

Imperatives

United Nations forecasts suggest that, if present trends in continue, China's industrial output will overtake that of the United States early in the 21st century (Lin, 1995). By the year 2002, China's GDP can exceed the US at just under \$10 trillion. The trade surplus of the so-called Greater Chinese economic Sphere (China, Taiwan Province, and Hong Kong) may be nearly 20 percent higher than Japan. Given her massive size and a growing world demand for cheap manufactures China could probably continue in a relatively low wage export-led growth mode for many years to come. The State Planning Commission has forecast that by the Year 2000 - only five years away-China's labor force will swell by 44 million. In addition there is already an agricultural labor surplus of about 150 million - a third of all farmers. On top of this, some 120 million workers will be obliged to leave state enterprises (Economist, 1995). This is a massive reserve army that is comparable to the entire North American labor force. There is a danger that an overly export-led strategy by China may kill the goose that lays the golden egg.

Even before China entered the fray of international competition, the rise of the Asian Tigers already had contributed to social concerns of the already industrial countries. These difficulties included and a collapse of regional manufacturing, high unemployment, and a declining middle-class. One question then is how the world economy will accommodate such an enormous partner as China? In the last decade some sectors of the industrial economies have finally begun to discover a viable regional paradigm for their own future development. A second question, therefore, is what lessons China can learn from this new thinking about regional development?

With respect to the first question two answers have become apparent. The first is to for China target exports at other market areas. It is of note, for example, that each of the three regions considered in *China's Regional Development and Policy* (DRC, 1995)-

tries for their regional partners. The initial proposals for the export sectors of the Yellow River Delta also look towards Asia. The second answer is to look inwards at other provinces, again as China is already doing. The last decades saw a re-emphasis in China's regional development from the pre-Mao era towards the coastal regions (Wang and Li, 1995). This opening of the coastal regions was seen as a way to generate industrial growth based mainly on the imported production and management technologies, and so revitalize the nation. The coastal dynamos would stimulate the hinterlands through demand for raw materials, energy, semi-processed and agricultural goods, eventually reaching the most distant western regions.

In practice, the Chinese regional strategy has been difficult to manage. Rapid growth in the 1980s inevitably strained the infrastructure of large coastal cities such as Shanghai, Tianjin, and Guangzhou, and their physical and social infrastructures have been unable to cope (Linge and Forbes, 1990). In addition, disparities in growth rates and incomes across and within the provinces of China have become a major issue (Fan, 1995). Treyz (1995), for example, concludes from a statistical analysis that inequalities among regions increased between 1987 to 1991. In addition, China increasingly is likely to confront a series of environmental problems (Rimmer, 1997). Indeed, since the Rio Conference on the Environment, sustainable development at the regional level has been raised to "paramount" importance in China's overall economic strategy. China has undertaken a number of pilot projects to explore this new challenge for development. One of the most important is the UNDP project *Support for Sustainable Development of the Yellow River Delta* (UNDP, 1995). This region, and the three provinces, covered in China's Regional development will be considered in the light of the following discussion of new development models in the industrial countries.

New Industrial Paradigms

The response of the industrial countries to increased competition

models of development. In retrospect it appears that the shift was long overdue (see e.g. Cole and Florida, 1993). The decades between 1945 and 1970, during which mass production was extremely effective in delivering high growth rates to the industrial countries. Although the end of this era for North America and Europe was initially attributed to the 1973 oil embargo, later studies shown that already by the 1960s the possibilities for mass production in these regions of the world were already becoming exhausted. Competition from low-wage NICs increased, and the Fordist mode of production was alienating workers and consumers alike. People were no longer prepared to accept poorly made, de-personalizing, supply-driven products and production processes. In response to this, a central challenge of the 1990s has been to develop new forms of industrial organization. This involves changes in work and management, in plant and firm structures, in the relationship between firms, between the industrial sector and the science and technology system, and in the relationship between the state and the industrial sector.

In the face of a collapse, from the beginning of the 1980s, firms began to explore a series of new paradigms for industrial development with names such as "post-Fordism", "flexible specialization", and "lean production". Some were imitative of the still successful Japanese model. Others were based on the experience of small firms in Northern Italy. Many mistakes were made until it was realized that the appropriate response to increasing competition was to institute a new type of production. This new system would meet a the demand of consumers with rising expectations for products that could be delivered quickly and tailored to their own personal needs, and derived from variously defined flexible systems of regional production. Kaplinsky (1995) calls this "mass customization" while Storper (1993) prefers the term "high volume, flexible production."

Kaplinsky (1995) suggests a number of key intra-firm requirements for the new methods to be successful. This includes new types of factory layout, multi-tasking and multi-skill work practices, increased quality of manufactured inputs at source, new less alienatng

inspired improvements. He shows that such changes can be gained in many types of environment including developing countries, by several kinds of organization -clusters of small firms in relatively close geographic proximity, mini-firms, as well as large firms undertaking cellular production. Key to all this was systemic integration and continuous innovation. In the 21st century knowledge and human intelligence will replace physical labor as the main source of value, offering a new paradigm that "with every pair of hands comes a free brain." Kaplinsky (1995) emphasizes that, although goals may be similar, different countries and cultures can achieve them in different ways. Nonetheless, new developing regions should recognize the character the new competition from industrial nations, and to use this understanding to improve their own production systems.

The Regional Dimension

The new thinking emphasizes the regional dimension of industrial organization. Storper and Scott (1995) explain that local and regional economic communities have an evolutionary dynamic that attaches to the places in which they develop. Especially in new systems of just-on-time and learning-oriented production, the transactions tie firms together through inter-establishment industrial relations and networks. Moreover these systems do not follow the traditional rules of the market of simply minimizing the cost of inputs. Just as important is to establish longer term relationships through which all entities can move in unison to continuously upgrade their processes and products. Storper and Scott argue that regions are one of the essential bases in the emerging global economy. Ohmae (1993) too has argued most forcefully that "region states" are coming to displace the nation state as the center piece of global economic activity. He considers that "the nation state has become an unnatural, even dysfunctional unit for organizing human activity and managing economic endeavors in a borderless world."

Florida (1995) has encapsulated these ideas into notion of the

-manufacturing infrastructure, human infrastructure, physical and communications infrastructure, and industrial governance. His analysis helps to explain why markets alone are insufficient to provide a region with a sustainable advantage. In contrast to what has gone before, the Fordist-style mass consumption societies, the formal rules of governance - the regulations and standards, within and between firms and governmental organizations, as well as informal behavior and practice - are not characterized by top-down vertical hierarchies, Florida argues that regions must develop governance structures that reflect and mimic those of knowledge intensive firms - codependent relations, network organization, decentralized decision making, flexibility, and a focus on customer needs and requirements.

Additional insights into the degree of differentiation within the concept of regionalization are offered by Storper (1993). These help us to identify the activities that necessarily lie within a given learning region, and those which can survive beyond it. While the leading provinces in China already have incipient learning capability, other provinces do not, so it is necessary to identify the necessary linkages and products, that will enable the various regions to profit and progress from their present situations.

Storper insists that products - not establishments, firms, branches of production, or even territorial production complexes - are the basic units around which the logic of production and innovation are constructed. He differentiates between dedicated (i.e. customized) and generic products, and specialized and standardized modes of production. By mapping the spectra of risk and uncertainty inherent in the production and innovation of mass consumption and mass customized goods onto his dichotomized products and processes, Storper clarifies their various demands for factors of production including intellectual inputs, as well as their use of geographic space. He subdivides products as follows:

- dedicated-specialized i.e. one-off items such as non-turn-key capital equipment or customized hand crafted furniture where constant face-to-face contacts are needed, and where markets are lumpy

- generic-specialized i.e. mass consumption items with predictable demand such as medicines with a high level of costly and uncertain intellectual (scientific) inputs and change
- generic-standardized i.e. very high volume mass consumption items based on widely diffused knowledge requiring large irreversible (dedicated) investment to satisfy statistically predictable markets
- dedicated-standardized i.e. mass customization goods that must closely track rapidly changing markets (including garment fashions produced in sweat shops, and motor cars produced in kanban-type factories).

Storper also provides valuable insights about the requirements for, and character of, innovation, territorial concentration, and information and commodities flows. He argues that,

- every dedicated-specialized product contains innovation. Innovation and production are concentrated in technology or industrial districts.
- innovation of dedicated-standardized products (i.e. mass customized) involves assembling generic-standardized products so as to provide new dedicated qualities (i.e. product innovation). Close contact with market tends to require localized production as explored by Kaplinsky (1995).
- innovation of generic-standardized products is a constant market driven process that standardizes generic-specialized know-how (e.g. equipment) so as to standardize formerly dedicated-standardized products. Typically innovations is in a corporate technology core, with spatial division of labor for multi-regional production and multi-national trading),
- finally, dedicated-specialized products are created by a localized community of specialists, in systems of districts and strategic alliances.

While the concepts discussed above are all insightful, they may be usefully reevaluated and extended before they can be applied to the situation of China's regional development strategies, in the light of historical trajectories, specific production possibilities, local insti-

integrity. Of the above mentioned authors, only Kaplinsky (1995) investigates the implications for low income developing countries beyond the general idea that production of, and demand for, mass-consumption goods is rapidly diffusing to low wage economies. Storper's division, for example, omits whole segments of production in developing countries, not least the traditional rural sector on which a good proportion of China's subsistence population still rely. These sectors have been addressed, however, by other authors concerned with issues of technology in developing countries.

Implications for Overall Regional Development in China

China's Regional Development and Policy (DRC, 1995) represents part of the effort by the Chinese authorities to confront the new challenges of regional development. To understand the possibilities for regional development, three provinces with widely varying incomes and technological capacity (i.e. DRC, 1995, p90) were selected for comparative study of the effects of the national regional development strategy and policies. Liaoning province in the Northeastern region had the largest heavy industrial production capability long before the economic reform. Guangdong, a coastal province, is celebrated as a frontier of experimental economic reform and Yunnan province is a landlocked province in the hinterland.

The report on Guangdong complains of the lack of large firms there because of the provinces "irrational organizational structure" (DRC, 1995, p 393). Nonetheless, the province's abundance of small enterprises may be just the starting point for coordinated networked clusters, producing dedicated-specialized goods, such as those found in Northern Italy (e.g. Piore and Sable, 1984). Authors such as Mytelka (1993) explore such possibilities for extending new technologies to LDCs, including those with income levels comparable to China's interior provinces (such as Yunnan). Many of the difficulties arise from lack of human resources, but she concludes that the supposition of international agencies such as the World Bank that these can be

systems for managerial skills, or automated machinery for labor skills, is wishful thinking. She recommends the application of an innovation driven model of development that will involve a move away from industrialization strategies based on the mass-production model towards a more flexible networked structure for local industry.

A similar stance is taken by James and Bhalla (1993) who stress the importance of technology deepening if LDCs are to advance economically, and argue that the new technologies allow industrialization to be based on flexible small-scale production. This can have important consequences for income redistribution, one important goal of the declared Chinese national strategy. This might be the most effective means to provide the mass-consumption goods needed by populations in poorer regions. This is most relevant to the opening up of Yunnan and other interior regions that are expected to develop entirely new regional growth poles (DRC, 1995, p 395). Here, one especially optimistic scenario for use of new technologies is provided by Meier (1997). After considering the special questions posed for new technologies, he suggests that powerful new knowledge now available, but not yet utilized, will help overcome potential food shortages arising from the rapid growth of populations and prosperity in China's major conurbations.

The Yellow River Delta

The Sustainable Development of the Yellow River Delta project (DRC, 1996) is part of an effort to introduce thinking about sustainable development in China's regional development. The YRD is one of the largest river deltas in China-located in the Bohai Economic Region and the Northeast Asia Economic Area. Historically, the YRD has been subject to repeated flooding, and thus was relatively under-populated until its rich oil deposits were exploited in the 1960s the Sheng Li corporation. This industry which has expanded alongside a less dynamic largely subsistence agriculture sector. The delta

variety of biological species. Now that flooding may be better controlled (UNDP, 1995), plans are underway to expand other industry and agriculture in the region.

All parties involved in the preparation of the YRD Plan-the central government (PRC), the province (Shandong), the regional municipality (Dongying), the oil company (Sheng Li), and the international agencies (World Bank and UNDP), and the principal donors (Holland)-agree that there should be rapid economic growth in the region. There are, nonetheless, differences as to the precise goals and objectives and the balance of growth and sustainability. In particular, although the economic engine in the region is to be industrialization driven by exploitation of oil resources, the YRD is one of the few places in China with under-exploited agricultural land. Thus a concern of the Central government is also to enhance the contribution of the region national food provision and food security. This increases the emphasis placed on the environmental dimension of the region's development. Another concern is that the social provisions of the national plan may not be met by corporate aspirations for a perfect market based on massive industrialization, given the continuing goal of narrowing incomes between urban and rural populations (Wang and Li, 1995) °

In terms of a global regional strategy, the provisional Plan expects the Yellow River Delta to establish a complementary market with developed countries of the Northeast Asia. Japan and South Korea are short of natural resources but rich in funds and advanced technology, whereas the Yellow River Delta is rich in resources but short of capital and sophisticated technology. Japan and South Korea are short of labor and wages are high, while the Yellow River Delta has a large labor force and low wages. To facilitate this trade, a new Dongying seaport is under construction is located at the Northwest coast of the delta.

The Sheng Li corporation is central to the strategy. Indeed, at present, the YRD might best be considered as a company region, comparable to the old industrial cities of the United States and Eur-

from central, provincial, municipal, and county administrations. This situation arises from the Chinese practice that every large industrial enterprise will create its own economic society. This role of the Sheng Li Petroleum Administrative Bureau in the economic development of Dongying municipality is quite evident. For example, the company has promoted the growth of the petrochemical, textile, construction, food, paper making, and transportation equipment sectors.

But the company is being forced to extend its scope. Although the driving force of future growth in the region is oil production, local deposits of crude oil are becoming. To the extent that the company is restricted to operate within the YRD because of the territorial character of development across the Provinces Sheng Li is constrained to invest there. The strategy of the company has been to maximize regional value added from oil through new refining and petrochemical activities, and through a process of diversification, as well as investment in regional infrastructure and spin-off and start-up companies, building on extensive overseas links and developing scientific and technological skills. The Sheng Li Petroleum Administrative Bureau already has created around 120 primary schools, 17 vocational schools, and 5 universities and technical colleges, and provided venture capital for several new enterprises.

Comparing the present situation of Sheng Li as a regional entity, to the earlier exposition of the new industrial paradigms, it can be argued that the YRD has the potential to become a learning region, driven by the scientific and technological capacity of Sheng Li, and the other research institutions in Dongying. But this transformation is still at an embryonic stage, as witnessed by the high degree of dualism, the high use of imported know-how, and so on, despite the scientific research institutes and universities there. The range of research undertaken by Sheng Li and the universities and research institutes can be systematically extended and integrated into the wider economy through collaborative partnerships with enterprises. The key to fulfilling this regional potential lies in the building of a dynamic learning network between the various institutions, enter-

of workplace innovation throughout the region. In this way Dongying can become a technology creating and exporting region, rather than a technology user and importer. Sheng Li's national and worldwide network of contacts and marketing experience can help to foster this transformation, in addition to its obvious role as the spearhead in a campaign to attract new investment.

Thus, like other regions of China, the YRD has an incipient learning capability, embodied in existing institutions and infrastructure, and populations. Whether this is sufficient to provide the kind of sustainable advantage postulated by the new regional paradigms is not yet clear, since present economic decision is markedly centralized around Sheng Li and so lacks the flexibility required by the new regional paradigms.

The extreme duality of the YRD economy between the petroleum sector and the village-level subsistence sector sets it apart from learning regions in industrial countries. Here, it may be that the down-sizing potential of new technologies could enable the YRD to meet its goal of maintaining the integrity of communities at the village level. Typically, following the authors cited earlier, this involves upgrading the science inputs to existing techniques or crops so as to dramatically improve productivity and yields, and expand the "bread-basket" role of the YRD within the national economy. For this, the existing agricultural vocational colleges might be brought up to full university status by networking to other academic and enterprise research centers. The State Education Committee (SEC) has recently announced a program to spread agro-technical skills to farmers in thirty prefectures and cities across China, including the YRD. This includes soil science, fertilizer science, agricultural energy and machinery. Since so many oil sector workers live in the villages of the YRD, the education and skill level and familiarity with machinery etc. already is considerably higher than most villages. Other education, training, medical, and other information services can be provided to villagers via various electronic media.

With the help of Sheng Li, the YRD also may develop technol-

other village-based economies in China and developing Asia. The existing mode of village level production, which is local-customization or the making of products suited to local markets using local raw materials and knowledge, can be reconfigured into a system of mass-customization, without passing through the stage of mass production. New products may also emerge from the sustainable development requirement built into the YRD development strategy (Jiang, 1996). Consistent with this would be for the YRD to become a regional laboratory for the development of environmentally sound technologies in manufacturing and agriculture. With current world-wide concern about the need to protect our environments, this has become an increasingly profitable export sector. With its research experience, Sheng Li is well positioned to contribute to this field, and can help other enterprises to follow suite. This profit motive in commercializing the production of environmental technology, backed up by tax rebates on research expenditures, and the Plan proposals for preservation areas, bird sanctuaries, forests, and other more visually attractive parkland, might prove more effective in curbing emissions than present ineffective pollution taxes (Xie And Saltzman, 1995).

The above illustrates some possibilities for implementing new regional thinking in the YRD. The conclusion must be that while this region, and others considered in this paper, may have many of the necessary components of a learning region, these components appear not yet to be assembled in the interrelated manner suggested by the authors reviewed in this paper.

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