THE "SECOND INDUSTRIAL REVOLUTION" IN SINGAPORE. Industrial policy in a newly industrializing country

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Comparing industrial policies in the western industrialized welfare states with those in the newly industrializing countries (NIC's) leaves little doubt why countries in the first group have become more and more unable to sustain even modest rates of economic growth while the second group is catching up with historically unprecedented increase in growth and technological competence, even during the recent period of massive increases in energy prices and slow growth of world trade.

In the West sunset industries get generous handouts. Educational systems are designed to promote post-industrial values and technological illiteracy. Even business education at the university level seems to be no exception. The new "master of business administration", we are told, "knows almost nothing about product strategy, design management and the role of technological innovation".[1]

Delinking from the worldmarket, once hailed by neo-marxists and development populists as salvation from the economic ills of the Third World, is becoming reality for more and more industrialized countries of the West. The western industrialized world has made innovational activity and investment in human capital less and less rewarding while at the same time providing generous subsidies and creating rights for vetoeing innovations for those owners of productive resources engaged in low-technology and high-cost production.[2] In fact, western governments intervene most frequently to protect declining firms and industries. Despite their adulation for high-tech, they display bail-out mentalities and ad-hoc policies.

Against this pattern of politically engineered or sanctioned de-industrialization, we want to describe industrial policy in the Republic of Singapore, one of the "four dragons" or industrial "baby tigers" (besides Hong Kong, Korea and Taiwan) of eastern Asia.

Any economist studying Singapore'e recent development experience with a background of western industrial strife enters into a completely different world. He sees a government pushing up wages for nearly 100% in four years (1979-1982), to shake out indigenous low-productivity manufacturers and sqeeze multinational companies. He sees a government providing massive incentives for an innovative deepen-

ing and widening of the economy, investing rapidly increasing amounts in building a scientific and technological infrastructure, and aiming at the highest level of engineers per 1,000 inhabitants anywhere in the world.[3] He sees politicians strongly committed to strengthen the "confucian" values of hard work and achievement[4] and even trying to bio-engineer the gene-pool of the population by giving tax and other incentives to academically trained parents (with presumably above - average intelligence), acting on the hypothesis that human intelligence is strongly influenced by genetic factors.[5]

While western politicians are preaching the virtues of innovation - "innovation" becoming their new slogan - they actually attempt to shore up decaying industries through a "re-industrialization policy" and blocking entrepreneurial initiatives, the Singapore administration, mass media and even trade unions tell the local and multinational entrepreneurs, "innovate or waste away", but also provide an environment which makes innovation an economically rewarding activity and tinkering instead of innovation economic suicide.

What is the economic logic behind this "second industrial revolution", as the Singapore government has termed her new industrial policy?

Colonial Heritage

A look at Singapore's history of economic development can provide us with some cues. In 1819, Sir Stamford Raffles founded modern Singapore because of its strategic location and natural harbour. During the laissez-faire rule of the British colonial administration, the Singapore economy was build around entrepôt trade, the grading processing, repacking and re-exporting of primary products from the Southeast Asian region, and the re-export of manufactured goods from the industrialized countries of the West to the neighbouring Asian countries. Under the colonial free trade regime, neither foreign nor local entrepreneurs had any incentive to set up manufacturing establishments in Singapore.

Singapore statistics inform us that in 1957 (at the end of the colonial period), 66,800 persons were employed in manufacturing establishments.[6] But if we subtract the persons employed by the British military establishment, industries "naturally" protected by high transport costs and special factors (like breweries or newspapers) and the facilities linked with the grading, packaging etc. of raw materials,

the manufacturing sector shrinks to nearly zero.

So at the eve of independence, Singapore could boost the second largest port in the British Empire, practically no manufacturing industry, an unemployment rate of 13.5%, a wide-spread poverty, a low level of literacy etc. Even in 1966, nearly half of the labour force had no educational qualification at all.[7] The indigenous per capita income was around one thousand Singapore dollars in 1960. We estimate that during the colonial period indigenous GDP grew with an annual average rate of between 0.75 and 1.0%.[8] This growth rate was too low to substantially increase the standard of living of the mass of the indigenous population, given the wide-spread disparities and inequalities in the distribution of income and wealth.

What was the reason for this growth performance? The most general answer: The economic strategy as implemented by Raffles and the British colonial adminstration foreclosed any higher growth options. The existing property rights upheld by the colonial distribution of political power provided no incentives for innovational activity beyond trading, dealing and whealing where the British as well as the Chinese excelled.

In a free trade environment which provided comparative advantages to re-export trade the setting up of manufacturing facilities with higher productivity or value added would have been economic suicide. That no manufacturing activity and a service complex linked to it was set up before independence is only the natural concequence of rational economic action. Only by changing the property rights, i.e. by providing economic incentives for innovation in non-trading sectors, could a high-growth option be realized.

Present Situation

It was exactly this strategy - incentives to industrialization - which was implemented after the People's Action Party (PAP) under Lee Kuan Yew came to power, in 1959. Within this same year 1959, three pieces of economic legislation (the Pionier Industries Ordinance, the Industrial Expansion Ordinance, and the Control of the Manufacture Ordinance) provided massive inducement to manufacturing activity.

After a short import-substitution phase before (1959-1963), during (1964-1965), and after (1965-1967) Singapore's political fusion with the Federation of Malaya, a phase characterized by a generally low level of nominal and

effective protection,[9] Singapore's development became totally export-oriented, until the present day.

The astonishing and - considering the timeperiod of just two decades - even dramatic change in the structure of the Singapore economy is described in the following table.

Table
Percentage distribution and average annual growth rates of Singapore Gross Domestic Product by industrial origin, 1960-1981.

	Percentage distribution (current prices)		Annual growth rates at 1968 factor cost in percent
	1960	1981	1960-1981
Agricultural Sector	3.7	1.3	2.7
Industrial Sector	18.2	41.1	
Manufacturing	11.8	30.5	12.3
Construction	3.6	7.9	11.0
Quarrying	0.3	0.5	10.0
Utilities	2.5	2.2	9.8
Services Sector	79.4	63.9	
Trade	35.8	23.8	7.6
Entrepôt Trade*	21.0	6.8	3.8
Domestic Trade	14.8	17.0	10.4
Transport, Communications	14.2	12.3	10.8
Financial and Business Services	11.3	17.6	11.4
Administration, Defence, Social Service, etc.	18.1	10.2	6.3
Less: Imputed Bank Service Charge	1.6	6.6	-
Gross Domestic Product at Factor Cost	100.0	100.0	9.1

Source: * Own estimate, based on various sources, no official data released.

Source: Own calculations based on Republic of Singapore, Ministry of Trade and Industry, Economic Survey of Singapore 1981, Statistical Appendix.

The structure of the economy about 1960 shows an economic system built around entrepôt trading. This sector accounts for 21% of the GDP, more than the total goods sector and double the - statictically blown up - manufacturing sector. During twenty years of "neo-colonial" and "dependent" growth as a "peripheral" economy,[10] manufacturers have outperformed middlemen as the main contributors to economic growth. The share of re-export trade in GDP has declined to less than 7.0%. And with an annual growth-rate of

3.8%, the backbone of the colonial economy, "agriculture", was - the slowest growing sector. The figures in the table support our hypothesis that the free trade-strategy built around re-export trade, as engineered by the colonial administration, did indeed produce some growth (without development), but at the same time foreclosed high-growth options which could be realized only by a strategic shift in the structure of economic incentives after economic management was taken over by Singapore nationals.

The strategic management of Singapore's economy since independence was based on two pillars:

- imported capital, technology and entrepreneurship, (in short: multinational innovation)
- social, political and infrastructural engineering, which provided an attractive low-cost environment for manufacturing and related activities, making Singapore a "multinational paradise".[11]

Incidentally, but not very surprising, this policy package has brought up a lot of praise from mainstream economists, one of them describing Singapore "as the best governed country in the Third World".[12]

We have tried to figure out statistically the foreign contribution to Singapore's economic growth. According to our calculations, 98% of the variation of Singapore's GDP is accounted for by the variation of foreign gross fixed assets. Similarly, the change in productivity (GDP per worker) is extremely dependent (92%) on foreign investment.[13]

The political leadership of Singapore seems well aware of the foreign contribution to local growth. "If we remove them [the foreigners, J.R.] the economy will subside like four punctured tires", Prime Minister Lee Kuan Yew once remarked. And in his National Day speach in 1981, Lee said, "If we were to depend on Singapore entrepreneurs we would not have today's Singapore".[14]

But the policy of "incentives for industrialization" based on foreign competence had some serious drawbacks. These surfaced at the end of the 1970's and resulted in a new policy shift culminating in the "Second Industrial Revolution".

1. To maintain a high growth rate on income and welfare, Singapore had to rely more and more on foreign investment and entrepreneurs. Not astonishingly, the share of foreigners in GDP increased continually from 18.4% (1970) to 28.2% (1980).[15] Similarly, the contribution of local Singaporean enterprises to new investment commitments has declined from over 40% (1974) to just 7.5% (1978).[16]

2. To increase value added and worker productivity, technology and products of continually higher innovation-

intensity have to be introduced. But the incentives to an innovational upgrading of existing establishments and the introduction of innovations had become weaker and weaker at the end of the 1970's:

a) Multinational companies could make satisfactory profits by sticking to established production technology and product lines because government policy (via the National Wages Council) was still adhering to a "cheap labour" policy. This resulted in weak incentives for productivity increasing mechanization and capital intensification.

b) On the other hand, for local entrepreneurs the competitive pressure was too strong. Endowed with lower technological, organizational and marketing ability and suffering from an "overvalued" exchange rate, sustained by the higher-efficiency multinational complex and a "natural" comparative advantage of other sectors of the economy (re-export, tourism), their profits (returns to capital) were squeezed.[17]

Consequently there was a shift of local resources and entrepreneurial talent from export-oriented and import-competing production into the non-traded sector (domestic trade, property, banking etc.). Local manufacturing entrepreneurs were crowded out by multinational business.[18]

The "Second Industrial Revolution"

To tackle these problems the Singapore government engineered a shock therapy, in 1979. It mandated wage increases of an average 20% in 1979, 1980, and 1981. Even 1982, the average wage increase has been around 15%.

By making labour relatively more expensive, the government intended a shake out in the traditional labour-intensive industries and a shift towards capital intensive production methods and high technology, including automation. This process was labeled by the government as the "second industrial revolution" to make clear it was the deepening and widening of innovation which was really behind this unique act of economic and social engineering.

Besides the high wage policy, the 1979 package consisted of new fiscal incentives for investment in human and machine capital, flanked by increased efforts of the Singapore administration in the fields of infrastructure, research and development, manpower and skills development, and campaigns to stem the influence of western welfare society values by stressing the virtues of the confucian ethic and "learning from Japan". In other words, the government intended to make the property rights more favourable for

innovators, to increase the competence level of workers, managers and innovators, and - via wage and exchange rate policy - to increase the competitive pressure on multinational and indigenous entrepreneurs.

It is still too early to evaluate in detail the consequences of these measures. But recently released data show that the productivity increase following the measures has been substantial and well above the productivity trend during the preceeding decade. Labor productivity increased 5% during 1980 and 5.4% during 1981. In the manufacturing sector, productivity increased by 9.2% in 1981, compared with annual average productivity increases of 2.1% during 1970-1980.[19] Similarly, fixed assets and value added per worker of new investment commitments jumped from $ 28,600 (1980) to $ 65,000 (1981) and $ 36,200 (1980) to $ 66,800 (1981), respectively (at constant prices).[20]

On the other hand, the abruptly engineered shift of the incentive system for innovative activity in Singapore increased dramatically and intendedly the squeeze on the indigenous Chinese entrepreneurs: manufacturers who were unable to survive in the new environment were advised to relocate their business in the neighbouring ASEAN countries and Sri Lanka.

Another important new element in Singapore's industrial policy must be mentioned. Contrary to the period 1960-1979, when multinational companies were given de facto (not de jure) special incentives compared to indigenous entrepreneurs, the government now is providing local innovators with a new set of specially designed incentives. Presently indigenous innovators are able to draw for all phases of the innovation process on governmental assistance, subsidies, tax rebates etc. beginning with increasing the competence level of workers and managers (Skills Development Fund), getting advice on innovations (Development Consulting Scheme), introducing new production technology (Interest Grant for Mechanization Scheme; Small Industries Finance Scheme), introduction of new products (Product Development Assistance Scheme), all in addition to generous tax and financial incentives.[21]

Conclusions

For conclusion let us evaluate the Singapore experience. A first crucial factor special to Singapore is the absence of a traditional agricultural sector. All problems connected with agricultural-industrial interaction do not exist.

A second point worth making is that Singapore's devel-

opment path falsifies the liberal free trade development model as well as neo-marxist development thinking. The free trade regime under British (colonial) property rights did not result in substantial increases in economic welfare for the mass of the population. More seriously, the traditional incentive system contained no factors which could trigger off a spontaneous change into a higher growth regime. Government action has been critical in engineering this change, action adhering technically to the rule of law, but, nevertheless, being highly interventionistic.

It may surprise many that the government share in GDP as an indicator of state influence on the economy has risen continuously since independence and reached 53.3% in 1982.[22]

But the Singapore experience does provide an even stronger rejection of dependency thinking. The multinationals - the traditional whipping boy in dependency theory - have been the major cause of the increases in real income during the past twenty years. Also if the industrial linkages vis-à-vis local manufacturing firms have been weak, multinationals have set up numerous backward and foreward relationships among themselves and were helpful in creating a modern service sector in which local competence can play a bigger role.

In addition, the Singapore experience demonstrates that "low wages" ("exploitation") are in no way the backbone of export-oriented development, as has been repeatedly opinioned by marxist and related thinking. Even Singapore with her guided labour market does not support the thesis that free labour markets[23] are exploitive or have to be "reformed" by purchasing power, increasing activities of trade unions, by government regulations, etc.[24]

We have seen that government intervention in the Singapore labour market via the National Wages Council has probably been counterproductive: It slowed down considerably - compared to a free market situation - the innovational deepening and widening of the economy. Another important point which has to be considered: As we saw, the foreigners share in GDP has increased continuously, reflecting the growing multinational contribution to economic growth. But behind this statistical fact lies a qualitative problem. With higher innovational intensity of Singaporean production, the share of innovational profit and rent in the value added will increase. If innovation is mainly a foreign (multinational) affair, the share of locals in innovation profit and rent will progressively shrink with the intensification of the innovation process itself. There is no other way to stem this erosion than to increase the innovational competence level of local factors of production.

Very often in the literature Singapore's economic performance has been interpreted as too much dependent on "special" factors not given in other developing countries. So "learning from Singapore" (and even other NIC's from the Far East) has been ruled out as part of a rational development strategy.

The most important special factors seems to me the smallness of the city state (just 2.5 million persons), i.e. a small country with no agricultural hinterland. The small internal market forces the country not only to adopt an outward-looking strategy of development, but more crucial, it allows to set up a strategy build around foreign entrepreneurship (multinationals), even if these provide only weak linkages with local producers and - via the factor and foreign exchange markets - make the survival of local entrepreneurs even more precarious. For a small country such a situation must not be a serious problem, so long it is willing to share an increasing part of her national income with the foreign owners of production.

A country with a potentially bigger national productive capacity could not rely on such a strategy, if only for the simple reason that it would need an inflow of foreign capital, technology and entrepreneurs of gigantic dimensions. If such a country also adopts an outward-looking strategy and tries to attract entrepreneurial resources it would have to install some kind of dual incentive system (property rights structure):

- foreign resources would have to be allocated as under free trade;
- local resources would have to be given the chance to increase their productive capacities without discriminating export activity.

Because of the above mentioned conditions, development without active local innovational activities is doomed to failure. That means, the policy nurturing local innovators - adopted only recently in Singapore - must be a part of development policy right from the start. Development policy will, therefore, be much more complex and difficult to implement than in Singapore.

Summary

Industrial policy in the newly industrializing countries, especially of the Eastasian type, is geared to foster rapid structural change and increases in technological capability. An interesting case of such an innovation-oriented industrial strategy is the Republic of Singapore. Since independ-

ence, economic policy - best described as economic engineering - has been characterized by wide-ranging manupulation of the incentive system for local and multinational enterprises. This has resulted in a fast rate of industrialization based on multinational companies. But some of the consequences of this strategy (modest productivity gains, stifling of local research, development and innovation, influx of foreign workers) triggered a major shift of economic policy around 1979, culminating in the "Second Industrial Revolution": The island state is seen as a future "brain centre" for the South-east Asian region which will concentrate on high-technology manufacturing and research and offer sophisticated financial and information-based services. Contrary to the post-independence strategy, in which multinational companies were the prime moving force, local entrepreneurs now are direct beneficiaries of the new incentive package. Interestingly, the new policy includes also the bio-engineering of Singapore's gene-pool: To correct the "lopsided pattern of procreation" - the rich (and educated) are having fewer children than the poor (and ill-educated) - incentives are offered to the rich to have more children and to the poor not to procreate.

Notes

[1] Roger Bennet and Robert Cooper, The Misuse of Marketing, McKinsey Quarterly, Autumn 1982, cited in C. Lorenz, The perils of tinkering instead of innovating, Financial Times, 22.11.1982.

[2] A classic example is the economic decline of the Ruhr region, once the industrial growth pole of Germany; see Erich Staudt, Mißverständnisse über das Innovieren. Die Betriebswirtschaft, vol.43 (1983), pp.350-355, and for a general analysis Jochen Röpke, Staatsversagen als Ursache der Innovationsschwäche in westlichen Industrieländern, in: A. Schüller u.a. (eds.), Innovationsprobleme in Ost und West, Stuttgart/New York, 1983, pp. 91-114.

[3] For an overview see various recent Annual Reports of the Singapore Economic Development Board (EDB).

[4] Compare M. Richardson, Back to Confucius, Far Eastern Economic Review, 26.6.1982; P. Smith, An Ancient Code for a better tomorrow, Far Eastern Economic Review 7.5. 1982, p.22-23; V.G. Kulkarni, The non-Chinese syndrome, Far Eastern Economic Review, 22.3.1984, p.22-28; The Economist (London) The Post-Confucian Challenge, 9.2.1982, pp.67-72.

[5] See Far Eastern Economic Review 8.9.1983, pp.23-24; Liak Teng Kiat, Genetics does matter in intelligence, Straits Times (Singapore), 6.10.1983; Neue Zürcher Zeitung, Geld und Geist in Singapur, 22./23.4.1984, p.6; V.G. Kulkarni, Some are more equal, Far Eastern Economic Review, 21. June 1984, pp.31-32.

[6] Department of Statistics, Economic and Social Statistics: Singapore 1960-1982, Singapore 1983, p.37, see also J.J. Puthucheary, Ownership and Control in the Malayan Economy, Singapore 1960, Reprint Kuala Lumpur 1979, pp.96-105, who lists the various activities included in "manufacturing".

[7] V.V. Bhanoji Rao and M. Ramakrishnan, Income Inequality in Singapore, Singapore 1981, p.105.

[8] For the derivation of these estimates see Jochen Röpke, Die "Zweite Industrielle Revolution" in Singapur, Geschichte, Ursachen, Wirkungen, mimeo.

[9] Augustine H.H. Tan and Ow Chin Hock, Singapore, in: Bela Balassa (ed.), Development Strategies in Semi-industrial Economies, Baltimore and London 1982, pp. 280-309.

[10] For interpretations of Singapore's economic growth from the view of dependency and neo-marxist theory see Hans-Ulrich Luther, Ökonomie, Klassen und Staat in Singapur, Frankfurt (a.M.) 1980 and Frederic C. Deyo, Dependent Development and Industrial Order. An Asian Case Study, New York 1981.

[11] The Economist (London), Singapore Survey, 29.12.1979, p.27.

[12] H.W. Arndt, Discussion, in: Ross, Garnaut (ed.), ASEAN in a Changing Pacific and World Economy, Canberra, London and Miami, 1980, p.276. This widely shared opinion is reflected in Singapore's creditability in the international capital markets. She has the highest bonity of all developing countries, ranking even before many industrialized countries as Sweden, Belgium etc. (see Handelsblatt, 18.4.1984, p.8),

[13] J. Röpke, Die "Zweite Industrielle Revolution" in Singapur, op.cit.

[14] Financial Times (London), 30.5.1980, p.4; The Straits Times (Singapore), 22.8.1981, p.13.

[15] Own calculations based on Department of Statistics, Economic and Social Statistics, op.cit., p.55.

[16] Economic Survey of Singapore, Statistical Appendix.

[17] This can be considered the Singapore equivalent of the "Dutch Disease".

[18] This fact makes the Singapore case very different from those of the other three of the "four little dragons" -

Hong Kong, Taiwan, Southkorea - in which the multinational element is far less prominent.

19 Economic Survey of Singapore, 1981, op.cit., p.53.

20 Singapore Economic Development Board, Annual Report 1981/2, p.13.

21 For an overview of the various assistance and incentive schemes see the recent Annual Reports of the Singapore Economic Development Board.

22 In our estimate, the governmental contribution to GDP includes also the activities of the various statutory boards (like the Housing and Developing Board, Port of Singapore Authority, etc.).

23 As are to be found in other East Asian newly industrializing countries.

24 For this opinion see for example Hartmut Elsenhans, Grundlagen der kapitalistischen Weltwirtschaft, in: Dieter Senghaas (ed.), Kapitalistische Weltökonomie, Frankfurt a.M., 1979, pp.104, 110-112, etc.