as far as the “fabrication industries” are concerned (electronics, electrical appliances, clothing, etc.). The advantages upon which this global specialization is built are massive amounts of low-cost labour and an abundance of engineers and highly educated personnel in the population. The continent’s scarcity of raw materials in relation to its growth needs has allowed Latin America and Africa to export growing amounts of minerals, energy and agricultural produce at higher and higher prices.

Latin America has had increasing difficulty competing in fabrication, especially in the areas of high-volume, low-cost products. It is far less densely populated than Asia and what is, in fact, very low-cost labour is still far more expensive than its Asian counterpart. Yet its rich endowment of natural resources and energy provides a window of opportunity for specializing in the “process industries”.⁵ The traditional problem of mono-export of raw materials could be turned into a high-growth future of complex technologies and a varied export profile by taking intelligent advantage of the possession of natural resources.

⁴ An array of online resources for the literature on global value chains seen from the perspective of developing countries can be found at <http://www.globalvaluechains.org/>.

⁵ The concept of a “fabrication industry” is used here to refer to manufacturing in which products are assembled from distinct parts (automobiles, mechanical, electrical and electronic equipment, clothing and so on), usually by human labour in workshops and on assembly lines. A “processing industry” is one specializing in the direct transformation of raw materials by chemical, electrical, heating or other methods (steel, paper, tomato sauce, petrol, plastics) and services such as telecommunications. The main distinction is that the production process occurs “inside” the system of equipment and the personnel involved oversee and support the process rather than performing it, as in fabrication. See Woodward (1965).

It is also likely that globalization will tend to raise prices for natural resources generally (although without eliminating volatility). The prospect of favourable average prices for these commodities opens up a possible means of funding the development of technologies and human capital related to them. The region could become the supplier of material inputs, food and other agricultural goods (from the most standard to the most tailored and sophisticated) to the rest of the world.

The strategy would involve constant technological upgrading of resource-based activities and gradual improvement of the export profile through continuous innovation in products, processes and auxiliary activities, primarily with a view to creating high-value niches differentiated from traditional commodity markets. This implies a gradual transformation of the whole economy. The idea is to engage in a concentrated effort to master the technologies of processing industries, from large-scale commodities (steel, aluminium, paper, refining, beer, petrochemicals and certain types of food) through medium-scale specialities (chemicals, biotechnology, nanotechnology) to small-scale customized materials and special chemicals or other niche products. This effort can be grounded in the capabilities already acquired by each country in its specific area of resource endowment and in other processing industries (metallurgy,

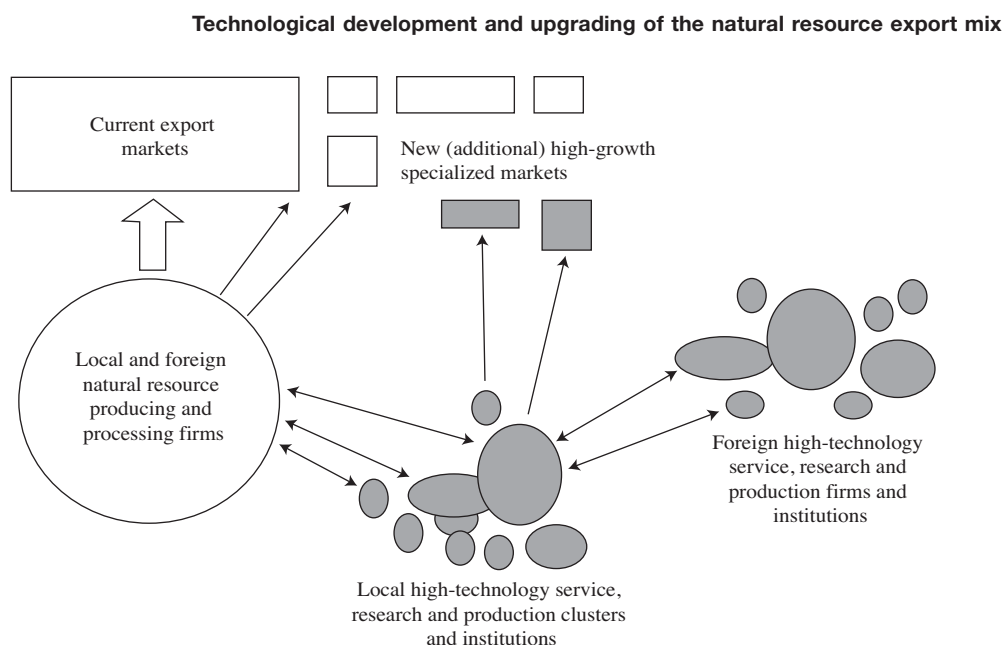
chemicals, food processing), and could advance along the new technological trajectories being opened up by materials science and the life sciences. The goals would be to migrate gradually towards higher and higher value-added products with more and more specialized and customized features and to establish strong networks of innovation (with the participation of local, continental and international firms and universities) to sustain the effort over time. Figure 1 represents the idea in diagram form.

Some innovation networks could enlist the active participation of extractive or agricultural GCs, be they foreign or local. Or they could be constructed by local companies joining forces in formal or informal clusters (such as winemakers, flower growers, cocoa producers, organic farmers, tourist inns and guides, textile designers and so on).

The idea would be for each country to strengthen the know-how already incorporated into its current export products and to then move technologically up, down and sideways within the value networks concerned.⁶ Depending on the resource endowment

⁶ In their argument for a resource-based strategy in Africa, Walker and Jourdan (2003) insist on the importance of what they call lateral innovations that originate, for example, in mining but are suitable for subsequent use in other industries because of their generic nature.

FIGURE 1



Source: prepared by the author.

of each country and the capabilities it has already built up, efforts would be directed towards a specific set of goals. These might include the following:

- Endowing materials currently exported with special qualities in order to target niche markets, examples being anti-termite (or highly elastic) wood, fully customized or biodegradable materials, or special alloys and composites.
 - Developing further capabilities for tailored and niche products in the major processing industries (metallurgy, petrochemicals, paper, glass, etc.).
 - Increasing the technological capabilities of the drinks and food processing industries (both product and process technologies).
 - Increasing the technological capabilities of industries associated with export agriculture, animal products, fisheries, forestry, etc., and further developing the industries that produce inputs for them.
 - Exploiting the endless range of indigenous fruits and vegetables, with their superb flavours and textures, and developing the technologies needed to export them in perfect condition to high-priced “gourmet” niche markets.
 - Designating areas to be set aside for “organic” production and establishing a certification of origin system.
 - Developing health-related biotechnologies for human, animal or plant needs identified locally as well as improving export-related products.
 - Developing environmental protection capabilities involving alternative energies, recycling, pollution capture, etc.
 - Exploiting the varied types of modern tourism by taking full advantage of the variety of natural and historical conditions in the countries and using imaginative business models.
 - Learning to custom-design the additives, catalysts and other specialized chemicals that may be required by process industries (local or global).
 - Developing a specialized capital goods industry capable of responding to both simple and exacting requirements from process industries, be they large, medium-sized or small.
 - Developing or enhancing complementary computer software, systems and services and electronic instrument industries that are likewise capable of meeting user specifications.
 - Promoting a dense network of small knowledge-intensive enterprises (SKIEs) to serve each area of specialization.
- Using research and development (R&D) and education to reinforce progress in the desired directions.

The specific resource endowment of each country and the levels of knowledge and expertise accumulated there would indicate the preferred areas of specialization to pursue and the appropriate links and alliances to form within the region and beyond. The new knowledge and expertise required to follow the suggested paths will necessarily involve global networks and alliances both with the academic and research communities and with GCs at the forefront of these new industries. They are also likely to require foreign investment, as well as strategic alliances and joint ventures between GCs and locals and between companies in the region.

The mixed technological legacies of Latin American countries must be taken into account when judging the potential to pursue a strategy like the one proposed. Nonetheless, there are common features in the region’s history that provide the basis for a broad stylized overview of this group of countries:

- While the assembly plants established under the import substitution model restricted innovation (often by contractual obligation), export activities, usually in the hands of multinationals, were up to date technologically, employed local personnel in a managerial and technical capacity and often engaged in adaptive innovation.⁷
- Complementary industries developed to replace assembly plants (glass, paper, cardboard, plastics, packaging, printing, cement, paint, ceramics, etc.) and basic agroindustries (beer, milk, juice, coffee, pasta, etc.) are all mainly process industries using local raw materials, and they consequently needed adaptation and improvements even if they were based on foreign technologies and equipment.⁸
- Most service infrastructure networks, usually set up by governments, such as telephone, electricity, water and sewage systems, were manned by local personnel, and they therefore needed to have full operational and maintenance capabilities as well as the ability to make minor improvements and adaptations. Once they were privatized, foreign

⁷ Given the local specificity of raw materials production (or extraction), important innovations were sometimes made *in situ*. Lake Maracaibo in Venezuela was the site of pioneering innovations in underwater drilling.

⁸ See, for instance, Vera-Cruz (2006) and Dutrénit (2006) for beer and bottle-making in Mexico.

companies came in with new technologies and retrained existing personnel on the basis of their previous experience.

- Some countries succeeded in making the move upstream in import substitution to steel, petrochemicals and capital goods with the resulting accumulation of know-how and engineering capabilities, as well as a degree of innovation capacity.
- Later, with the opening of their economies and the arrival of the information revolution, most countries developed indigenous companies to design hardware and software products and to provide systems integration, maintenance and other services.

Taken all together, this indicates that the common history of industrialization efforts in Latin America has bequeathed a degree of bias towards processing industries and enough ICT capabilities to serve as a minimum platform of technological expertise for this strategy. Nonetheless, the whole proposal hinges on a gigantic effort in education, training and technological capability enhancement across the whole of this range.

Unfortunately, with the exception of tourism and some agricultural sectors, most process industries are not labour-intensive, but rather skill- and capital-intensive. Furthermore, the reorientation proposed would make them even more knowledge-intensive. Hence, the strategy demands a complementary effort to promote the growth of high-employment industries (construction, health, personal services). But that would not be enough.

The issues of income distribution and poverty have been highlighted by the social polarization that China and India, the successful emerging countries, have been experiencing. Latin America, of course, has a tradition of polarized income distribution and of marginalization in the countryside and in the shanty towns surrounding the main cities, and this worsened during the “lost decade”, giving rise to social discontent, resentment and an ardent desire for change. Any strategy for growth that does not recognize this appalling reality will be socially unacceptable and politically unstable.

The development goal must be the one promoted by Fernando Fajnzylber in the 1990 ECLAC publication *Changing Production Patterns with Social Equity*.⁹ He

had already pointed out that while Asian and South European growth in the 1970s had reduced inequalities, the majority of the Latin American countries had grown with very unequal income distribution patterns.¹⁰ It is interesting to note that, during their catching-up process, the four “Asian tigers” all established universal intensive education programmes with a strong technical bias, and progressively developed a more even income distribution. Both have continued to prevail as they have moved up the growth and development rankings.¹¹

In the course of the analysis that follows we shall argue that it is precisely because of the opportunities offered by the current paradigm that the twofold objective of lifting the bottom of the pyramid while generating growth in the front ranks of the economy is now achievable.

This means creating a dual strategy or “dual integrated model”. One part of it would be to achieve technological mastery (deep specialization) in resource-based industries with a view to establishing strong positions in the global marketplace, while the other would be to develop the wealth-creating capacity of each part of the territory and thereby improve local people’s quality of life by leveraging local advantages to target local, national or global niche markets. In the first part of the strategy competitiveness is the goal, in the second it becomes a means to well-being for the population concerned. The first is oriented towards top-down, the second towards bottom-up growth. The sectors promoted in the first would be the engines of growth in the economy; those developed in the second would be its poverty fighters.

In the last section it will be argued that the two prongs of the dual model need to be socially accepted and ideologically integrated, but clearly distinguished institutionally. Let us now discuss how the three hyper-segmentations that characterize the globalization process open up opportunities for each side of this dual strategy.

⁹ ECLAC (1990). See also ECLAC (2008).

¹⁰ Fajnzylber (1990), figure 1, p. 12. The subject is still on the ECLAC agenda, with special reference to structural heterogeneity as a reason for the scale and persistence of inequality. See, for example, Infante and Sunkel (2009).

¹¹ The Republic of Korea, Singapore and Hong Kong Special Administrative Region are among the top 28 countries (score above 0.9) in the human development index ranking (UNDP, 2007).

IV

The hyper-segmentation of markets

Opportunities at both ends of the dual model

The ICT revolution has led to a refined fragmentation of all markets, not only in manufacturing but also in raw materials and services, in such a way that many fabricated products, from mobile phones and desktop computers to T-shirts and refrigerators, are now treated as commodities, while the idea of a “speciality” niche is now frequently associated with raw material segments such as certain types of premium coffee and special steels.

In each case, the commodity segment is simply the very high-volume, no-frills, lowest-cost version of each product, once it has reached a certain degree of maturity. Profit margins for industrial commodities are very thin, and comparative production advantages are absolutely indispensable for success. On the other hand, many raw materials markets have upper layers with special qualities that command a premium in the market and can turn into semi-monopolies with relatively stable high prices (Kaplinsky, 2005). Much the same can be said, naturally, of services and industrial products that are customized, branded or organized in creative business models. Figure 2 presents a map of market segmentation, indicating the two main directions of differentiation, the relative proportion of profit margins in each and how these are obtained and protected. Figure 3 gives some illustrative examples and indicates the directions to follow for improved market positioning.

One of the consequences of this complex structure in all markets is the need to switch from regarding “industrialization” as the last word in development to perhaps having to coin a term such as “technologization” to refer to the more advantageous positions on the world market maps (e.g., the shift from “basic” products or services towards the “special”, “unique” or “custom” corners of the map in figure 3). This, together with the rise in raw materials prices driven by the advance of globalization, can help to eliminate or significantly diminish the traditional disadvantages of raw materials.

Another consequence of this kaleidoscopic structure is that there is plenty of space for small and medium-sized enterprises (SMEs) to coexist with giant corporations and for traditional products to

aspire to global markets next to high-technology ones. This means that proper market targeting is as much a prerequisite, and offers just as great a wealth of opportunities, for bottom-up sectors as for top-down ones.

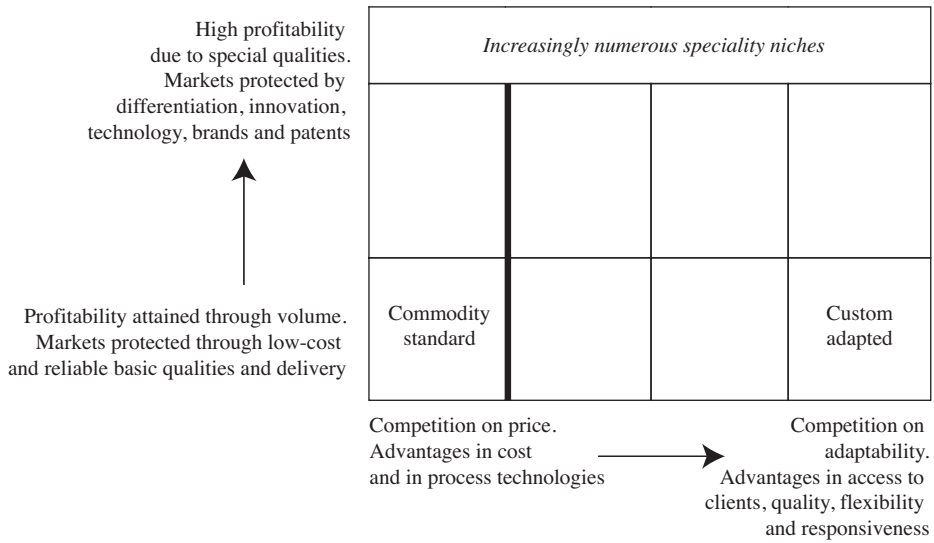
As a result of this hyper-segmentation, furthermore, the approach normally used to group industries in the mass production era is becoming inadequate. Rather than being classified by product type or production process, industries are now often grouped by destination markets. A producer of specially woven and treated cloth for making sails is no longer in the textile industry but rather in the sports and leisure industry. A company specializing in shoes for diabetics would be classed as being in the health industry, and so on. Sports and leisure, entertainment, environmental protection, health and creative industries are being recognized as increasingly important categories. Typically, these new industries offer more lucrative and protected opportunities for specialized producers as well as better-targeted distribution channels.

A particularly useful aspect of this variety in markets is that it opens up opportunities for much smaller scales of production. With the mass production paradigm, production had to amount to several container-loads or several tons per month in order for exports even to be considered. Neither transportation nor distribution systems were geared to handling small quantities of anything. Today there are innumerable specialist stores that stock global “niche” products, supermarkets and department stores make it their business to offer an extremely wide-ranging choice, and global courier services have developed very efficient systems of transport and delivery of any quantity at any frequency at relatively decreasing prices. Innovation in this direction is happening and is meeting a growing demand.

In this new world of proliferating niche markets, the range is extremely wide, running from the most traditional to the highest-technology and most knowledge-intensive products. There are niches for artisan ceramics and for biotechnology diagnostic kits. Long-distance services can range from straightforward

FIGURE 2

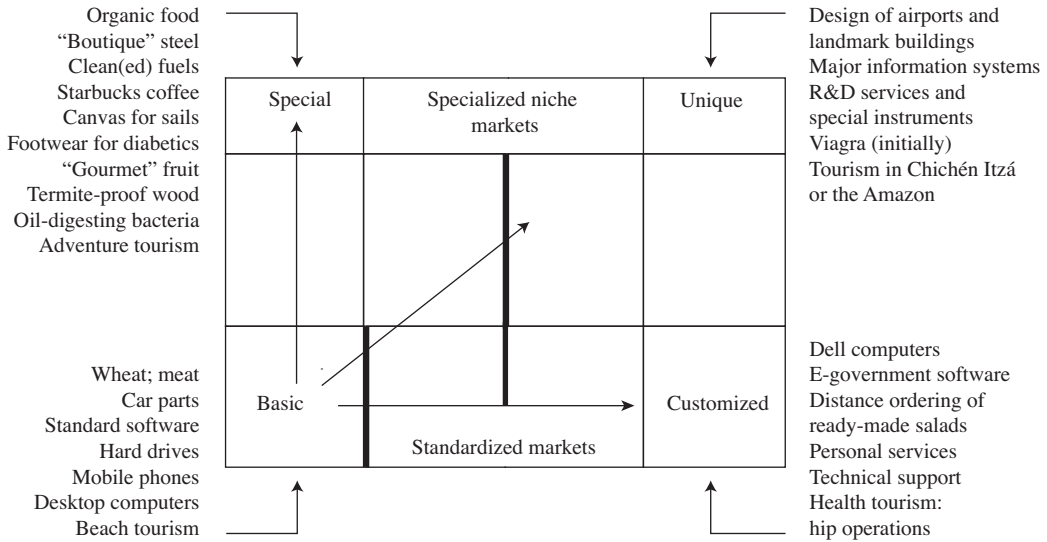
Hyper-segmentation of markets in the information and communication technologies paradigm



Source: prepared by the author.

FIGURE 3

Some examples of positioning



Source: prepared by the author.

call centres to interpretation of geological survey readings. Similarly, local outsourced services can range from food catering to data security. Specialized exports might include anything from an outstanding local marmalade or cheese to services for the detection of faults in sophisticated processing equipment. Tourism provision can range from a traditional Andean village organized into a “local experience” for travellers or a bird-watching trip in the tropical forest to a conference in a high-technology centre in

the middle of a beautiful landscape. Environmental protection activities can cover the gamut from certified “organic” produce to the use of bacteria specially developed to “digest” oil spills. The range is as wide as the variety of local conditions; the limits are set by the entrepreneurial imagination.

The notion of “glocalization” is particularly useful here. It refers both to the adaptation of global products to local conditions and to the identification of local products with global potential.

V

The hyper-segmentation of value networks

Strategies and policies for mutual advantage

There are many types of value networks, from producer-driven ones coordinated by a global producing corporation such as IBM, Toyota, Telefónica or Zara, through the buyer-driven supply networks of pure trading GCs such as Walmart or Tesco, to industrial districts formed locally to sell globally.¹² What they all have in common is that they combine autonomy for each of the elements with the power to coordinate the whole network. In the case of GCs, headquarters determines the goals and degrees of autonomy of the individual elements; in the case of clusters formed by partnerships between independent producers, it is the elements that determine the strategy and powers of the common core. The latter can sometimes become part of a GC network.

It is important to note that in these structures the ultimate level of competitiveness belongs to the network rather than to any of its components. Consequently, relationships within the network will be marked by the contribution each component makes to the whole. The link between this contribution and the relative distribution of benefits across the network is, of course, strongly mediated by relative power and by the information each participant has about the network and markets (Schmitz, 2004).

Isolated firms do not fare well in the ICT paradigm. Arm’s length relationships with suppliers, clients and

competitors, as in the mass production paradigm, no longer yield the best results and can endanger a company’s survival. This fact is at the root of the success of clustering and franchising strategies the world over and of the various programmes undertaken by governments and international agencies to promote diverse forms of partnership for cost sharing or for joint global marketing or training. It also explains the formation of stable clusters or consortia, both to help established industries survive and to generate new sources of activity in impoverished areas. Likewise, it is behind the attempts of many companies in Latin America to become suppliers to trading or producing GCs, with diverse results.

This discussion of market segmentation is meant to make it clear that the closer a product or service is to the commodity corner of the market map, the stronger will be both the price pressure and the demand for stable, basic, standard qualities with little deviation from specifications and delivery times. The more special the product or service, or the more knowledge value it incorporates, the greater the bargaining power of the supplier.

While certain countries in the region may possess some unique capabilities or traditions that can represent a valuable speciality, or be home to some highly knowledgeable specialists or innovators who can command a premium for their work, the majority are likely to have to begin the learning process at the bottom and aim at repositioning from there by innovating upward or sideways into more niche products or services. Appropriate support for enabling

¹² For producer- and buyer-driven networks, see Gereffi (1994) and Gereffi and Kaplinsky (2001). For local networks, see Schmitz (2004).

such improvement could—or should—be designed and made available, especially for the bottom-up part of the strategy.

But perhaps the discussion about the conditions for joining production networks is most relevant to the top-down part of the strategy relating to engines of growth, which in the end is the one that will fund the other half. The management literature has thoroughly studied the behaviour of global corporations, analysing how they are changing their structures and spreading across the world, how they take decisions and how they compete; the development literature, meanwhile, has been examining how the companies and regions that do the outsourced work fare in the process.¹³ This essay can only touch on some of the aspects most relevant to the proposal being discussed.

The extended geographical network of a GC is composed of an enormous variety of relationships with local companies and local labour forces across the many countries involved. The corporation itself is spread across the globe. Not only are regional managers sited abroad, but so are some of the global managers, so that they can take advantage of specific local conditions. Many production units are geographically situated where they can operate to best advantage and, increasingly, certain staff units are also being spread around various countries, including sections of R&D departments. This and the greater autonomy and incentives to innovate given to local subsidiaries create opportunities for mutually beneficial negotiations with host governments, with a view to raising the quality of jobs and of the activities performed locally.¹⁴ There are two different types of global workers in GC networks: offshore and outsourced personnel. The latter work for local companies belonging to the network through some sort of alliance or contract; the former are “inside” the GC and on its payroll.

Salaries for “inside” personnel may be the same as (or somewhat lower than) those paid in the country of origin but generally higher than is usual in the host country. They may also benefit from levels of security

that elicit loyalty and allegiance. Even the so-called “maquilas”, such as those in northern Mexico, no longer follow the minimum training routine work model. They need to involve workers in learning for quality control, continuous improvement and flexibility.¹⁵ Moreover, growth in the proportion of jobs of this type as a result of further foreign investment in the same region may end up setting the pace for pay increases and education and training levels expected in the area.

On the other hand, the more GC units there are in a particular country or locality, the greater the demand for services and the greater the outsourcing opportunities will be in that same locality, depending of course on the type of units and on local conditions.

Resource-based industries have to go offshore for obvious reasons. In fact, they have decades of experience with a particular way of working. They typically keep control of core activities and employ as many local personnel at each level as possible. They tend to outsource any high-technology work to global service corporations that may also employ local people. For this reason, in most Latin American countries with energy or mineral resources there is a pool of high-level engineering and management professionals who have experience in that industry and are able to take over some activities as outsource contractors. Resistance to using local companies has traditionally been high, though this could be attributed partly to the legacy of the import substitution model and its lax attitude to productivity and technological mastery (Pérez, 1996).

Policies to enable componentization¹⁶ of value networks in agreement with the GCs present locally could well function as a positive-sum strategy under the new conditions. The increase in demand generated by globalization is already calling forth greater and greater investment in raw materials and generating growing demand for service companies (Gurlit, Mencarini and Montealto, 2007). This will put pressure on global service companies to move experienced personnel to the new zones of operation and open up opportunities for competent local companies.

The new outsourcing relationships, be they in raw material GCs or in the downstream fabricating or process industries, are not necessarily the arm’s length,

¹³ On management see, for example, Berger (2006) and Garten (2000); on the development side see Gereffi and Kaplinsky (2001), Giuliani, Pietrobelli and Rabellotti (2005) and Humphrey and Schmitz (2004). For systems integration, see Prencipe, Davies and Hobday (2003) and Hobday, Davies and Prencipe (2006). For the notion of global production networks and the way not only production but also innovation is being outsourced, see Ernst (2000) and Ernst and Kim (2002).

¹⁴ See Marin (2007).

¹⁵ See Dutrénit and Vera-Cruz (2007) on the Mexican maquilas.

¹⁶ This term is being used rather than “disaggregation” because the process goes further, with separation not just into “parts” but into the “components” of parts.

price-squeezing ones of the past. The relationship with suppliers in the value network varies, of course, potentially moving from old-style arrangements with strong price pressures to high-level, high-quality interaction as the product or service shifts from requiring low skills to higher levels of knowledge intensity and innovativeness. At the upper end of the range, there can be strong technical interaction, information sharing, very well-paid contracts and even co-funding of innovations. The idea of the proposed strategy would be to facilitate the process of moving up to those positions in value networks, while recognizing that reaching those levels may require gradual upgrading and that the lower rungs of the ladder may create more employment and provide opportunities for building up capabilities. The ultimate goal would be to widen and enrich the skill profile as well as the export mix.

GCs no longer behave as carelessly towards the local society and environment as may often have been the case in the past. The trend towards corporate social responsibility, in the treatment both of personnel and of surrounding communities, and in relation to the

environment, is growing and is likely to spread further. It has perhaps been strongest in those industries where creativity is the determining factor in competitiveness and staff satisfaction is therefore indispensable; it has also become important in those consumer industries that are exposed to the transparency of the Internet and need to maintain a good image. However, even in cases such as mining, where geographical distance acts as a shield against visibility of behaviour and where the clients are major companies rather than consumers, corporate responsibility has enhanced productivity and hence is tending to spread as normal best practice (Warhurst, 2005). This said, it is still the responsibility of national and local government organizations to ensure that the natural and human environment is preserved and enhanced. Information about the standards of responsible business practice set by the leading companies in these fields can modify expectations and inform realistic and mutually beneficial negotiations. Growing competition for raw materials between Asia and the West will also tend to strengthen the negotiating hand of whoever possesses them.

VI

The hyper-segmentation of technologies High-technology specialization coexisting with traditional methods

Dichotomies are no longer useful for understanding the new best practice under the ICT paradigm. In technology, there has been a combined movement towards “componentization” and reintegration. Once each component of the whole has become fully differentiated and specialized, they all come together and interact in a much more dynamic network. The process has a fractal nature, because each of the specialized segments in turn is componentized into all the contributing parts.

In its restructuring process, a GC determines its “core competencies”, which are those that lie at the heart of its position in the market and its strategy going forward.¹⁷ It is in these core aspects that the GC

concentrates its technological mastery and innovation efforts. Other activities will be finely segmented and analysed in terms of the technological capabilities required and will then be outsourced under contract or bought in when needed from carefully chosen competent suppliers whose core competence is in that component. These will therefore be willing and able to reach for mastery in that aspect and to innovate in it. By componentizing, outsourcing and constructing this complex value network, the GC is also erecting an innovative structure across the whole range of activities involved.

In this structure, there are plenty of opportunities for local small knowledge-intensive service enterprises (SKIES) both in face-to-face supply and in the remote provision of digital services. By its nature, in fact, globalization generates markets for SKIES in each locality as it spreads. In turn, the existence of a

¹⁷ Prahalad and Hamel (1990) introduced the concept of core competencies.

fabric of competent and reliable knowledge-intensive services increases the competitiveness of all existing local users and serves to attract further local and foreign investment, which will continue to strengthen the SKIE network.

There is also ample space for competent suppliers of standard or semi-standard goods and services with enough mastery of the process technologies involved to be able to continuously improve quality and productivity.

None of these opportunities appears automatically. They require persistence, time and effort to build the capabilities needed for those roles (possibly starting by working in less demanding markets) and to develop the capability of negotiating a favourable position.

Large local exporting companies aiming to become competitive GCs will also need to develop the capability to componentize and outsource, while building mastery in core technologies and engaging in constant improvement and innovation in them.

Though little mention has been made here of the electronics, software, telecommunications and Internet service industries, they actually constitute the basic platform for the competitiveness of networked organizations and for effective participation in the global economy. The success of any strategy under the logic of the ICT paradigm in the current period requires efficient low-cost telecommunications and the availability of highly competent software, systems and maintenance SKIEs. Most Latin American countries have already advanced a good way along this path. Participants should easily be able to agree on policies to intensify the process.

A particular feature of ICTs is the intangible nature of many of their products and services. This makes it possible to outsource most back-office data services (including call centres) to any part of the planet where a competent and responsible entrepreneur sets up the service. The same can be said of translation services and of the interpretation of complex digitalized data in any field (geology, medicine, biology, finance, climatology, etc.) as long as the appropriate specialists are available.

The other aspect of intangible products is that ambitious innovations in intangible services can be initiated in any country and become global if successful, as in the case of Skype, for instance, where little Estonia has played an important role. Knowledge or language specificities can also generate niches in local or global markets. In Brazil there are dozens of Portuguese-language equivalents of Web 2.0 English sites, which

benefit from Portuguese-language advertising and can reach the colonies of the old Portuguese empire. The Spanish-speaking world has also developed on the web, but it still has a long way to go (its constituency includes Hispanics in the United States).

Another useful feature of the ICT paradigm is that the hyper-segmentation of markets results in the coexistence of a much greater variety of technologies and scales than was ever possible in mass production times. This is opening up innumerable opportunities on the bottom-up side of the dual strategy. Organic coffee grown in the shade, harvested by hand, toasted by traditional methods and benefiting from a guarantee of origin is sold in gourmet shops at premium prices, while machine-harvested coffee will be the commodity low-cost variety in the supermarkets (where the gourmet types will also be sold). There is no exclusion or marginalization of one technology by the other, nor is there price equalization at the lowest level, but rather a process of differentiation by quality and a range of prices that reflects the differences.

On the other hand, ICTs create the potential for customization extending even to the level of the individual user. This sort of “high-technology artisan production” or (when done at high volumes) “mass customization” is one of the many instances where this paradigm does away with old dichotomies through fusion.¹⁸

The range of opportunities for striking off in new directions and test-marketing products in relatively small quantities is immense. That is the route being taken by innovation in new energy sources and systems; that was the manner in which the low-cost airlines entered the industry, and it is the form being taken by attempts to create products for the so-called “bottom of the pyramid” (Prahalad, 2004). A particularly striking innovation that breaks with the trajectory followed by the automobile industry in the last decades is the ultra-simple US\$ 2,500 car developed by Tata Motors in India. At the same time, extremely expensive, ultra-advanced electric cars built by new start-up companies such as Tesla are being brought to market in California, competing with the majors.

The time has come for the long-sought “adequate” or “appropriate” technologies, but the concept had to

¹⁸ We have been witnessing the proliferation of rather ugly but expressive portmanteau terms reflecting this fusion, such as “glocalization” (referred to earlier) and “coopetition”.

wait for a technological paradigm capable of handling the coexistence of different levels of productivity and technological sophistication without having to homogenize prices or markets. This has been

greatly facilitated, of course, by the ease with which information technology tools can handle commercial inventory control and other administrative processes, regardless of numbers, variety or changes in time.

VII

The seeds of the future

Using current opportunities to prepare for a technological leap

The choice of a resource-based path for the technologization of production in Latin America has an additional advantage that is pregnant with future possibilities.

The ICT revolution is now entering the deployment period, as its power to increase productivity and facilitate innovation spreads to all other industries.¹⁹ Meanwhile, the next revolution is in gestation. It would appear now that the revolutionary industries of the future are likely to be some combination of biotechnology, nanotechnology, bioelectronics, new materials and new energies, shaped by technological breakthroughs and probably by growing environmental awareness and concerns.

All these technologies can be roughly ranged in the category of process industries. During the current gestation period they are likely to develop in connection with some existing leading industries. New materials will find more and more uses in the fabrication industries, nanotechnology in surfaces, electronics, cosmetics, health products and others. They may also influence raw materials production itself, examples being special bacteria for leaching in the mining industry or for removing pollution and

spills, special chemical additives to give particular qualities to wood or to serve as catalysts in oil refining and petrochemicals, natural pest control processes in organic agriculture and so on.²⁰

If historical rhythms are any guide, the transition to that new revolution might occur in about two or three decades. Whatever the time frame, Latin America can now make a start on enhancing its capabilities in preparation for the next revolution, using its current resource-based exports as a platform for leading-edge innovation and as a source of funding.

It is important to note that Japan and the “Asian tigers” acquired their initial experience by assembling transistors and electronic equipment in the 1950s and especially the 1960s and early 1970s. At the time, these were being used in products typical of the mass production revolution: radios, televisions, record players, etc., with the portable versions constituting a market-expanding innovation. This placed those countries in an advantageous position in terms of experience and capabilities when the microprocessor inaugurated the ICT revolution. Something similar could take place in Latin America the next time around, not however by chance but because of a conscious drive in this direction.

¹⁹ This period is the second of two stages in the spread of each technological revolution; it begins following the growth and collapse of a great financial bubble and the consequent institutional adjustments, historically characterized by a return to an active role for the State in the economy. See Pérez (2004, pp. 74-77, 107-112 and 175-188) and Pérez (2006).

²⁰ See Hernández-Cuevas and Valenzuela (2004) and Gutman and others (2006) for strategic thinking on biotechnology in Latin America.

VIII

A temporary window of opportunity And why resource-based development theories are also temporary

The proposal being presented here asserts that natural resources can, under current conditions and possibly for a few years longer, become the basis for launching a self-funded development leap. The implication is that these resources can be technologized in order to improve the quality of the export mix and open up opportunities for marginalized sections of the population. Yet traditional doubts about the possibility of resource-based development may cause its feasibility to be questioned.

It is interesting to note that the idea of the “resource curse” is very recent and was preceded by other theories employing other arguments which may sometimes seem contradictory. What is being claimed in the present study is that opportunities change as different technological revolutions with different conditions emerge and propagate.

Classical economists (and popular opinion at the time) considered the possession of natural resources an advantage for development. The idea was confirmed – and partly inspired – by the fact that countries such as Australia, New Zealand, Canada and Argentina made huge leaps forward on the basis of their mining, agricultural, meat and wool exports in the last quarter of the nineteenth century, using the proceeds to fund ports, airports, railways and other infrastructure. Resources also played a positive role in the economic history of the Scandinavian countries, as well as in that of the United Kingdom and the United States.

Natural resource production began to be seen as a burden on development once the mass production revolution was fully established and high-productivity industry had become insatiable in its need for cheap energy and raw materials, and synthetics began replacing one natural material after another. Both Prebisch and Singer saw the price scissors between manufactures and materials as an obstacle to development at a time when they actually had become so, at the beginning of the deployment period of mass production in the mid-1940s (Prebisch, 1951; Singer 1950).²¹

²¹ See Pérez (2004 and 2009) on the characteristics of periods in which successive waves of technology are established and deployed.

The notion of “Dutch disease” appeared later to refer to the way gas (or oil) exports determined the exporting country’s exchange rate to the detriment of manufactured exports. The concept appeared when energy prices soared in the 1970s and was first used in an article in *The Economist* in 1977. More recently, various “resource curse” hypotheses have become fashionable. Some rode on the back of the African experience of violence, wars and corruption in the internal struggle for the control of such sources of wealth as diamonds, gold and oil; others were based on the contrast between the rise of the “Asian tigers” and the lost decade in Africa and Latin America.

The contention of the present study is that there are certain specificities in the current context that are different from those which prompted those recent theories and that open a temporary window of opportunity for resource-based growth. However, it is only a window and it may be of relatively short duration, perhaps a decade.²² This judgment and those that follow are based on my personal assessment of the conditions that make the present proposal viable.

The following are some of the factors that create a favourable context for initiating the strategy now (2010-2012):

- The balance between supply and demand in the globalization process means that prices for raw materials are almost certain to settle at levels higher than those normal in the past, although volatility will not disappear. The average level will depend on any financial regulations introduced (to prevent commodity speculation) and market adjustments.
- While significant extraordinary profits continue to flow, it should be possible to achieve positive-sum negotiations between users and suppliers and

²² The time available to initiate a strategy with a chance of success is different from the time it may take for this strategy to pay off. The Republic of Korea entered the semiconductor industry and became a leader in memory chips at the right moment. Ten years later it would not have been possible, but the benefits of that early entry and success have been multiplied as that expertise has served as a platform for further advances under changing conditions.

between corporations and governments with a view to allocating some natural resource profits and taxes to investment in capacity expansion, downstream processing, technologization and improvement of externalities. This would boost the top-down development strategy (human capital, high-technology services, infrastructure, environmental protection) as well as potentially providing funding for bottom-up development projects.

- The 2008 financial crisis has created the conditions for acceptance of a more active role for the State in the economy.
- Changes in environmental awareness, regulation and corporate behaviour are still incipient but are beginning to intensify. In particular, process industries and extraction firms have been slow to adopt the global ICT paradigm (in terms of incorporating local capabilities into their networks), but they can be seen to be moving now.
- Large specialized service companies are overstretched and will probably welcome the entry of local allies. In time they will expand to meet demand and those that are not “inside” the network (on an independent or allied basis) will find it much harder to enter.
- The potential competitors in this sort of strategy (Africa, Russia, Kazakhstan and others) are only just setting off along a similar route.
- Those countries or regions that become early competitors by riding these trends will have a head start, and whichever region attracts the most dynamic GCs will acquire decisive advantages.

Another aspect setting resources on a dynamic path is the way the current direction of globalization is increasing its environmental impact. Both the limits on the availability of natural resources and the climate change threat are going to become key forces shaping markets and technologies related to energy,

materials, water and food. This suggests that scarcity will tend to push up the prices of natural resources, making their possession an even greater advantage. These price changes and the resulting rise in freight costs will penalize the movement of unprocessed raw materials across the world. That should favour local processing. At the same time, higher prices will put pressure on users to reduce the amount of material employed per unit of output. That should favour more finely specified materials of the kind suggested in the proposed strategy.

Because of higher freight costs, the geographic distribution of globalized activities is being reconsidered and more factors are being taken into account in the choice of local, regional or global sourcing, depending on product characteristics and cost components. This trend is opening up some opportunities and closing others.

The time frame for these environment-related trends to become mainstream may be very short, depending on the intensity of global warming effects and the regulation that may accompany them. In any case, this needs to be a central feature in any resource-based strategy from the start.

Lastly, the whole of this strategy depends on a serious push for active engagement accompanied by a simultaneous strengthening of knowledge and experience. Learning and the creation of human capital take time, as do major investment projects. This implies that only an early and determined pursuit of these goals will place the Latin American countries on a dynamic growth path in time to follow it successfully.

What is clear is that if the increased income from natural resource exports ends up becoming a source of superficial growth and of increased imports for consumption, a very valuable opportunity will have been squandered.

IX

Implementing the vision

Generating consensus and an adequate institutional framework

There are already many Latin American companies participating in GC networks, and some are building global networks of their own. There are also many government initiatives to promote partnerships among small and medium-sized firms to increase their competitiveness. Some countries have gone much further in one or other aspect of the strategies suggested here, as well as in other directions. The question is whether those scattered efforts are enough, whether they will yield the maximum potential benefits to the companies and population of these countries, and whether current conditions are bringing forth all the potential that exists for wealth creation and innovation. A concentrated effort in an agreed direction would create increasing externalities for all and is likely to bring urgently needed results more rapidly.

The “State or market” dichotomy is now obsolete and counterproductive. Neither central planning nor a “level playing field” will do. The field has to be tilted to favour the great majorities and to provide a strong stimulus for the growth and success of potentially competitive sectors of the economy by further reinforcing their advantages. A consensus vision resulting from a richly informed and intensive debate involving businesses, government and society as a whole would bring the maximum cohesion, the most effective guidance and enabling instruments and the most profitable overall results for local (and global) participants. The goal would be to mobilize the whole of society so that the different actors take initiatives along lines that, while different, converge upon an agreed general direction.

Among the possible stakeholders to bring to the table are governments (from national to local), GCs, large local companies, SKIES, SMES, universities and research institutes, relevant NGOs, consultancy firms, banks and international funding agencies, diasporas (especially their business and intellectual components), the media and society at large. The aim is to achieve the promise of every positive-sum game: everyone helps to increase the size of the pie and everyone gets more of it.

Learning will need to involve three complementary layers. First there is learning in the public sector itself, given that only a competent, well-functioning government structure can guide a sophisticated modern economy. Then there are education systems, whose methods and behaviour need updating and overhauling as much as their technical content. Lastly, there is the learning to be done in the business sector in whatever measure is necessary in each case to bring about gradual improvements in innovation capabilities. Collaboration among the three sectors, in coordination with their global counterparts when appropriate, is what will weave a strong national innovation system.²³

Besides these agents, learning will need to spread throughout society both in the form of general public opinion, aided by the experience of work and education, and through the media, with proactive support from different NGOs and other organizations.

Where policies and instruments are concerned, the two prongs of the strategy are very different and thus a dual institutional framework will also be required.

In the author’s view, the criteria and methods to be used on either side of the dual model are different enough to require different attitudes, behaviours and competencies, and even different institutions and policy instruments. Yet on both levels success will require a sufficient number of highly skilled personnel with the necessary level of capabilities and dedication and the power to commit the government, along with a clear understanding of the new market dynamic and the opportunities it presents for favourable positioning and linkage. Bold policies and great determination will be required for success. This means that countries cannot rule out the use of temporary tariff barriers and special subsidies and taxes to provide a strong

²³ This wider notion of a “national innovation system” encompassing all the societal agents involved in the innovation process was introduced by Freeman (1987) and Lundvall (1988).

bottom-up impetus with the aim of attaining decent living standards for the poor.

There are obviously major differences between the larger and more powerful countries and the smaller ones, in terms both of resource potential and of implementation capabilities in the private and public sectors. Some of the regional and multilateral organizations could contribute with technical and financial support here, and the stronger countries could establish mechanisms to serve as dynamic poles and help draw the smaller ones in their wake.

Relative size and levels of previous development aside, there are many other power-related factors that could influence the feasibility of the strategy in general and actually have the effect of heightening differences between countries. Production and market conditions are very different depending on whether companies are local or foreign, whether the business concerned deals in minerals and energy or agriculture, livestock activities, forestry and fisheries, whether ownership and control of production are in a few hands or dispersed, and whether international trade and markets are concentrated or diffuse. Conditions will also differ depending on the proportion of the value chain that is (or could be) in the territory, the greater or lesser relative weight of knowledge-intensive versus routine activities, and so on. The variety of conditions will define the need for appropriate policies in each case, albeit with the same general goal.

Yet the crucial issue that could make or break the strategy is the actual or potential power of institutions to promote consensus, apply bold measures and sustain policies, enforce regulation and taxes and avoid failure because of “capture” or corruption or both.

There should be no illusions about the likely resistance the proposed strategy may arouse from both ends of the ideological and political spectrum. There will be objections both to the role of the State and to that of GCs in the process; there will be doubts

about the potential for resource-based growth and about local innovation capabilities. It therefore needs to be ensured that the debates are informed by ample data. The more knowledge is made available about what is happening in other parts of the world (and indeed in Latin America itself) in terms of innovation and cooperation and the development of natural resource niches, the fewer prejudices will need to be confronted and overcome.

In conclusion, the argument of this paper is that a window of opportunity has now opened, one that is particularly well-suited to the natural resource endowment and historical experience of Latin America, and that this should not be wasted. It is a chance to take advantage of the hyper-segmentation of markets, activities and technologies typical of the ICT paradigm and apply them even more thoroughly in resource-based processing industries. This should be facilitated by rising average prices for such resources as a result of globalized growth. By using a portion of the increased revenues to upgrade the technology level of the export mix and to improve the wealth-creating capabilities of the population, the region can become highly specialized in custom materials, sophisticated foods and other natural products, while positioning itself for the next technological revolution. The strategy can serve both for high-end competition in global markets and as a means of lifting the poor out of poverty by creating clusters for “niche” specialization right across the territory.

Innovation in all aspects of business is increasingly practised and understood as the way to success. The time has come for an equivalent wave of rethinking, reorganizing and innovating in the public sector as an agent and facilitator of change for maximum public benefit. Indeed, the success of a strategy such as the one proposed here will very much depend on summoning up determined leadership and wide-ranging institutional creativity.

(Original: Spanish)

Bibliography

- Bazan, L. and L. Navas-Aleman (2004), "The underground revolution in the Sinos Valley: a comparison of upgrading in global and national value chains", *Local Enterprises in the Global Economy*, Hubert Schmitz (ed.), Cheltenham, Edward Elgar.
- Bell, Martin (2006), "Time and technological learning in industrializing countries: how long does it take? How fast is it moving (if at all?)", *International Journal of Technology Management*, vol. 36, No. 1/2/3, London, Inderscience Publishers.
- Berger, Suzanne (2006), *How We Compete: What Companies Around the World Are Doing to Make It In Today's Global Economy*, New York, Currency-Doubleday.
- Bisang, Roberto and others (eds.) (2006), *Biotecnología y desarrollo*, Buenos Aires, Prometeo.
- Dutrénit, G. (2006), "Instability of the technology strategy and building of the first strategic capabilities in a large Mexican firm", *International Journal of Technology Management*, vol. 36, No. 1/2/3, London, Inderscience Publishers.
- Dutrénit, G. and A.O. Vera-Cruz (2007), "Triggers of the technological capability accumulation in MNCs' subsidiaries: the maquilas in Mexico", *International Journal of Technology and Globalisation*, vol. 3, No. 2/3, London, Inderscience Publishers.
- ECLAC (Economic Commission for Latin America and the Caribbean) (2008), *Structural Change and Productivity Growth, 20 Years Later. Old Problems, New Opportunities (LC/G.2367(SES.32/3))*, Santiago, Chile.
- (1990), *Changing Production Patterns with Social Equity: the Prime Task of Latin American and Caribbean Development in the 1990s (LC/G.1601-P)*, Santiago, Chile. United Nations publication, Sales No. E.90.II.G.6.
- Ernst, Dieter (2000), "Global production networks and the changing geography of innovations systems: implications for countries", *East-West Center Working Paper Economics Series*, No. 9, Honolulu, East-West Center, November.
- Ernst, Dieter and Linsu Kim (2002), "Global production networks, information technology and knowledge diffusion", *Industry and Innovation*, vol. 9, No. 3, London, Routledge.
- Fajnzylber, Fernando (1990), "Industrialization in Latin America: from the 'black box' to the 'empty box': a comparison of contemporary industrialization patterns", *Cuadernos de la CEPAL series*, No. 60 (LC/G.1534/Rev.1-P), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC). United Nations publication, Sales No. E.89.II.G.5.
- Freeman, Christopher (1987), *Technology Policy and Economic Performance: Lessons from Japan*, London, Pinter.
- Garten, Jeffrey E. (ed.) (2000), *World View: Global Strategies for the New Economy*, Boston, Harvard Business Press.
- Gereffi, G. (1994), "The organization of buyer-driven global commodity chains: how U.S. retailers shape overseas production networks", *Commodity Chains and Global Capitalism*, G. Gereffi and M. Korzeniewicz (eds.), London, Praeger.
- Gereffi, G., J. Humphrey and T. Sturgeon (2005), "The governance of global value chains", *Review of International Political Economy*, vol. 12, No. 1, London, Routledge.
- Gereffi, G. and Raphael Kaplinsky (eds.) (2001), "The value of value chains: spreading the gains from globalization", *IDS Bulletin*, vol. 32, No. 3, Brighton, Institute of Development Studies, July.
- Giuliani, E., C. Pietrobelli and R. Rabellotti (2005), "Upgrading in global value chains: lessons from Latin America clusters", *World Development*, vol. 33, No. 4, Amsterdam, Elsevier.
- Gurlit, Wieland, Eduardo Mencarini and Ricardo Montealto (2007), "Weighing the risks in South American basic materials", *The McKinsey Quarterly*, McKinsey & Company, August.
- Gutman, Graciela and others (2006), "Una visión de conjunto. Las biotecnologías en Argentina: situación actual y potencialidades", *Biotecnología y desarrollo*, Roberto Bisang and others (eds.), Buenos Aires, Prometeo.
- Hernández-Cuevas, C. and Pablo Valenzuela (2004), "Strategies to capture biotechnology opportunities in Chile", *Electronic Journal of Biotechnology*, vol. 7, No. 2, Valparaiso, Valparaiso Catholic University.
- Hobday, Michael, Andrew Davies and Andrea Prencipe (2006), "Systems integration: a core capability of the modern corporation", *Industrial and Corporate Change*, vol. 14, No. 6, Oxford, Oxford University Press.
- Humphrey, John and Hubert Schmitz (2004), "Governance in global value chains", *Local Enterprises in the Global Economy: Issues of Governance and Upgrading*, H. Schmitz, Cheltenham, Edward Elgar.
- Infante, R. and O. Sunkel (2009), "Chile: towards inclusive development", *CEPAL Review*, No. 97 (LC/G.2400-P), Santiago, Chile, April.
- Kaplinsky, Raphael (2005), *Globalisation, Poverty and Inequality: Between a Rock and a Hard Place*, Cambridge, Polity Press.
- Kindleberger, Charles P. (2005), *Manias, Panics and Crashes: a History of Financial Crisis*, Houndmills, Palgrave Macmillan.
- Lundvall, Bengt-Ake (1988), "Innovation as an interactive process: from user-producer interaction to the national systems of innovation", *Technical Change and Economic Theory*, G. Dosi and others, London, Pinter.
- Marin, Anabel (2007), "Thinking locally: new approaches to foreign direct investment" [online] <http://web.scidev.net/en/policy-briefs/thinking-locally-new-approaches-to-foreign-direct.html>.
- Nadvi, K. and Hubert Schmitz (eds.) (1999), "Industrial clusters in developing countries", *World Development*, vol. 27, No. 9, special issue, Amsterdam, Elsevier.
- Pérez, Carlota (2009), "La otra globalización: los retos del colapso financiero", *Problemas del desarrollo*, vol. 40, No. 157, Mexico City, National Autonomous University of Mexico.
- (2006), "Re-specialisation and the deployment of the ICT paradigm: an essay on the present challenges of globalisation", *The Future of the Information Society in Europe: Contributions to the Debate*, R. Compano and others, Technical Report EUR22353EN, European Commission, November [online] http://www.carlotaperez.org/papers/PEREZ_Respecialisation_and ICTparadigm.pdf.

- _____ (2002), *Technological Revolutions and Financial Capital: the Dynamics of Bubbles and Golden ages*, Cheltenham, Edward Elgar.
- _____ (2001), "Technological change and opportunities for development as a moving target", *CEPAL Review*, No. 75 (LC/G.2150-P), Santiago, Chile, December.
- _____ (1996), "La modernización industrial en América Latina y la herencia de la sustitución de importaciones", *Comercio exterior*, vol. 46, No. 5, Mexico City, Banco Nacional de *Comercio Exterior* (BANCOMEXT), May [online] <http://www.carlotaperez.org/Articulos/modernizyherencia-ISILA%20t.htm>.
- Prahalad, C.K. (2004), *The Fortune at the Bottom of the Pyramid. Eradicating Poverty through Profits*, Philadelphia, Wharton School Publishing.
- Prahalad, C.K. and Gary Hamel (1990), "The core competence of the corporation", *Harvard Business Review*, vol. 68, No. 3, Boston, Harvard Business Publishing, May-June.
- Prebisch, Raúl (1988), *Pensamiento y obra*, Buenos Aires, Editorial Tesis.
- _____ (1951), "Growth, disequilibrium and disparities: interpretation of the process of economic development", *Economic Survey of Latin America 1949* (E/CN.12/164/REV.1), New York, United Nations. United Nations publication, Sales No. 51.II.G.1.
- Prencipe, Andrea, Andrew Davies and Michael Hobday (eds.) (2003), *The Business of Systems Integration*, New York, Oxford University Press.
- Schmitz, Hubert (ed.) (2004), *Local Enterprises in the Global Economy*, Cheltenham, Edward Elgar.
- Singer, Hans (1950), "The distribution of gains between investing and borrowing countries", *American Economic Review*, vol. 40, No. 2, Nashville, Tennessee, American Economic Association.
- UNDP (United Nations Development Programme) (2007), *Human Development Report 2007-2008*, New York.
- Vera-Cruz, A.O. (2006), "Firms' culture and technological behaviour: the case of two breweries in Mexico", *International Journal of Technology Management*, vol. 36, No. 1/2/3, London, Inderscience Publishers.
- Walker, M. and P. Jourdan (2003), "Resource-based sustainable development: an alternative approach to industrialisation in South Africa", *Minerals & Energy. Raw Materials Report*, vol. 18, No. 3, London, Routledge.
- Warhurst, Alyson (2005), "Future roles of business in society: the expanding boundaries of corporate responsibility and a compelling case for partnership", *Futures*, No. 2-3, Amsterdam, Elsevier, March-April.
- Woodward, Joan (1965), *Industrial Organization: Theory and Practice*, Oxford, Oxford University Press.