

Overview

WHAT IS THE STATE OF INDUSTRIAL DEVELOPMENT AROUND THE world? Perhaps the clearest impression is that of diversity and divergence. A few developing economies have done very well in recent years in coping with the fast-changing industrial scene. But others, a disturbingly large number, have done badly. This is hardly news. It is now well known that economic performance, particularly industrial performance, is highly variable among developing economies. This is accepted as part of the hard reality of development and globalization. Early models of inevitable convergence, based on simple neoclassical growth models, have given way to more diffuse analyses stressing that structural, institutional and social factors may continue to drive economies apart.

UNIDO endeavors to build on the consensus for macroeconomic stability, institutional reform and open trade and investment. It takes it as given that technological change will continue at a rapid pace—and that economies will be knitted together by freer flows of information and productive factors and by the international rules of trade and investment. In this setting, the ability to compete internationally will be the basic condition for growth in the industrial sector. Relying on such static endowments as primary resources and cheap unskilled labour may be a good way to start, but it is a bad way to continue.

Most of the effort has to come from within economies, providing the right environment for capability building and investing in the necessary factors and institutions. But such local efforts should be helped from outside. Opening markets completely in developed economies will help greatly, but much more is needed to narrow the widening gap between economies and to build industrial capabilities in developing economies. Indeed, this is the mission of UNIDO—building and enhancing industrial capabilities. UNIDO continues to work to narrow that gap and to ensure the international community's support with financial and other resources. It is with this purpose that UNIDO launches its first *Industrial Development Report*.

This report shows starkly how wide the dispersion is in levels of industrial development, how much it has grown and, most

important, how it reflects structural factors. Those structural factors are difficult to alter in the short to medium term—and often cannot be left to reverse themselves. Nor can they be expected to improve simply by exposing economies to rapid liberalization and globalization. They thus raise strong policy concerns. The international community and national governments together have to address the growing structural gaps that drive divergence. If they do not, there is a real risk of serious long-term marginalization of many countries from the dynamics of industrial development. The clear solution is to follow the high road to competitiveness—to develop capabilities and increase productivity growth through concerted innovation and learning.

The report also shows that successful developing economies have used widely differing strategies to build industrial capabilities and compete in world markets: building capabilities through domestic research and development (R&D), through foreign direct investment or through a combination of the two (table 1). Some, but relatively few, have succeeded by drawing in foreign technology largely at arm's length while building strong technological and innovative capabilities in local firms. Others, a larger number, have gone some way by plugging into global value chains, becoming suppliers of labour-intensive products and components, without having strong domestic capabilities. Of these economies, a few have managed to combine their reliance on foreign direct investment with strong industrial policy, targeting the activities they wish to enter and the functions they wish to upgrade. Others have tapped the potential of foreign direct investment by more passive policies, benefiting from sound economic management, pro-business attitudes, attractive locations and plain good luck. The less successful developing economies—and there are many—have not managed to follow any of these strategies effectively.

At first sight, the best strategy for developing economies without strong technological capabilities is to find their way into the production systems of global value chains and let local capabilities develop slowly. While recent experience of global production systems shows that this works, some caution is called for. Latecomers entering global production sys-

Table 1 Reliance of major high-tech exporters on domestic R&D and foreign direct investment, 1985 and 1998

Rank ^a		Economy	R&D per dollar of high-tech exports (dollars)		R&D per dollar of inward foreign direct investment (dollars)		High-tech exports (billions of dollars)		High-tech products as a share of manufactured exports (percentage)	
1998	1985		1998	1985	1998	1985	1998	1985	1998	1985
1	3	Japan	0.937	0.635	100.40	62.42	114.9	36.6	29.6	20.8
2	2	United States	0.622	0.686	1.75	1.68	196.9	53.3	31.0	25.8
3	1	Germany	0.368	0.816	5.01	13.09	92.7	24.3	17.1	13.2
4	6	Switzerland	0.331	0.282	1.35	2.33	18.3	4.7	23.2	17.0
5	9	Sweden	0.283	0.231	0.71	3.33	20.4	4.1	24.7	13.4
6	8	France	0.266	0.245	0.76	1.67	65.1	14.3	21.6	14.6
7	18	Korea, Republic of	0.264	0.119	5.90	3.50	36.0	3.7	27.2	12.2
8	5	Austria	0.233	0.284	0.65	2.19	7.4	1.6	12.2	9.2
9	11	Denmark	0.225	0.228	0.57	5.50	7.6	1.8	16.0	10.9
10	10	Spain	0.213	0.229	0.28	0.20	10.2	1.5	9.3	6.0
11	15	Italy	0.210	0.141	1.45	0.97	24.5	7.5	10.1	9.5
12	4	Finland	0.200	0.342	1.45	2.95	10.5	0.8	24.4	5.7
13	7	Canada	0.177	0.278	0.52	0.98	23.8	6.2	11.1	7.1
14	19	Belgium	0.159	0.105	0.26	0.20	17.4	3.5	9.7	6.4
15	13	United Kingdom	0.134	0.167	0.49	0.72	76.3	17.9	28.2	17.6
16	12	Israel	0.113	0.211	0.67	2.76	6.6	1.1	28.3	17.0
17	14	Netherlands	0.098	0.164	0.34	0.78	40.8	6.9	24.3	10.2
18	17	Taiwan Province of China	0.068	0.131	1.50	1.37	38.6	4.7	35.0	15.4
19	26	China	0.033	0.000	0.03	0.00	33.5	0.3	18.2	1.2
20	21	Ireland	0.022	0.019	0.38	0.31	25.2	2.7	39.3	25.8
21	23	Singapore	0.010	0.008	0.07	0.02	62.3	4.7	56.7	20.4
22	16	Mexico	0.004	0.134	0.02	0.28	31.3	1.9	26.6	8.6
23	25	Malaysia	0.004	0.001	0.03	0.00	34.3	2.3	46.9	14.8
24	24	Hong Kong SAR	0.002	0.003	0.00	0.00	6.0	2.4	24.5	14.2
25	20	Thailand	0.001	0.043	0.01	0.03	15.6	0.2	28.3	2.4
26	22	Philippines	0.000	0.014	0.01	0.07	19.0	0.3	64.3	5.8

Source: UNIDO Scoreboard database (see technical annex).

Note: Includes only economies with high-tech exports of more than \$5 billion in 1998.

a. Based on R&D spending per unit of high-tech exports.

tems will find it difficult to sustain growth as wages rise—unless they can raise their skill, technological and institutional bases. Plugging into global value chains does not by itself ensure that participants will upgrade their capabilities. Yet such upgrading is essential. Moreover, global production systems are highly concentrated, and the concentration rises with the sophistication of the technology.

With globalization and liberalization on the rise, economies must be internationally competitive to prosper and grow. Governments have reduced or are reducing restrictions on trade, international finance and foreign direct investment. Domestic liberalization is being strengthened by new international rules of the game for economic activity. Production across national boundaries is being integrated under common ownership or control—often in the hands of a small number

of large private companies—making it even more difficult to isolate economies from world market forces. Technical change is underpinning these processes. The result is that enterprises are exposed to global competition with an immediacy and intensity rarely seen before.

How can countries see where they stand?

The Scoreboard introduced in this report provides information on crucial aspects of industrial development and competitiveness. It has two parts: an index of a country's ability to produce and export manufactures, and benchmarks of the structural drivers of industrial performance.

Benchmarking industrial performance

The competitive industrial performance (CIP) index measures the ability of countries to produce and export manufactures competitively. It is constructed from four indicators: manufacturing value added per capita, manufactured exports per capita, and the shares of medium- and high-tech products in manufacturing value added and in manufactured exports. The first two indicators tell about industrial capacity. The other two reflect technological complexity and industrial upgrading.

A ranking of 87 economies (selected on the basis of data availability for inter-economy comparison) by the CIP index reveals a general and expected pattern: industrialized economies congregate near the top, transition economies and middle-income developing economies around the middle, low-income developing economies and least developed economies at the bottom. Looking at the regional averages for developing economies shows East Asia leading the CIP ranking in 1998, followed by Latin America and the Caribbean, Middle East and North Africa, South Asia and Sub-Saharan Africa (table 2).

Table 2 Ranking of economies by the competitive industrial performance index, 1985 and 1998

Rank		Economy	Index value	
1998	1985		1998	1985
1	6	Singapore	0.883	0.587
2	1	Switzerland	0.751	0.808
3	15	Ireland	0.739	0.379
4	2	Japan	0.696	0.725
5	3	Germany	0.632	0.635
6	5	United States	0.564	0.599
7	4	Sweden	0.562	0.633
8	7	Finland	0.538	0.494
9	8	Belgium	0.495	0.489
10	12	United Kingdom	0.473	0.426
11	10	France	0.465	0.450
12	11	Austria	0.453	0.445
13	13	Denmark	0.443	0.424
14	14	Netherlands	0.429	0.398
15	19	Taiwan Province of China	0.412	0.292
16	9	Canada	0.407	0.474
17	16	Italy	0.384	0.379
18	22	Korea, Republic of	0.370	0.247
19	21	Spain	0.319	0.259
20	20	Israel	0.301	0.290
21	17	Norway	0.301	0.348
22	30	Malaysia	0.278	0.116
23	28	Mexico	0.246	0.125
24	..	Czech Republic	0.243	..
25	45	Philippines	0.241	0.044
26	26	Portugal	0.240	0.159
27	34	Hungary	0.239	0.088
28	..	Slovenia	0.221	..
29	23	Australia	0.211	0.214
30	18	Hong Kong SAR	0.204	0.320
31	24	New Zealand	0.186	0.188
32	43	Thailand	0.172	0.058
33	27	Brazil	0.149	0.140
34	25	Poland	0.143	0.176
35	29	Argentina	0.140	0.122
36	44	Costa Rica	0.129	0.053
37	61	China	0.126	0.021
38	36	Turkey	0.108	0.082
39	32	South Africa	0.108	0.096
40	33	Greece	0.102	0.093
41	37	Romania	0.095	0.072
42	31	Bahrain	0.089	0.099
43	42	Uruguay	0.087	0.062
44	..	Russian Federation	0.077	..
45	40	Tunisia	0.068	0.064
46	35	Venezuela	0.060	0.085
47	53	Chile	0.056	0.030
48	56	Guatemala	0.056	0.028
49	65	Indonesia	0.054	0.012
50	50	India	0.054	0.034
51	38	Zimbabwe	0.052	0.071
52	57	El Salvador	0.051	0.027
53	46	Morocco	0.048	0.038
54	41	Saudi Arabia	0.047	0.063
55	49	Colombia	0.041	0.035
56	47	Mauritius	0.041	0.037
57	67	Egypt	0.038	0.012
58	48	Peru	0.035	0.037
59	39	Oman	0.032	0.069
60	55	Pakistan	0.031	0.028
61	58	Ecuador	0.025	0.025
62	64	Kenya	0.025	0.013
63	60	Jordan	0.024	0.022
64	66	Honduras	0.023	0.012
65	52	Jamaica	0.022	0.032
66	51	Panama	0.022	0.032
67	69	Bolivia	0.021	0.009
68	..	Albania	0.021	..
69	71	Sri Lanka	0.017	0.008
70	62	Nicaragua	0.017	0.020
71	63	Paraguay	0.015	0.013
72	..	Mozambique	0.013	..
73	74	Bangladesh	0.011	0.008
74	54	Algeria	0.009	0.029
75	72	Cameroon	0.008	0.008
76	59	Senegal	0.008	0.023
77	68	Zambia	0.007	0.010
78	75	Nigeria	0.006	0.006
79	79	Nepal	0.006	0.001
80	70	Tanzania, United Republic of	0.005	0.009
81	78	Malawi	0.003	0.003
82	73	Madagascar	0.003	0.008
83	77	Central African Republic	0.003	0.003
84	80	Uganda	0.003	0.001
85	..	Yemen	0.001	..
86	76	Ghana	0.001	0.006
87	..	Ethiopia	0.000	..

Source: UNIDO Scoreboard database (see technical annex).

The stability of the CIP ranking over time confirms that industrial performance is path-dependent and difficult to change. But there have been some leaps. Major improvements have been experienced since 1985 by middle-income developing economies (China, Costa Rica, Malaysia, Mexico, the Philippines and Thailand). Enhanced industrial performance in these economies has been triggered, to a great extent, by their insertion into global value chains through transnational corporations (figure 1).

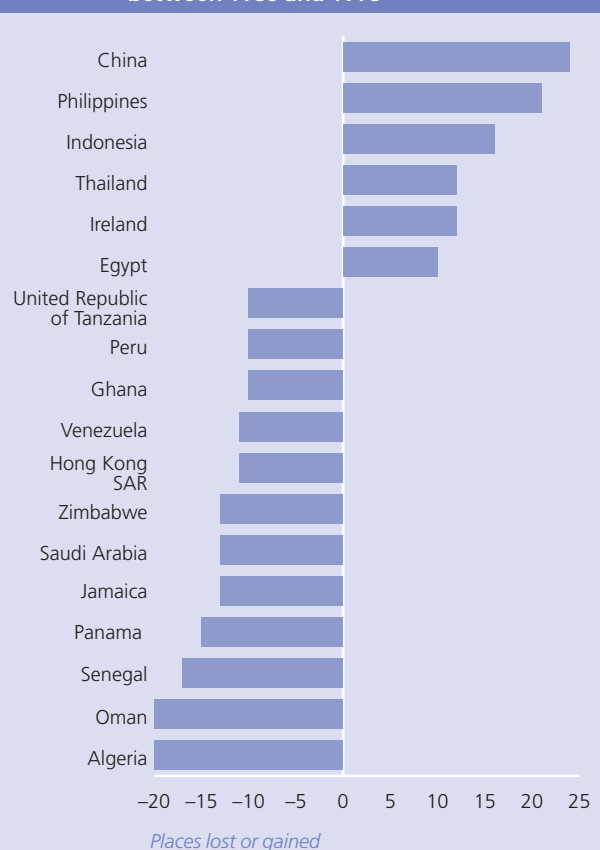
Low-income economies remain at the bottom in the CIP index and the gap between least developed economies and other developing economies widened during the period 1985–1998 (table 3). This points to growing industrial divergence within developing economies. Low-income economies have not moved up the technology ladder. Evidence suggests that 42 developing economies had a technology structure in 1998 similar to that in 1985. Only 16 developing economies (of the 58 in our sample) have shown dynamic production and export structures towards technology-intensive products.

Industrial production and manufactured exports within developing economies are highly concentrated. The top 5 countries account for 60 percent of developing country industrial production and 61 percent of exports. By contrast, the bottom 30 countries account for only 2 percent and 1 percent. Most worrying, these shares declined during 1985–1998.

Benchmarking the "drivers" of industrial performance

Industrial performance is the outcome of many social, political and economic factors interacting in complex and dynamic ways. The purpose here is to benchmark economies on their

Figure 1 Winners and losers in competitive industrial performance rankings between 1985 and 1998



Source: UNIDO Scoreboard database (see technical annex).

Table 3 Ranking of least developed countries by the competitive industrial performance index, 1985 and 1998

1985			1998		
Overall rank	Economy	CIP value	Overall rank	Economy	CIP value
59	Senegal	0.023	72	Mozambique	0.013
68	Zambia	0.010	73	Bangladesh	0.011
70	Tanzania, United Republic of	0.009	76	Senegal	0.008
73	Madagascar	0.008	77	Zambia	0.007
74	Bangladesh	0.008	79	Nepal	0.006
77	Central African Republic	0.003	80	Tanzania, United Republic of	0.005
78	Malawi	0.003	81	Malawi	0.003
79	Nepal	0.001	82	Madagascar	0.003
80	Uganda	0.001	83	Central African Republic	0.003
			84	Uganda	0.003
			85	Yemen	0.001
			87	Ethiopia	0.000

Source: Annex tables A3.1 and A3.2.

Note: The 1985 sample is smaller than the 1998 sample because no 1985 data are available for Mozambique, Yemen and Ethiopia.

key structural variables—referred to here as drivers—using available data. This report focuses on five proxy variables for drivers directly relevant to industry: skills, technological effort, inward foreign direct investment, royalty and technical payments abroad and modern infrastructure.

Singapore led developing economies (and the world) in foreign direct investment per capita in 1998, while Hong Kong Special Administrative Region (SAR) of China was in fifth place. Other developing economies among the top 20 recipients of foreign direct investment were Malaysia and Chile; one transition economy, Hungary, also ranked among the top 20. Singapore and Hong Kong SAR ranked among the top 5 in payments for technology per capita, followed in the developing world by Malaysia, Taiwan Province of China and the Republic of Korea. Singapore ranked third in physical infrastructure, with Bahrain and Hong Kong SAR also in the top 20.

The ranking of economies by each driver of industrial performance shows considerable stability over time (just as the ranking by the CIP index does). Thus the ranking of economies by R&D spending per capita for 1998 is highly correlated with that for 1985, and so on. Even so, some countries changed their relative position significantly between 1985 and 1998, such as Uruguay in the skills index, Ecuador in R&D per capita and Tunisia in foreign direct investment per capita.

Indigenous technological effort (proxied by enterprise R&D) appears to be one of the most important factors for improving industrial performance, in industrialized and developing countries alike. Foreign direct investment has become central to competitive performance (especially in fast-moving industries) as global production systems have grown in importance. And skills and infrastructure continue to be key drivers.

But indigenous technological capabilities do not always match industrial performance. Some economies with high capabilities have "underperformed" due to a disabling regulatory environment, macroeconomic instability and other fundamental factors. Bahrain, Hong Kong SAR and Panama are among them. Similarly, economies with relatively low capabilities have "overperformed", rapidly upgrading their export structures, led by transnational corporations. They include Malaysia, Mexico, the Philippines and Thailand (table 4).

Among developing economies, industrial capabilities are highly concentrated, with East Asia leading in all factors. Industrial divergence among developing economies is even more acute when looking at technological capabilities. For instance, the bottom 30 economies account for only 2 percent of developing economy foreign direct investment inflows in 1998, and their R&D expenditure, technology license payments and Internet hosts are almost negligible.

Table 4 Developing economies by industrial performance and average capabilities, 1985 and 1998

Year	Overperformers (industrial performance higher than drivers)	Balanced high (industrial performance and drivers in balance)	Underperformers (industrial performance lower than drivers)
1998	Singapore Taiwan Province of China Malaysia Mexico Philippines Thailand	Korea, Republic of	Bahrain Chile Hong Kong SAR Panama
1985	Brazil Hong Kong SAR Zimbabwe	Argentina Korea, Republic of Taiwan Province of China Singapore	Ecuador Panama Jordan
Balanced low			
All other developing economies (45 in 1998 and 44 in 1985)			

Source: UNIDO Scoreboard database (see technical annex).

Note: The analysis is based on the difference between the CIP index and the composite index of the five drivers. Balanced economies have values within the range defined by the standardized mean plus or minus its standard deviation. Overperformers have values above that range, and underperformers values below that range. Balanced high and low economies have values above and below the standardized mean of the CIP index and the composite index of drivers.

Innovation and learning drive industrial development

The report demonstrates that building technological capabilities is a long, costly and risky process, which many developing economies cannot afford entirely on their own. But the emergent global setting opens up alternatives for developing economies to build up such capabilities. Although external sources can be used by developing economies to stimulate industrialization, building domestic industrial capabilities is a must if industrial growth is to be rewarding and sustainable. In today's interdependent world, connectivity to the external sources of technology and market access remains vital for industrial success. Tapping into global value chains, especially in knowledge-driven sectors, can be a good means to enter global markets and gain access to new technology and knowhow.

Enterprises in developing countries generally start the innovation and learning process by importing new technology; they then invest in building their capabilities to master the tacit elements. How much they invest depends on the incentives thrown up by markets, mainly by the competition faced

in foreign and domestic markets, as well as on the ability to assess complementary supporting activities. Enterprises draw on internal and external resources—both foreign and domestic—to build their capabilities. The process starts with capabilities needed to master the technology for production purposes and may deepen over time into improving the technology and creating new technology.

Linking, leveraging and learning capture what enterprises—and countries—have to do to enable their technological development.

- *Linking*—connecting with outsiders to acquire needed technologies and skills.
- *Leveraging*—going beyond arms-length transactions to squeeze as much as possible from the new relationships with those outsiders.
- *Learning*—making the many efforts to master process and product technologies, consciously building the foundation for improving current technologies and creating new ones.

Whatever the process, enterprises have to start with their initial complement of resources, technologies, skills and capabilities. It is what they do with these elements that counts. The most important thing an enterprise can do is accelerate its acquisition of capabilities by looking overseas to obtain information, purchase machinery, acquire bits of technology, bring in consultants and so on. An important part of this can be linking up with other enterprises or institutions, locally or overseas, through formal or informal ties. Strategically, it makes a lot of difference what choice is made—but the choices are also heavily constrained by the enterprise's competence and the options available to it.

Latching onto global value chains

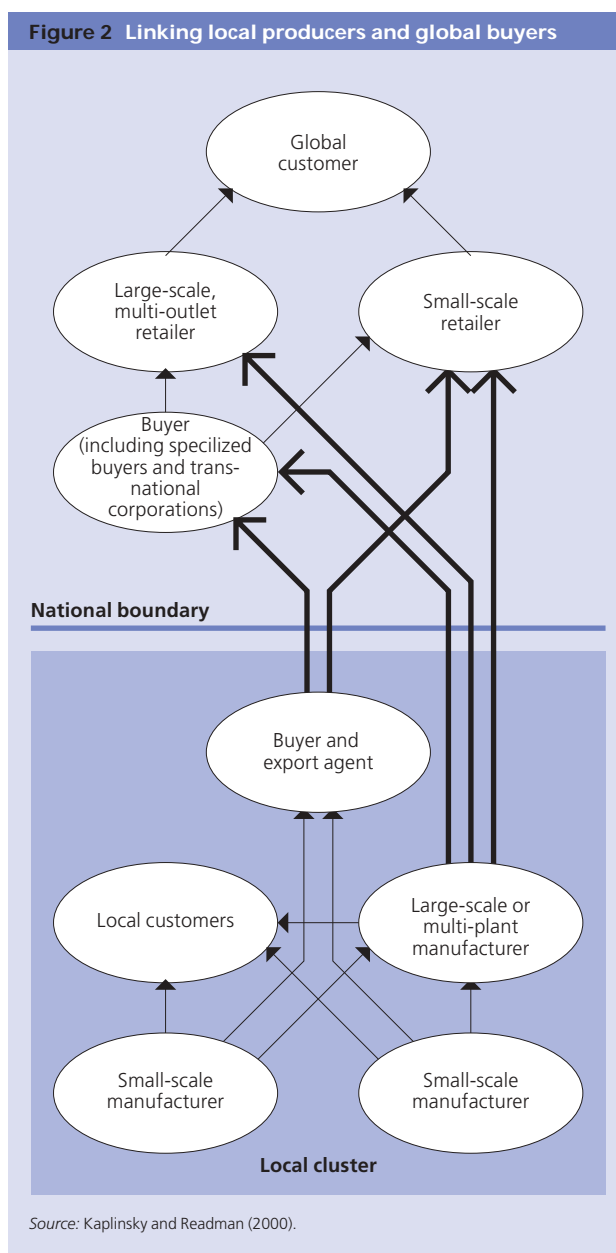
The report shows how firms and economies can build a foundation for ongoing innovation and learning by competing in global value chains. Spread around the world, enterprises in global value chains perform related activities to bring a product (or service) from design and product development to production, marketing and sales and to consumption, after-sales services and eventual recycling. The advantage of latching onto global value chains is that firms can seek involvement at their level of technological competence.

Competing in global value chains can build foundations for industrial innovation and learning. Crucial factors for latching onto a global value chain are not only the hard facts of price,

quality and punctuality but also the willingness to learn and to absorb advice from the lead enterprises. Global value chains can thus unleash enterprises—but they can also constrain them. Particularly in manufacturing, the insertion of local activities in wider networks is an opportunity for developing countries to upgrade their capabilities (figure 2).

But entering global value chains does not provide an assured ride up a capability escalator. It is often a fast track to acquiring production capabilities, but moving further up the chain can lead to conflicts with existing customers. Some firms even have had their capabilities downgraded as a result of their

Figure 2 Linking local producers and global buyers



integration in global value chains. So, it makes sense for late-comers to use all the resources they can acquire from the advanced world, in return for providing such services as low-cost manufacturing. But this requires a strategic choice to use the links for domestic development.

Helping firms solve problems and grasp opportunities

The report also details how—and whether—support institutions can help firms meet the information, skill, finance and other needs that are difficult to satisfy in open markets. A nurturing environment is required to foster vibrant industrial development (box 1). And ensuring access to vital services that support innovation and learning is a critical part of establishing that environment. Many of these services are supplied through the market in industrialized countries, but even these countries find it necessary to augment what is supplied

through the market with subsidized services. Various considerations provide ample justification for the provision of subsidized services to support the process of innovation and learning—even more for developing countries.

Many types of institutions are essential in supporting innovation and learning by firms. Infrastructure determines the cost of operation and interacting with the outside world. Training and specialized education are very important, as are financial services. The focus here is on the institutions directly supporting the innovation and learning efforts of firms.

What principles, then, should guide the provision of the subsidized services for innovation and learning? The report considers three to be paramount.

- First, support institutions should be established and managed and subsidized services provided within the framework of the national strategy for industrial development.

Box 1 Institutional support to technological efforts of firms

Basic industrial services

- Promote inward investment
- Provide export services
- Provide management services
 - Collect marketing information
 - Collect data on exports and imports
 - Provide managerial consulting
- Provide financial services (accounting, tax assistance, investment advice)

Technology Information Centres

- Provide information technology to firms, including networks, software, Internet capabilities, intranet, and databases
- Perform troubleshooting, assistance, and repair to firms
- Provide training in informational technology applications

Metrology, Standards, Testing, and Quality Control Centres

- Define domestic standards
- Assist firms in meeting International Organization for Standardization (ISO) compliance standards
 - Train firms in ISO standards and regulatory requirements
 - Test products to ensure compliance with standards
 - Provide technical assistance to firms
- Help firms with calibration of instruments
 - Maintain calibrated standards and calibration equipment
 - Calibrate firms' machinery

Productivity Centres

- Improve quality
- Improve productivity, efficiency
- Provide training

Technological Extension Agencies

- Extend available technology to businesses lacking technical capabilities
- Help firms use cleaner production technologies
- Provide information on available technology
- Identify problems and use access to technology sources to solve problems
- Serve as external consultants and assist firms with trouble-shooting
- Promote cooperation of small and medium-size enterprises with larger research and cluster initiatives (South Africa MAC program)

Research and Development Laboratories

- Design new processes and products.
- Train businesses through demonstration, participation and extension
- Implement new technologies
 - Import and learn foreign technology
 - Adapt foreign technologies to local needs
 - Integrate these technologies into economy in collaboration with firms

- Second, as a general rule, subsidized provision of industrial services has more justification the more widely shared the specific services rendered.
- Third, the services and organizations should not be supplied solely by government. As quickly as is feasible, they should be supplied in public-private partnerships or by private firms and associations—with subsidies, if justified, or without, if the market can supply the services.

Formulating strategies

Developing economies can build competitive industrial capabilities in the current setting. Also clear is that building these capabilities needs extensive policy support. The success of

developing economies that employed industrial development policies in export-oriented environments—with complementary policies to build skills, technological capabilities and supporting institutions and to leverage foreign resources—shows that such strategies can radically transform the industrial landscape in just a few decades.

The report argues that the basis of any coherently framed industrial strategy is a national vision of industrial development—a vision to get on the high road to competitiveness by increasing productivity growth through concerted innovation and learning (box 2). Foresight exercises offer a disciplined means for determining targets and the ways to achieve them in formulating industrial development strategies. The focus of these exercises in developing economies differs from that in industrialized economies in

Box 2 Four Tigers—four broad visions

The four Asian Tigers were the first countries in the developing world to launch an export-oriented manufacturing strategy. While Hong Kong SAR was always free trade, the other three—Singapore, the Republic of Korea and Taiwan Province of China—turned from import substitution to export orientation in the early 1960s. They led the first wave of labour-intensive industrial exports: garments, textiles, toys, footwear and the like. Over the 1970s and 1980s they upgraded their export structures in different ways, depending on their differing visions of what they wanted their development paths to consist of. This depended in turn on their social and political structures, resource endowments, size and history.

In Hong Kong SAR the vision of the colonial government was market-driven resource allocation, with no particular ambition to develop local manufacturing. Although Hong Kong SAR was once the leader in the developing world in manufactured exports, this vision led to quality improvement in labour-intensive exports but to relatively little structural deepening. As a result, with rising wages, most manufacturing shifted to lower wage countries, and industrial and export growth stagnated or turned negative. The export structure remained at low technology levels, the lowest among the Tigers.

In Singapore, by contrast, the government had a strong vision of technological upgrading and deepening. This led it to intervene extensively in investment patterns, skill development and infrastructure building while retaining a free trade setting. The result was considerable deepening, allowing Singapore to combine high and rising wages (nearly 20 percent higher than in Hong Kong SAR) with output and export growth. Singapore moved rapidly from low-tech activities to petrochemicals and then producer electronics and equipment, simultaneously raising its technological levels from simple assembly to high-end manufacturing, design and development. Transnational corporations, providing state-of-the-art technologies and access to their global networks, dominated the process. While Singapore developed a very high-tech export structure, however, its research base stayed small and the main sources of innovation remained overseas.

The Republic of Korea and Taiwan Province of China also had very strong visions of industrial development, this time with larger ambitions for national enterprises. Transnational corporations were allowed a much smaller role, though foreign technology was tapped extensively in other forms. Their governments used infant industry

protection (offsetting its harmful effects by strong export incentives), credit allocation and subsidies, foreign direct investment restriction and skills and technology support. And they did this in ways to induce local firms to enter difficult activities, raise local content and take on advanced technological functions. The Republic of Korea's interventions were more pervasive and detailed. They involved fostering the *chaebol*, the conglomerates that spearheaded its heavy industry and high technology drive, learned the most advanced technologies and became major transnational corporations in their own right. Taiwan Province of China intervened less directly in the industrial structure, though it used public enterprises to enter several heavy industries. It supported its small and medium-size enterprise dominated structure with an array of technology, training, finance and export marketing policies and institutions. Because of their far-reaching efforts, the Republic of Korea and Taiwan Province of China have the greatest technological depth in the developing world, and their exports embody the most intense learning.

A vision gone sour

Some of the Republic of Korea's seeming policy successes later turned sour. The Asian financial crisis dramatically exposed the substantial risk inherent in the pursuit of an ambitious vision by aggressively interventionist means. The risk is that policies, while proving to be highly effective in the medium term, can have seriously detrimental consequences for long-term institutional development. The Korean government's practice of directing the allocation of credit severely retarded the development of modern financial institutions—and stifled the establishment of an adequate regulatory system. In turn, its promotion of the *chaebol* ultimately created a number of differently dysfunctional private entities whose exploitation of the policy regime resulted in unwise investments—leading in some cases to excess capacity, in others to bankruptcy in whole or in part. In a very real sense, then, the high costs imposed on the people of the Republic of Korea by the crisis-induced recession and the subsequent vigorous pursuit of systemic policy reform are the price paid for the government's earlier inability to rectify growing institutional deficiencies. Taiwan Province of China did not foster *chaebol*-like enterprises, but otherwise followed a similar though distinct set of policies. It has paid a far lesser price by managing the long-term consequences of directed credit more effectively.

Sources: Amsden (1989); Wade (1990); Lall (1996); Westphal (forthcoming).

that the objective is to catch up with the global technological frontier, not to remain on, or at the forefront of, the changing frontier. Even so, developing economies require foresight in relation to existing industries—not simply for keeping up but also for catching up to a shifting frontier—and in relation to industrial activities for which potential competitive advantage is within grasp.

The report makes three major points on the policy process. First, policy needs vary with the level of development. As markets and institutions become more efficient and complex, the need for direct interventions falls and the potential costs rise. Second, industrial development policy must be systemic. No strategy can succeed unless it dovetails physical investment in capacity with technology development, skill building, cluster strengthening and so on. Third, policies must correspond to the phase of learning and so must change accordingly: policies in the infant phases of capability building must differ from those in the mature phase, when R&D and frontier innovation become vital.

Enhancing capacities to sustain productivity growth

Industrial development can drive human development and national development. By attending to the drivers of industrial development countries can greatly improve their potential industrial performance. Needed are policies to ensure sustained productivity growth with an emphasis on equitable distribution. Only when countries achieve this will they turn onto the high road to development, drawing fully on world trade and investment flows and connecting their people to the global economy.

Developing economies have to deliberately mobilize the key ingredients of productivity growth and spread them widely. Getting the macroeconomy right and opening up to trade and investment is only a first step. And it is one that needs to be handled carefully: many countries have rushed into it without adequate preparation. If they stop here and make no deliberate effort to build up the widest possible base of higher order skills, capabilities and institutions, growth will slow down or grind to a halt.

Countries have to build the capacities to take on, at competitive levels, more complex activities that use emerging technologies and sustain rising wages. This entails building the institutions and providing the support to create new skills, information and capabilities. These ingredients of success are hardly a secret. What is difficult is to devise and implement practical strategies to suit the specific needs of particular developing economies.

The task is broad and challenging. It is also slow, difficult and detailed. It requires understanding and tackling the basics of small, incremental changes on which received theory provides little guidance. It entails constant adaptation and learning on the part of policymakers. And it has to call forth the cooperation of a range of agents, private and public, as well as new forms of governance that are difficult to introduce.

In all this, countries need consciously to build their technological capabilities through concerted innovation and learning. To get the productivity gains promised by such efforts they need, in addition, to put in place the institutions to support their proactive integration into the global flows of trade, capital and technology. Again, the international community can do much to support these efforts—and again, UNIDO will work to ensure that such support is forthcoming.