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TAXONOMY OF INDUSTRIAL POLICY

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Taxonomy of industrial policy

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1. Introduction

This paper sets out a framework for a practical discussion on the application of industrial policy (IP). This requires

- A simplified set of concepts intuitively clear to policymakers
- A taxonomy that separates different areas and mechanisms for intervention
- A distinction between the role of IP in economies at different stages of development
- Illustrations of applications of IP in different economies.

The role of IP is to facilitate structural change in favour of higher productivity activity. The focus is on the creation or expansion of activities within the manufacturing sector, although in principle IP could target resource shifts in favour of any 'modern sector' activity. Where countries have environmental policies either through pricing or controls, they will impose constraints on the operation of IP, but it is assumed that environmental targets per se are set in a separate deliberation. Current thinking on 'strategic' IP sees its application as based on a consultative process between government and private producers. Policy recommendations from such a process can be potentially wide ranging, however, here the focus is on initiatives that have a direct impact on manufacturing and which fall under the bureaucratic purview of ministries of industry. Thus, general macro dimensions such as the exchange rate and monetary policy, and general regulatory measures relating to the business environment or investment climate are excluded, as are recommendations relating to general infrastructure improvements, such as power supplies or road links, which may benefit manufacturing, but which fall under the remit of other ministries.

The role of IP can be rationalized in terms of market failures and private decisions in response to market signals to generate an adequate level of manufacturing activity. This can be related to factors like attitudes to risk or lack of information or because returns to the economy exceed those to individual investors. Here action must be coordinated by governments and incentives given to firms that reward them for the external benefits they create for others. Application of successful IP can be likened to removing constraints in the 'problem tree' approach to growth diagnostics.[1] The key questions in any particular country case are what is the binding constraint holding back structural change in favour of industrialization and how can IP work to remove this constraint?

[1] See Hausmann, R, D, Rodrik and A. Velasco, 'Growth Diagnostics', mimeo 2005.

Figure 1 Industrial policy: possible interventions

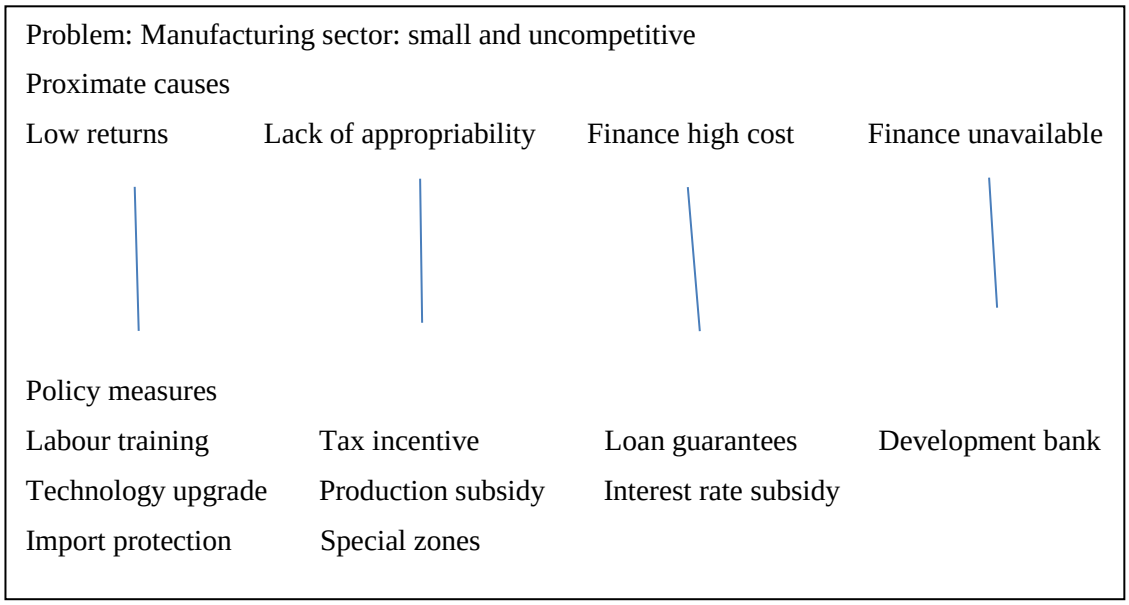


Figure 1 illustrates the growth diagnostics approach to IP. The policy problem is low growth and an uncompetitive cost structure in manufacturing for which there are four broad proximate causes:

- Costs may be too high by international standards creating low returns to investment
- Potential or underlying costs may not be uncompetitive, but private producers cannot appropriate all of the benefits from investment due to externalities and coordination failures
- Cost of finance may be too high due to perceived risk or lack of collateral
- Finance may be unavailable for long-term loans.

Depending on which of these factors is the most critical (and dialogue with the private sector can help clarify this), IP can apply different policy instruments. For example, labour training provision or subsidies to private providers may address high production costs. Tax relief or subsidies may be used to reward firms that create benefits for others, such as innovators whose new products or designs may be copied by followers, and agglomeration economies may be captured by a zoning policy. The appropriation issue is also addressed by investment climate measures that reduce the costs of doing business and improve physical infrastructure, but as noted above, these measures are not considered here under IP. In the area of financial constraints, loan guarantees can reduce interest charges and development banks can take risks on innovative activities. Where subsidies are involved, there is the risk of capture by vested

interests, and the rationale for a subsidy and its cost need to be made explicit and a plan for its phasing out should be part of the policy.

The problem tree approach can also be applied at the sub-sector level to examine detailed constraints specific branches of manufacturing face. Appendix 1 illustrates this with a product example.

2. Classification of IP

We know that the process of industrialization, broadly speaking, involves stages with some, although not precise, empirical regularity. This allows a categorization relating to 'early', 'middle' and 'late' IP relating to different types of economy. Within each stage there is a choice between general horizontal measures available to all firms and selective vertical ones applied selectively to priority targets, whether sub-sectors or specific firms.

2.1 Early stage IP

The transfer of low skilled workers out of agriculture into relatively labour-intensive activities using relatively simple technologies (or the simplest labour-intensive parts of a more sophisticated production process) occurs at relatively low income levels. The capabilities required of local producers will essentially be mastery over relatively mature production processes through technological 'know-how'. Manufacturing is typically organized around large numbers of small firms, an even larger number of microenterprises and a small number of larger firms which may be a mixture of subsidiaries of MNCs, private sector firms and, in some places, SOEs. The role of IP in this context is to stimulate and accelerate this process and with limited resources, selectivity within manufacturing is likely to be required. In all but the largest economies, most of the market for industrial goods will be overseas and trade specialization in a limited number of competitive manufacturing activities will be crucial.

Key objectives will include:

i) Diversification of exports away from primary goods into simple manufactures
ii) Processing (or 'beneficiation') of natural resources into resource-based manufactures
iii) Attraction of FDI to generate technology, management or marketing links
iv) Encouraging new start-up firms.

Measures to address these will include:

a) Provision of credits or loan guarantees
b) Incentives for FDI or technology
c) Vocational skills training
d) Incentives (taxes, import tariffs, subsidies) to raise the relative profitability of either all or targeted parts of manufacturing
e) Use of special zones or estates to draw on any agglomeration economies (particularly where it is difficult to provide good quality infrastructure on a country-wide basis).

At low income levels, important candidates for key constraints on expansion will often be a shortage of funds for long-term investment (capital market constraint), lack of skills (labour market constraint) or lack of incentives (product market constraint). Analysis in each country case would need to identify where the key constraint or constraints lie.

In relation to IP, there is always a choice as to how far policy should support industry in general (horizontal measures) and how far it should target specific sub-sectors (vertical measures). In practice, industrial diversification will be limited at low income levels and specialization on a limited range of activities is likely. This specialization may come about explicitly through policy choice or implicitly through firms' actions in response to horizontal measures.

Where a targeting approach to selection is adopted, there are alternative ways of identifying priority areas for support. One is to look for new activities that are relatively closely related to existing areas of production and which thus use the economy's existing set of capabilities and skills. Following this approach, early areas for encouragement will likely be based on the availability of low cost labour or natural resources. Another approach is to look at the product range wealthier countries with similar endowment structures have successfully exported in the past.[2] A third is to encourage a dialogue with the private sector to facilitate 'product discovery' and the emergence of ideas relating to market niches or novel products, which can be supported through a Development Bank or private venture capital. In each approach, however, a dialogue between producers and government will be necessary, but in practice, the range of options to discuss is likely to be limited.

[2] A rule of thumb that has been suggested is that the comparison should be made at the point at which the comparator country had a real income per capita no more than double that of the country concerned; see Lin, J and C. Monga (2010) 'Growth identification and facilitation: the role of the state in the dynamics of industrial change' World Bank Policy Research Working Paper, 5313. Weiss, J (2013) Strategic Industrial Policy and Business Environment Reform: are they compatible? Donor Committee on Enterprise Development Working Paper, June 2013, available at www.dced.org suggests technical criteria that can be used to check the short-run efficiency of any potential priority area.

2.2 Middle stage IP

As economies become more sophisticated in terms of production capabilities and as real wages rise, the industrialization process will see a relatively decline in relative roles of labour-intensive and resource-based manufactures, and a shift into medium technology activities or into the labour-intensive segments of relatively high technology goods. The capabilities required of producers will increasingly focus on mastery of technology rather than on production in terms of 'know-why' as well as 'know-how'. The pattern of manufacturing will see greater diversification in the sector with a relative decline in the share of large firms relative to small and medium-sized firms, but some countries may choose to build up selected large national champions. At this middle stage, the role of IP is likely to shift from encouraging a relatively small number of branches of manufacturing which intensively use the economy's resource endowments into stimulating a specialization in product lines which are relatively new to the economy and involves more sophisticated technologies. Once the stage of reliance on cost advantages determined by wages or natural resources is passed, the range of potential new products expands significantly, with considerably greater scope for 'discovery' of competitiveness. Key objectives at this stage will include:

a) Promotion of higher value-added medium and high technology products
b) Development of local adaptations to foreign technology
c) Upgrading of local firms within global value chains
d) Establishment of international marketing links to develop own brand products
e) Integration of environmental policy as an aspect of IP.

At this stage, the instruments of IP will expand to include:

i) Innovation or venture capital to encourage investments in new activities or technologies
ii) Incentives for more technologically advanced FDI
iii) Subsidies to local R&D and the encouragement of research consortia and industry-university links
iv) A focus on higher level skills training and higher education
v) Use of public procurement contracts or supplier development programmes to encourage local suppliers.

Public-private dialogue will assume greater significance given the broader range of activities in the economy, the growth of a private manufacturing sector and the potential for the emergence of different sets of bottlenecks in different branches of manufacturing.

2.3 Late stage IP

Late stage IP is principally about supporting the development of activities using frontier technologies and the education- and science-based infrastructure to make this possible and the creation of new technologies. In addition, there will be some 'defensive' IP aimed at supporting the restructuring of sunset activities in which an economy has no long-run competitiveness on the basis of existing technologies. Also, some high income countries may choose to pursue explicit 'catch-up' policies designed to break into markets dominated by a market leader. Instruments of IP at this stage will include:

a) Public-private R&D activity and support for research consortia (possibly combined with public procurement policy)
b) Venture capital for high technology investments
c) Higher education investment in applied science-based subjects
d) General educational improvements
e) Funding for enterprise restructuring
f) Retraining for workers.

This three-fold categorization of stages of IP is stylized and experience of no single economy matches this sequence exactly, but there are elements of it in the best documented case of IP, namely that of the Republic of Korea. The initial focus on relatively simple labour-intensive goods as part of import substitution in the 1950s to mid-1970s, can be thought of the early stage. The focus on capital-intensive activities of chemicals, shipbuilding and steel, for example, from the late 1970s through the 1980s, corresponds to the middle stage, and the shift towards support for knowledge-intensive activities in a more open foreign trading environment from the 1990s to the present represents the late stage. The global economy and international environment significantly differs from that during the Republic of Korea's industrialization drive between 1960 and 2000; nonetheless, the different emphases of policy over this 40-year period reveal the challenges at various stages of industrialization. Table 1 summarizes the shifts in IP in the Republic of Korea.

Table 1 Changes in policy in Korea 1960 onwards

Period	Priorities	Main instruments
1960-73	Exports in general – key sectors labour-intensive manufactures	Import tariff protection, export subsidies, tariff-refunds, subsidized credit and export targeting
1973-1980	Heavy and chemical industries – priority sectors steel, petrochemicals, nonferrous metals, shipbuilding, electronics and machinery; priority firms selected large enterprises	As above, plus use of policy loans to fund priority sectors and firms, tax credits as investment incentives
1980-90	Manufactured exports in high technology activities, small and medium enterprises, firms in need of restructuring	Phased import liberalization, some directed lending, investment incentives for R&D, ending of restrictions on foreign investment.
1990 onwards	Private sector-led development, restructuring of large firms, after 1997 Crisis, development of internationally competitive economy	Financial sector reform, open capital account and support for R&D.

Source: Weiss, J The Economics of Industrial Development, Routledge, 2011, Table 7.1

The distinction between the different roles of IP across economies cannot be based on income alone since resource endowments, government objectives, political economy and bureaucratic capacity all influence the design of policies. However, income per capita data give a rough indication of where different stages of IP will be relevant. Broadly, early IP relates to an economy with relatively low income per capita, say up to US$ 3,000 per capita (2005 PPP) and a relatively small manufacturing sector (say below 15 per cent of GDP). Middle stage IP, in turn, relates to both lower and upper middle income economies (US$ 3,000 to US$ 15,000) where the potential 'middle income trap' of declining competitiveness in labour-intensive activities and the need to move into more sophisticated manufactures may emerge. Late IP is principally for high income economies (above US$ 15,000 PPP) and a few at the higher end of the upper-middle income range.[3]

2.4 Taxonomy of IP

A wide variety of policy instruments can be used to apply IP. Current thinking stresses that there is no unique blue print for desirable IP. Different instruments offer different means of support for producers either by shifting relative incentives or providing various forms of direct

[3] What the threshold is for middle income status is essentially arbitrary. US$ 3,000 per capita in 2005 PPP terms is a higher threshold than used in the World Development Indicators definition, so early IP as discussed here applies to more than just the conventional group of low income economies.

support. Policy experimentation, learning from past mistakes, changing measures as needed, not offering open-ended commitments and listening to the private sector are each stressed as good practice advice. Grouping these various instruments in a simple presentation for the policy community requires a taxonomy that allows an intuitively clear distinction between areas of intervention and differentiates between countries by stage of development. The taxonomy suggested below distinguishes between five areas (or policy domains) and two broad categories of policy instruments or mechanisms within these areas. Within this 5 by 2 matrix, there are a relatively large number of specific policy instruments which can be applied. The latter part of the paper gives illustrations of their application. The areas for intervention[4] are:

- Product market
- Capital market
- Land market
- Labour market
- Technology.

Two broad categories of policy instruments are proposed – market-based interventions (for example, subsidies, taxes, import tariffs) and public inputs (provision of public goods as well as organizational change).[5] Market-based interventions impact on prices and taxes and thus operate through pricing links. Public inputs reflect the provision of goods or services, which firms themselves would not supply adequately, either because they cannot be marketed or because significant external benefits are involved. Institutions required to implement IP are included under this heading. In the taxonomy, no distinction is drawn between horizontal instruments (available for all manufacturing) and vertical instruments (available selectively), as a given instrument or support measure can be applied in general or selectively. The taxonomy is shown separately for low and middle income countries under the headings of early and middle IP. There is an overlap between some of these instruments and policy domains and will support each other in many instances. Each policy domain is discussed separately below for low and middle income economies with selective illustrations. There is a briefer discussion of late stage IP.

[4] This follows the approach to taxonomy of Warwick, K (2013), 'Beyond Industrial Policy, Emerging Issues and New Trends', OECD Science Technology and Industry Policy Papers 2, Paris, OECD, which has a rationale based on the categories applied in growth modelling exercises. Warwick includes institutions as a separate category, but they are omitted here because of the inclusion of public inputs as one of the two categories of policy instrument.

[5] The approach in UNIDO (2013) Industrial Development Report 2013, UN, Vienna, followed Perez, W and A, Primi (2009) 'Theory and Practice of Industrial Policy: Evidence from Latin American Experience' CEPAL Desarrollo Productivo Serie 187, CEPAL in decomposing IP into the role of the state as regulator (in terms of both incentives and controls), financier, producer and consumer. A fivefold categorization is unwieldy for the purpose here, and these five categories are subsumed within the 5 by 2 matrix.

3. Early stage IP taxonomy

Table 2 Early stage taxonomy

Policy domain	Instruments	
	Market-based	Public goods/direct provision
Product market	Import tariffs, export subsidies, duty drawbacks, tax credits, investment/FDI incentives	Procurement policy, export market information/trade fairs, linkage programmes, FDI country marketing, one-stop shops, investment promotion agencies
Labour market	Wage tax credits/subsidies, training grants	Training institutes, skills councils
Capital market	Directed credit, interest rate subsidies	Loan guarantees, Development Bank lending
Land market	Subsidized rental	EPZs/SEZs, factory shells, infrastructure, legislative change, incubator programmes
Technology		Technology transfer support, technology extension programme

In low income countries, the key policy problem is in utilizing the current resource endowments of these economies, which will typically be low cost labour and various natural resources, whilst not ignoring potential good ideas for innovative product lines or activities, which are not directly linked with these natural endowments. In practice, IP has differential effects within manufacturing in most economies, so in their application, the impact of these measures is vertical rather than horizontal. In principle, policy instruments should be geared towards supporting activities with either a long-run potential for growth, which require incentives to stimulate production, or strong spill-overs or externalities, so that gains to the economy exceed those to private investors

It is possible that given the range of potential measures without a clear view of objectives, interventions can work in contradictory rather than complementary ways. Hence, for example, if the goal is to promote particular activities through priority access to long-term credit, they should not be relatively disadvantaged by other aspects of policy such as import tariff rates or tax incentives. In addition, where activities flourish without special support, it will be important to ensure that this growth is not stifled by promoted but less efficient activities which can only compete because of the support they receive. Hence, it will be important to have an overview of how the various policy interventions are operating to avoid contradictory or unintended

consequences. Developing such a perspective will play an important role for a planning cell located either in the Ministry of Industry or in some cases in the Office of the Prime Minister.

3.1 Product market – early stage IP

Product market interventions that are market-based are alternative ways of increasing the relative profitability of manufacturing activities, either through an impact on prices received or paid or on rates of tax. IP in the past has been closely associated with 'infant industry' trade policies where import tariffs or quota restrictions are used to raise the cost of competing goods and restrict access to them. Today it is recognized that protection behind relatively high import tariffs, whilst not prohibited by WTO rules provided these are below a country's bound tariff rate for the product concerned, is only an advisable policy for country's with large domestic markets or with preferential access to large regional markets, where domestic production can achieve economies of scale. Even here there are other ways to support new activities, and relatively high import tariff protection will create consumer dissatisfaction, as information on comparable international prices is now widely available and can encourage smuggling. Any above-average tariff protection on infant industry grounds should be time limited and accompanied by IP measures to reduce costs and improve competitiveness.

In low income economies, most new manufacturing tends to be aimed at export markets to achieve economies of scale. Export promotion operates through the exchange rate,[6] but also through a range of possible incentives, such as differential tax rates for profits from export sales, cash grants or credit lines for export activity and import tariff rebates for imported inputs used in export production. Duty drawbacks are a means of supporting exporters which are widely applied and are eligible for all countries under the WTO. Export subsidies offered by low income countries are allowed under WTO rules, but the key issue is one of financing. Targeted time limited export subsidies for new activities may be feasible, but if offered on a widespread basis, would pose serious fiscal difficulties, which is why general support through a competitive exchange rate is an alternative strategy. Box 1 illustrates the position in relation to tariffs and export incentives for Ghana, a low income country with a small manufacturing sector dominated by agro processing.

In low income economies, because of the limited scale of the domestic market, investment incentives either to national or foreign investors are often a form of export promotion, since a significant share of sales will be abroad. Investment incentives in the product market usually take the form of tax holidays and exemptions, although—as discussed below—they operate in

[6] Here we do not discuss the role of exchange rate protection as a means of encouraging manufacturing, as this is a macro-economic measure.

other markets as well. Where foreign investors are involved, firm-specific incentive packages may be offered and involve a range of measures and specially negotiated tax rates which are more favourable than those offered to investors in general. Box 2 illustrates investment incentives offered in Nigeria, which has a highly complex system where incentives vary by type of activity, form of expenditure and region of location.

Product market support can take forms other than an impact on prices or tax rates, and interventions in the form of public inputs are available to support domestic linkages. For example, it is possible to use government procurement policy as a means of guaranteeing a market for domestic suppliers. This is an alternative version of local context requirements imposed on foreign investors in the past and now contrary to the WTO TRIMS agreement.[7] This policy offers the possibility of domestic linkages since even where foreign suppliers get the direct procurement order they can be required or encouraged to use some local content. However the impact of procurement policy will be limited by the supply capacity in the economy, since unless local suppliers can meet a minimum price and quality standard, it can be counter-productive by raising public sector costs.

IP can be applied to encourage foreign investors to create linkages with local suppliers, even in the absence of formal local content agreements. The public inputs involved here are technical assistance (support with product quality, technical know-how, certification and so forth) to local suppliers to raise product quality to a level at which it becomes attractive to foreign investors to use locally sourced supplies. This can involve a form of 'match-making' where a government promotion agency links investors with local suppliers, although again in a low income context, the range of potential suppliers will be limited. An alternative model is to provide tax incentives to foreign firms to choose local subcontractors, with exchange programmes that place a key employee of a foreign firm in a local supplier to train local staff, with their salary paid by the government and the foreign firm receiving additional compensation, for example, in a tax holiday.

[7]Procurement policies are subject to a different agreement to which low income countries are not party to.

Box 1 Tariff policy and export incentives: Ghana

Ghana's tariff regime has been liberalized considerably over the past 30 years, but customs revenue remains important for fiscal purposes, accounting for around one-third of total revenue in 2012 or nearly 38 per cent if excise taxes paid on imports are included. As a member of the Economic Community of West African States (ECOWAS), it has harmonized its tariff schedule in line with that of the Community and created a basic four band structure of zero, 5 per cent, 10 per cent and 20 per cent. Inputs into manufacturing production normally enter at the lower bans and some final products face 20 per cent, which gives a modest margin of protection to domestic producers and creates protection on value-added (the Effective Rate of Protection) of more than 20 per cent . Most manufactured products do not have bound tariffs, but ECOWAS policy would prevent an increase above 20 per cent. Overall, the average MFN tariff for the manufacturing sector was just below 13 per cent in 2013 and above-average applied rates were found for Clothing (20 per cent), Textiles (17 per cent), Wood, Pulp and Furniture (17 per cent) and Leather Goods, Footwear and Travel Goods (15 per cent). In 2015, the country formally implemented the ECOWAS Common External Tariff which will create some adjustments to these figures, but the main change will come through higher tariffs on non-electrical machinery and transport equipment, which will face tariffs of around 10 per cent.

As a low income economy, Ghana has the right under WTO rules to use explicit export subsidies, but has not formally notified WTO of any such measures. Exporters are eligible for refunds of tariffs paid on imported inputs used in export production, but there are complaints that the process is very slow and is not always complied with. Credit for exporters of up to US$ 3 million per loan is available from the Export Development and Agricultural Investment Fund (EDAIF), which is financed by a levy of 0.5 per cent on non-petroleum imports. The Export Credit Facility operates through designated financial intermediaries who receive the funds from EDAIF and on-lend to exporters. Exporters apply directly to the intermediary institutions which review these and make recommendations to the Board of EDAIF (which includes private sector representatives). The intermediaries bear the risk but EDAIF lends to them at a subsidized interest rate, whilst they on-lend at the Central Bank prime rate.

Producers selling more than 70 per cent of their output as exports are entitled to register as free zone enterprises and locate in one of the two EPZs, although they can also obtain this status if they do not choose to locate in an EPZ. Free zone status grants exemption from import tariffs on inputs used in exports, 10-year holiday from corporate tax and a tax rate of 8 per cent thereafter and a fast track customs clearance for imports. In addition, non-exporting firms are also allowed to locate in an EPZ to take advantage of the higher quality infrastructure available there.

Source: WTO (2014), Trade Policy Review: Ghana; available at www.wto.or

Box 2 Investment incentives: Nigeria

The Government of Nigeria has developed a differentiated package of financial incentives for various industries of the economy designed to encourage investment and to influence both its location and form.

Whilst the basic rate of corporate tax is 30 per cent, there is a complicated set of exemptions and reductions. Small firms in manufacturing with a turnover of less than N1 million are taxed at a low rate of 20 per cent for the first five years of operation.

Pioneer status: new firms above a minimum size of capital assets are entitled to apply for pioneer status within one year of commencing production. Such firms are granted a 5-year tax holiday from corporate tax. However, if they are located in economically disadvantaged areas, the holiday period is extended to 7 years. Pioneer status is granted to firms whose products fall within 69 approved industries covering much of manufacturing, including agro-processing, but not some of the relatively simple products like clothing, footwear and leather.

In addition, there are a number of other tax incentives designed to influence company behaviour.

R&D incentives: firms conducting R&D in Nigeria can offset 120 per cent of this expenditure against corporate tax as a tax deduction, and 140 per cent where the R&D involves a technology to use local materials.

Training incentives: firms carrying out in-plant training enjoy a 2 per cent point lower corporate tax rate for a period of 5 years.

Infrastructure: firms investing in their own infrastructure (roads, power, and so forth) because available facilities are inadequate can deduct 20 per cent of this cost against corporate tax.

New investment: capital allowances vary by different types of capital asset, for example, plant and equipment attracts an initial allowance of 20 per cent and then 10 per cent per annum.

Use of local raw materials: firms meeting a minimum ratio of local raw material purchase (60 per cent to 70per cent) qualify for a tax credit of 20 per cent for five years.

Employment: firms with a high labour/capital ratio and thus minimal automation are entitled to tax concessions, with the concessional rate as such being directly related to the number of workers employed.

Source: Nigerian Investment Promotion Commission (NIPC) Investment Incentives, available at: <www.nipc.gov.ng/investment.html>.

More generally, attracting foreign investors to an economy is an important means of developing new industry. However, it is now accepted that attracting FDI requires considerably more than relatively low tax rates and the promotional side of IP is an important public input. Apart from general investment climate measures (like reductions in bureaucracy and improvements in infrastructure), investment promotion involves establishing a brand image for an economy as an attractive location, whilst once investors are interested, investment servicing involves general assistance in disseminating information, accessing permits and meeting other requirements, for example, through 'one-stop-shops'. In particular, foreign investors will need assurance that any new activity will fit into their global supply chain, and in a low income context this will involve assurance about infrastructure quality and local skill levels.

Links with a foreign buyer as part of global supply or value chains are potentially important because they are a link between low income country producers and world markets. Where firms must seek out their own markets, IP has a role in developing export promotion agencies, which can bridge information gaps between producers and potential buyers. Such agencies can provide public good services like training in relation to marketing and standards, identification of and contact with buyers and support for trade fairs and export missions.

3.2 Labour market – early stage IP

Low cost labour is typically the key resource available in low income economies. However, unskilled labour will only be of limited use for manufacturing and some form of training will be required. It is thus preferable to link subsidies with a commitment by employers to training. At an early stage of IP, most of this can be delivered to workers in-house and market-based IP supports this through tax credits for training expenditure and where funds are available by training grants. In addition, one of the mechanisms to encourage employment is to link the availability of other forms of support such as credit allocation under favoured terms or special tax holidays with the creation of employment. This is typically applied in the case of foreign investors as part of the package of incentives they are offered. More general wage subsidies across manufacturing as a whole, offsetting a proportion of the payroll cost against tax, can also be used where employment is a key objective. This, however, is a potentially expensive subsidy because of its very general nature and is unlikely to be feasible on a horizontal basis at high rates of subsidy.

Public inputs involve the creation of training institutes for industry-specific skills which, in addition to basic numeracy and literacy, are provided by the education system. To be relevant, training must be designed in collaboration with the productive sector where possible, involving

apprenticeships in firms and skills councils representing industry by either participating in the design and delivery of training or providing partial funding. It is common for training levies to be imposed on the payroll costs of firms to finance sector training bodies. Box 3 illustrates the use of such a scheme in South Africa.

3.3 Capital market – early stage IP

In low income economies, a shortage of credit for long-term investment is often a key constraint as the system of financial intermediation is relatively poorly developed. In the past, IP has been associated with policies of directed credit whereby commercial banks are required to allocate a proportion of lending to favoured sectors at below market-clearing interest rates. This type of 'financial repression' is now not recommended because it undermines the development of a sustainable commercial banking sector and can lead to misuse of funds.

However, public sector loan guarantees supporting lending to target sectors or firms (usually SMEs) are compatible with stronger financial intermediation and are a form of market-based measure to support loan transactions. As guarantees reallocate risk between the lending institution and the guarantor, they must either be priced so a risk-adjustment is made to the interest charge, or an explicit budgetary allowance must be made for their subsidy component. Guarantees are particularly useful where commercial banks are risk-averse and where the public guarantor has levers that can be used to enforce repayment. Box 4 illustrates support for SMEs through credit guarantees in Nigeria. SMEs are supported in this way in many countries where employment creation is an important objective, but there is relatively little evidence to support the view that small firms are particularly dynamic in terms of output or productivity growth, although they may be more labour-intensive.

In addition, an important public input is the activity of public sector development banks to fund higher risk activities, where commercial bank funding is unavailable. This is particularly relevant for low income economies where commercial banks are unwilling to lend long-term or where it is difficult for borrowers to establish adequate collateral. Development banks can provide funding for both traditional and innovative activities and can operate by pooling risk.

They are potentially particularly important for activities or products new to an economy where their funding can be rationalized as a subsidy to innovators whose example provides an externality for later entrants to learn from their experience. However, there are limits to how far development banks should offer interest rate subsidies. Large subsidies reduce the ability to generate a revolving fund for further lending and may fail to impose discipline on borrowers. An approach that offers a modest subsidy is to pass on funds at the public sectors' borrowing

cost without charging the risk premium that a full market transaction would imply. A larger subsidy would be to pass on funds at below the government cost of borrowing, which involves an explicit fiscal transfer.

Box 3 Sector Education and Training Authorities: South Africa

In 1998, 23 Sector Education and Training Authorities (SETAs) were established by the government, each representing different industries of the economy. Each Authority is run by a management board made up equally of employer and worker representatives. The board is responsible for defining the strategic approach to training for the given industry and for informing member companies of the activities being implemented.

The South African government applies a 1 per cent compulsory payroll levy on all non-government medium and large companies with an annual payroll above a minimum level. Eighty per cent of the levy proceeds are then allocated through the Department of Labour to the various SETAs. The remaining 20 per cent is distributed to the National Skills Fund. Each SETA is required to distribute at least 50 per cent of levy proceeds or 40 per cent of the total levy back to employers as grants. There are two types of grants: rebates to the employer based on levy paid and discretionary cash grants. Rebates take the following form: 15 per cent of the levy for the appointment of a skills development facilitator, 10 per cent for the preparation of a workplace skills plan and a further 20 per cent for its implementation can be returned to the employer. The emphasis of the scheme is on planning and developing structured training in line with identified company needs. Companies are required to carry out a comprehensive training skill needs assessment by identifying their strategic development priorities and mapping the education and training required to achieve them. The intention is that eligible training for rebate is not decided by a central external body but evolves internally in each case through an identification of the specific skill development needs of individual firms.

Most SETAs do not provide direct training but support initiatives by:

- paying discretionary grants to enable learners to gain training
- registering moderators and assessors who ensure that the level of education is up to the standard required
- identifying skills that are needed in the industry, particularly those that are scarce
- accrediting training providers offering college and training courses
- monitoring the quality of training within a particular sector
- implementing projects that will help close the skills gap.

Source: Johanson, R.K (2009) A Review of National Training Funds. World Bank, SP Discussion Paper No. 0922. SETA, 2012. MerSETA. Available at: <www.vocational.co.za/merseta-manufacturing-engineering-and-related-services-sector-education-and-training-authority/>.

Development banks can also play an important role in using their knowledge of local markets to suggest to governments potential areas for externalities and spillovers and the bottlenecks preventing investors from developing those areas. Such market intelligence can be particularly important in a low income context, but its identification requires a significant level of market and technical expertise within a development bank. Box 5 describes a subsidized line of credit offered by the Industrial Development Corporation of South Africa for employment generation projects.

3.4 Land market – early stage IP

Here, IP relates to ensuring access to factory sites for new locations or for expansion. It often involves concentrating factory development in specific geographical areas or zones to take advantage of agglomeration economies, arising from proximity between enterprises. In some low income countries, access to land for factory sites is a constraint created by land tenure regulations (which may also cause a problem in using land as collateral against loans to fund enterprise expansion). A market-based intervention is where access to publicly owned land is offered to firms at a below-market rate to encourage new activity. In the taxonomy used here, legislative changes to facilitate the development of land markets are classified as a public good intervention.

Many countries now operate cluster programmes designed to encourage the concentration of firms to take advantage of agglomeration economies due to the proximity to a pool of skilled labour, a set of specialist suppliers, good infrastructure or a dynamic business environment with a sharing of equipment or marketing services. Public inputs can help coordinate and facilitate this process by providing access to land or the rental of factory space in special zones with good quality infrastructure as well as access to some of the product market incentives discussed above. Where zones have a special status, like EPZs or SEZs, they will be exempt from national tax rules on import duties or corporation tax, for example, and firms located there will have special tax status. In some instances, typically with donor support, cluster policies have moved beyond the provision of physical facilities and tax incentives for locations in a geographical area by funding schemes to encourage cooperation between firms in areas like marketing, training and technology development. Location policies such as EPZs are used widely in low income countries with mixed results, in part depending on choice of location, the level of government support and the institutional environment, particularly in terms of infrastructure. Public support for enterprise start-ups can be provided indirectly. Business incubators are agents funded by governments which act as an intermediary between a funding public agency and the potential entrepreneurs. Often located in special zones to take advantage of agglomeration economies,

they are designed to overcome problems faced by individual firms when starting up, be it in terms of business advice, mentoring or physical facilities.

There is ample evidence that firms tend to cluster together naturally to take advantage of proximity and the reduction in transaction costs this creates. The role of IP is to ensure that this clustering is as efficient as possible through the provision of infrastructure, information training and various other support services. Box 6 summarizes the results of a survey of 17 clusters in Asia and Africa, where a cluster is defined as a group of firms producing similar or related products in a specific geographic location or related products in the same location.[8]

Box 4 Credit Guarantees for SMEs: Nigeria

The Small and Medium Enterprise Credit Guarantee Scheme (SMECGS) was established in 2010 and is managed by the Central Bank of Nigeria which is responsible for its day-to-day administration. The objective of the Scheme is to increase access to credit by promoters of SMEs with a view to increased output and employment. The maximum loan amount of the Scheme is N 100 million, which can be in the form of working capital or term loans for refurbishment or expansion. The Scheme offers a high guarantee coverage rate of 80 per cent of principal and interest and is valid up to the maturity date of the loan. The guarantee will be executed at the point of loan disbursement by the bank to the customer and is redeemed if the facility becomes non-performing. All loans have a lending rate defined by the prime lending rate of the participating banks. They have a maximum payback period of 7 years including a 2-year moratorium.

The Scheme is open to SMEs (defined as "an enterprise that has an asset base (excluding land) of between N 5 million – N 500 million and a labour force of between 11 and 300") and meet the following criteria:

- Wholly-owned and managed by a Nigerian private company;
- Satisfactory cash flows and a clear business plan;
- No non-performing or delinquent loans with any financial institution;
- Up-to-date records on business operations, if any;
- Satisfy all requirements specified by a participating bank.

All borrowers are required to have one loan under the Scheme at any point in time and all Deposit Money Banks and Development Finance Institutions are eligible to participate in the Scheme as lenders.

Source: Central Bank of Nigeria (nd) Development Finance. Available at: <www.cenbank.org/Devfin/smefinance.asp> and < www.cenbank.org/Out/2010/publications/guidelines/dfd/GUIDELINES%20O-N%20N200%20BILLION%20SME%20CREDIT%20GUARANTEE.pdf>.

[8] Two cases from Japan in the original have been omitted here.

Box 5 Subsidized lending: Industrial Development Corporation, South Africa

The Industrial Development Corporation (IDC), a government-owned national development finance institution, plans to invest R 10 billion over a five-year period from 2012 through its Gro-E Scheme. Under the Scheme, the IDC offers special financial support to start-ups and expanding businesses, including funding for buildings, equipment and working capital on terms more favourable than its normal lending, provided they can demonstrate an ability to create jobs.

Firms eligible for the scheme include:

- Green industries, which includes renewable energy, energy efficiency, pollution mitigation, waste management and recycling as well as biofuels;
- Agricultural value chain activities, including agro-processing;
- Manufacturing industry, focusing on advanced manufacturing; automotive, components, medium and heavy commercial vehicles manufacturing; clothing textiles, footwear and leather; forestry, paper and pulp, and furniture; metals fabrication, capital and transport equipment; pharmaceuticals; plastics and chemicals.

The criteria set for financial assistance by the IDC include:

- Firms that have prospects of servicing their loan obligation;
- Firms whose maximum cost per job within the period does not exceed R 500,000;
- Firms that qualify for broad-based Black Economic Empowerment certification from an accredited verification agency, where applicable; and
- Firms operating or expanding in South Africa.

The scheme funds businesses at the prime lending rate of less than 3 per cent for loans. Where IDC equity is involved, a real after tax internal rate of return of 5 per cent is expected. A minimum of R 1 million with a maximum of R 1 billion per project will be allowed. The funding is available over five years or until the scheme is exhausted. The first drawdown of funds must be within a year of approval for funding (if not, pricing reverts to normal IDC pricing). The reduced loan pricing is available for five years, after which normal IDC pricing applies, and finance required in excess of the scheme's limit can be accessed through normal IDC funding.

Sources: IDC (Industrial Development Corporation), 2012a. News Updates – Strong Results Posted by IDC. Available at: <www.idc.co.za/media-room/articles/261-strong-results-posted-by-idc>.
IDC (Industrial Development Corporation), 2012b Development Funds, available at: <www.idc.co.za/development-funds/gro-e-scheme>

Box 6 Clusters in Asia and Africa

The clusters cover a range of products in different countries and institutional settings. Some, principally in Africa, have large numbers of small firms, whilst those in Asia tend to have a smaller number of larger firms, some of which are larger than most definitions of SMEs. The origins of the firms are diverse, but the common denominator is the influence of foreign technology, ideas or products.

Three groups of firm are identified. The first (firms 1 to 8) were set up by pioneering entrepreneurs who imitated the design of imported goods. The second (firms 9 to 15) were set up by foreign investors, state enterprises or migrant workers using foreign technologies. The third group (16 to 17) was set up as a result of the training activity of foreign investors or an international agency (UNIDO). Early success by the investment pioneers was followed by an influx of imitator firms in the same locality. The authors argue that in each case the primary initiative for formation of a cluster came from firms themselves, typically drawing on their own savings or those of their families, although in some instances, government support may have come later. Nonetheless, the authors argue for a strategy that is 'entrepreneur-led and government assisted' on the grounds that private initiatives in developing clusters will be sub-optimal due to market failures and externalities and that the government has an important role to play. They point to a number of measures:

- Management and technology training to raise awareness in firms, particularly in relation to international best practice in their industry;
- Investment in the infrastructure of better equipped industrial zones;
- Financial support through access to low cost credit to allow the high performing firms in a cluster to either expand or move to a less congested or better served zone.

Source: Otsuka, K and T, Sonobe (2009) 'A Cluster-based Industrial Development Policy for Low Income Countries' Policy Research Working Paper, 5703, World Bank

Table 3 Firm data on clusters

No	Location	Main product	Origin/ initial firm	Year of survey	No. of final goods firms in cluster	Average No. of workers per firm	Market
1	Taichung, Taiwan	Machine tools	SMEs	1998	100	70	Export: S.E Asia
2	Zhili, Zhejiang, China	Infant clothes/silk products	Farm households	1999	5,000	15	Export: Russia
3	Wenzhou, Zhejiang, China	Repair of electrical fittings	Farm households	2000	200	340	Domestic
4	Bac Ninh, Viet Nam	Rolled steel bars/agricultural implements	Farm households	2006	133	22	Domestic
5	Sargodha, Pakistan	Electrical fittings	SME	2008	1200	22	Domestic
6	Addis Ababa, Ethiopia	Garments/suits	Tailors	2007	700	26	Domestic
7	Nairobi, Kenya	Garments/suits	Tailors	2002	640	5	Export: Neighbouring countries
8	Kumasi, Ghana	Metalwork/car repair	SMEs	2005	500	6	Domestic
9	Northern, Taiwan	Printed circuit board	FDI	2000	60	930	Export: international
10	Chongqing China	Motorcycles	SOE/FDI	2001	50	900	Export: SE Asia
11	3 cities in Jiangsu, China	Printed circuit board	SOE/TVEs	2003	200	107	Domestic
12	Hatay, Viet Nam	Knitwear	Cooperative	2007	160	12	Export: Eastern Europe
13	Addis Ababa, Ethiopia	Leather shoes	Migrant artisans	2005	1000	10	Export: Neighbouring countries
14	Addis Ababa, Ethiopia	Metalwork	Migrant artisans	2008	130	73	Domestic
15	Nairobi, Kenya	Metalwork	FDI/SOE	2006	150	7	Domestic
16	Dhaka, Bangladesh	Garments	Training in Korea	2005	4100	1231	Export: international
17	Dar es Salaam, Tanzania	Garments	UNIDO training	2010	700	5	Export: Neighbouring countries

3.5 Technology – early stage IP

At the early stage of IP, technological mastery refers to knowledge of the production process in an imitation of practices developed overseas. In a low income context, technology policy is therefore likely to focus principally on ensuring firms master the introduction of imported technology. FDI whereby local production uses the technology and product design of the parent firm is one approach. Another is where the technology is embodied in equipment and how to use it is explained by the staff of the supplier on the basis of a form of licensing agreement. Government policy in the short term is essentially to facilitate one or both of these mechanisms, although once a firm has reached a minimum level of competence, there are more challenging issues for policy in relation to encouraging and supporting mastery over design technology and the ability to adapt, modify and innovate foreign technologies.

Local firms are unlikely to conduct any major R&D, and market-based tax incentives to encourage this as opposed to other forms of investment will be premature. Public inputs will focus on supporting investment agreements and technology licensing contracts with foreign firms, with public investment promotion agencies assisting in the initial search for partners or in the subsequent negotiations, as needed. In addition, in some industries, technology extension programmes through a National Technology Institute may provide training and advisory services, particularly to SMEs, in relation to the application of known technologies. These are likely to be mature widely used technologies where specific inputs from the innovating firm are not required.

3.6 Examples from South Africa and Ethiopia

In low income economies, a common starting point in deciding which activities to support is the resource endowments of an economy. An important form of investment in resource-rich, low income economies involves resource processing or 'beneficiation'. The objective here is to add value to natural resources through processing. It should not be automatically assumed that this is a sound strategy, since it requires that the higher revenues from the processed product are large enough to compensate for the higher capital costs involved. This will depend on mastery of the technology involved, scale of production and world market trends in processed and unprocessed prices, as well as on a series of additional support measures being undertaken. It will be important to master the more complex technology involved, to ensure there are adequate local skills and infrastructure, and critically, where foreign mining companies are involved, to give them adequate incentives to divert unprocessed minerals away from the export market. Box 7 illustrates some of the challenges with reference to the Beneficiation Strategy of South Africa.

A broader strategy focusing on both natural resource-based and labour-intensive manufacturing activities is illustrated in the industrial strategy of Ethiopia described in Box 8. This has been influenced explicitly by ideas taken from the East Asian experience, with a focus on export and production targets for priority activities. It illustrates the use of a number of the policy instruments discussed above.

1. Middle stage – IP taxonomy

Middle stage IP involves most of the policy instruments from the early stage but with a different emphasis to reflect the fact that the productive capacity of the economy, in terms of range of products and potential for technological mastery and innovation, is greater. The system of financial intermediation is also expected to be more developed allowing a wider range of financial instruments to be used. In addition, with a stronger private sector the balance between the roles of the public and private sectors in any collaboration on IP is likely to change. At this stage the relative importance of market-based and public good instruments will also differ since as firms develop a greater technical and financial capacity they are likely to require less in the way of market incentives and relatively more support in terms of co-ordination and the establishment of a research infrastructure.

Table 4 Middle stage IP taxonomy

Policy domain	**Instruments**	
	Market-based	Public goods/direct provision
Product market	Import tariffs, duty drawbacks, tax credits, investment/FDI incentives	Procurement policy, export market information/trade fairs, linkage programmes, FDI country marketing, one-stop shops, investment promotion agencies
Labour market	Wage tax credits/subsidies, training grants	Training institutes, skills councils
Capital market	Interest rate subsidies, loan guarantees	Financial regulation, Development Bank (first/second tier) lending, venture capital
Land market	Subsidized rental	EPZs/SEZs, factory shells, infrastructure, legislative change, incubator programmes
Technology	R&D subsidies, grants	Public-private research consortia, public research institutes, technology transfer support, technology extension programme

Box 7 Beneficiation Strategy: South Africa

Although not a low income country, the strategic approach taken in South Africa highlights the key critical constraints to development of the mineral industry. Five key constraints are identified:

(i) Limited access to raw materials for local beneficiation

Long-term export supply contracts limit the scope for diversion of unprocessed minerals for further processing. Measures to address this include use of beneficiation levels as an offset against the current ownership restrictions on mining companies by allowing a higher than stipulated foreign share of equity where processing takes place; export taxes on unprocessed products; a requirement for ministerial approval for export of unprocessed precious metals; funding for investment in processing from the Industrial Development Corporation; regulatory control over pricing of minerals like steel and iron ore to bring local prices below import parity levels since at these prices, processing appears uncompetitive.

(ii) Shortage of critical infrastructure

Major public investments in the expansion of road, rail and port services will be required to support further beneficiation. In addition, beneficiation is energy-intensive and requires uninterrupted power supplies. The infrastructure requirements of beneficiation activities are to be incorporated in national plans for infrastructure and the government intends to use its public good provision of infrastructure as an instrument to promote local processing by existing mining companies, by linking its decision to improve infrastructure facilities in specific locations to company decisions on processing.

(iii) Limited exposure to R&D

Even a middle income economy like South Africa is not in a strong position in relation to local R&D in mining and beneficiation. The R&D requirements of beneficiation are to be incorporated in the national plan for science and technology with a view to developing competitive technologies. This involves partnerships with international companies and the development of stronger domestic research infrastructure.

(iv) Inadequate skills

The limited numbers of scientists and engineers with a background in mineral processing will be addressed in conjunction with the private sector and the relevant industry training authorities.

(v) Access to international markets

Access to future markets is an important issue since a high proportion of the processed mineral products will be for export. Existing trade agreements are to be reviewed to identify opportunities for processed mineral exports. In particular, there is an intention to take advantage of the agreement with China to encourage Chinese investment in beneficiation as well as access to the Chinese market.

Source: A Beneficiation Strategy for the Minerals Industry of South Africa, Department of Mineral Resources, Government of South Africa, June 2011.

Box 8 Ethiopia: Industrial Development Strategy

The 2003 Industrial Development Strategy identified a wide range of priority areas – initially, textiles and garments, meat processing, leather products, sugar processing, construction and micro and small enterprises. Following its success through private sector initiatives, the cut-flower industry was added later along with some import substitution activities, so de facto the approach to priorities was almost horizontal. To meet the targets set for the priority industries, support programmes included both market-based economic incentives as well as the provision of public inputs through capacity building, cluster development programmes and direct public investment in selected areas, where private investment was deemed inadequate.

The incentives included credit on favourable terms (for example, long repayment periods and sub-market-clearing interest rates) and export credit guarantee loans. Funds were provided through the Development Bank of Ethiopia and government-owned land was made available to firms in the selected industries. In relation to capacity building, a number of industry-specific institutions were created such as the Textile Industry Development Institute and the Leather Industry Development Institute to support and coordinate the private sector. These institutes have been implementing capacity building programmes to enhance competitiveness. In 2009, a 'benchmarking' initiative was launched in which selected enterprises in these industries were to receive direct support and technical advice from relevant international firms under a government-funded programme. The respective industry Institutes were also to be twinned with an appropriate international institute to learn best-practice. The Leather Industry Development Institute has been twinned with the Indian Leather and Leather Products Institute, for example.

Support for the cut-flower cluster came after its initial success. Early entrants to the industry faced difficulties relating to logistics and access to land and finance. In 2002, they formed an industry association to negotiate with the government, and in 2003, the industry was added to the list of priorities and started to receive support. Access to government land at a low rent was important, which allowed the establishment of a location-based cluster, as was funding through the Development Bank of Ethiopia and government intervention to resolve the coordination problem in providing air freight facilities by initiating collaboration between exporters and Ethiopian Airlines which reserved space for shipments of flowers to Europe. Manpower needs for specialists were partially addressed by one of the public universities being upgraded to offer specialist degrees and diploma courses in floriculture. The industry association is seen as having an important role in the industry's development by initiating industry standards, linking producers and assisting in export marketing, and the experience is now widely cited as a successful state-business partnership.

Success in some of the other priory areas has been more difficult to achieve. Specifically in relation to apparel and leather, Table 4 presents an analysis of key problems in these industries and the policy measures recommended to overcome these derive from a study by the World Bank.

4.1 Product market – middle stage IP

Market-based product market interventions in terms of protective import tariffs are still used in middle income economies, but much less commonly than even 20 years ago. Most middle economies now have relatively open trade regimes although tariff peaks are retained for some sensitive products. As discussed earlier, infant industry protection is not the first choice means of supporting manufacturing activities, particularly where economies are relatively small in terms of the size of the domestic market, and there are alternative ways of raising the relative profitability of manufacturing activities. Policies based on high import tariff protection alone have rarely been successful, as they need to be combined with support measures to raise productivity and product quality and ultimately, to develop exports.

In middle income economies, market-based incentives such as import duty drawbacks for exports and investment incentives such as tax holidays are used widely, but explicit export subsidies by middle income economies are banned by WTO rules. Attraction of foreign investment remains an important objective, particularly in higher technology activities and is seen as a key means of raising the technological and product sophistication of a country's export mix. Export promotion agencies have a role to play in supporting marketing initiatives, but the more capable local firms are, the less important their role will be.

Public good provision in terms of creating the infrastructure and operating environment required by international firms, particularly in high technology areas, will be critical in attracting FDI. International firms will require not just adequate physical infrastructure but a minimum level of domestic skills, a potential research infrastructure and the possibility of adequate local suppliers of parts and components. Financial market-based incentives, such as low tax rates, are often not central to the decision to invest in a particular location. However, it is now not uncommon for incentive packages to include assistance in dealing with the bureaucracy and upfront cash grants for feasibility studies and, if the investment goes ahead, grants for land and buildings purchase, training and first-year wage costs. These are negotiated on a case-by-case basis. Investment promotion agencies also provide public goods in terms of overcoming lack of information on investment opportunities in a country and can coordinate the activities of firms so that investments that are unprofitable when viewed independently become profitable if undertaken collectively, as they support each other. Box 9 discusses the experience of the investment promotion agency of Costa Rica (CINDE) whose success in attracting investment by INTEL has received a lot of publicity.

Box 9 Investment promotion: Costa Rica

The Costa Rican government pursued a strategy of attracting a technologically leading multinational firm to invest in the country to create a demonstration effect for other international firms. The President personally instructed CINDE to target electronics, specifically the semi-conductor producer INTEL. The country had already introduced a range of investment climate reforms by the early 1990s, but these were not enough for it to be considered a potential investment location. Whilst INTEL was considering a location for a new semiconductor fabrication plant, it took two years of contacts before the firm even granted CINDE an interview to make the case for Costa Rica. Nineteen negotiation sessions followed, with the central concern of INTEL being to ensure that the new plant could be easily integrated into its global supply chain. Two issues proved critical and at one stage, President Figueres was involved personally to demonstrate the commitment to resolving these. First, CINDE had to guarantee key infrastructure facilities – principally, a renovation of the national airport earlier than planned, with special facilities for INTEL freight, plus the building of a new power substation dedicated to the INTEL plant. Second, the government had to form a public-private partnership for vocational training in which the National Technological Institute would design a training programme for IT workers, engineers and managers in collaboration with INTEL. Only with these assurances was Costa Rica added to the shortlist for consideration as a site, and at this point, the government was required to match the investment incentives offered by other locations. INTEL decided to go ahead with the plant on the strength of an offer to change the tax law, with the necessary legislative change not occurring until almost a year after the plant construction had started.

The other major manufacturing activity successfully targeted by CINDE was medical devices. The country initially attracted investment in relatively low technology products, mainly disposable devices like catheters. More complex products like heart valves were not produced because they required a process of sterilization, for which facilities were not available in the country. With no local production of these more complex goods there was no demand for sterilization and no plans to invest in this area. The public good coordination role of CINDE was to target producers of sterilization facilities, which it did successfully, so that within a couple of years, a number of cardiovascular producers came to Costa Rica creating significant exports of the more complex (non-disposable) medical devices. Hence, this intervention allowed the country to move up the value chain of medical devices.

The policy of investment promotion has worked very well in attracting FDI and as of 2014, there were around 250 multinationals in Costa Rica, many in electronics and medical devices. There are concerns, however, regarding the limited linkages these firms have with the local economy and the relatively weak productivity performance of local firms.

Source: Moran, T.H (2014) Industrial Policy as a Tool of Development Strategy: Using FDI to Upgrade and Diversify the Production and Export Base of Host Economies in the Developing World, E15 Initiative Discussion Paper, November 2014.

Backward linkages between foreign investors and local firms are important in middle income economies, both for their employment effects and because they are a way of spreading technological know-how to suppliers. Even, as in some cases, where investment promotion policy also aims to induce international first tier suppliers of foreign investor firms located in an economy to follow these investors, the first tier suppliers also provide a potential market for local inputs.

IP can encourage linkages through market-based measures such as tax credits determined by the size of local inputs, purchases or indirectly through public procurement programmes. Alternatively, from a public good perspective, IP can aim to overcome an information failure by providing 'match-making' services linking foreign investors with appropriate local suppliers. Since the response of local supplier firms to the opportunities offered by FDI is likely to be conditioned directly by the gap between the capabilities of local suppliers and the level of product sophistication required by the foreign firms, IP can go further by providing targeted support to potential local suppliers. This support will need to address a range of obstacles to the creation of successful linkages, including lack of technical know-how, certification and standards, human resource limitations and difficulties in accessing finance. Some variants of this approach involve foreign firms or their business associations in the choice of local suppliers. Financial incentives, usually in terms of tax credits, can be given to encourage them to work with the selected local suppliers to allow the latter to gain certification and meet the necessary standards for component production. Box 10 illustrates the experience with investment promotion and supplier linkages in Penang, Malaysia.

Box 10 Linkage promotion: Penang, Malaysia

Computer components (part of the information hardware sector) are produced in a number of clusters in Malaysia, and a cluster approach to high technology development was formally adopted in the Second Industrial Master Plan in 1996. Different states within Malaysia have implemented a cluster support policy with varying degrees of government involvement. The most active state has been Penang, and surveys of firms in Malaysia have contrasted the relative success of firms there in establishing themselves as part of global networks and in developing linkages with smaller local subcontractors, with a much weaker development in other states, such as Johor.

The key challenge of Malaysia's promotion policy in the 1980s was to encourage electronics firms to shift from low skill activities, like making printed circuit boards or assembly of finished products into higher value, more complex products. The state government in Penang adopted a successful interventionist approach, with the Penang Development Corporation playing a key role in filling information gaps on local subcontracting capacity and in putting multinational investors in touch with small local subcontractors. Similarly, the Penang Skills Development Centre established with strong government support, was rated highly by foreign and local firms as a source of labour training.

Part of this greater state involvement in Penang has been explained by the political configuration there as compared, for example, with Johor. Historically, ethnic Chinese have dominated small and medium enterprises in Malaysia, and this group found it easier to work with the Penang state government than with governments in other states. The Chinese Chamber of Commerce thus worked closely with the state leadership in Penang. However, government intervention cannot resolve all issues and the Penang computer components cluster has been criticized for its lack of R&D activity, with multinational firms preferring to undertake R&D in their home country or Singapore. Lack of R&D capacity is a national issue relating to investment in education and scientific research, and there is little that individual state governments can do to overcome national limitations.

Source: Oyelaran- Oyeyinka, B and R, Rasiah (2009) Uneven Paths of Development: Innovation and Learning in Asia and Africa, Edward Elgar, Cheltenham, Chapter 4

Product market support can be applied on a horizontal or vertical basis. If the latter route is used, priorities or targets can either be selected centrally on the basis of technical criteria (for example, based on measures of current or latent comparative advantage) or through interaction with the private sector. At the middle stage of IP, where the private sector is assumed to be more developed and access to finance is easier, there is more scope for allowing priorities to emerge from private sector initiatives. This can also operate at the firm level through private sector-based incubator programmes, where private agencies are funded by IP to select and support potential start-up firms. Incentive issues arise where the incubators receive a flat fee per firm they deal with rather than on the subsequent success of the firms, and current thinking stresses the importance of incentivizing incubator agencies by linking their fees with subsequent performances of start-up firms. One way of addressing this is to offer the option of allowing incubator agencies to retain a share of the equity of the incubated firm so they will benefit from subsequent profitability. Examples of sub-sector targeting based on private sector involvement in Colombia and Chile is presented in Box 11.

Product innovation has an important role in middle stage IP. Innovating firms create a demonstration effect as they alert imitators to a market opportunity, even if the technology used is protected by a patent or licence. This provides a rationale for special support for innovators, which can either come through the product market, for example, through a production subsidy or tax relief, or though the capital market through priority access to funds. One approach is to provide a subsidy to exporters of new products until total exports of the new product passes a minimum value. This is not WTO-compatible, although a subsidy based on domestic production, not export sales, may, provided it can be classified as a general subsidy, be open to all who meet the specified criteria. Complications with this approach are defining a new product for an economy and in setting a minimum sales value above which the subsidy will cease. If the minimum value is set too high, it will allow immediate follower firms to benefit from the subsidy, not just the innovator, and will give the innovator an incentive to prevent dissemination of information on its product. If it is set too low, it will give too little an incentive to the innovating firm.

Box 11 Targeting with private sector inputs: Colombia and Chile

In Colombia, a high-level National Competitiveness Commission composed of senior public and private sector members was created in 2007; a private sector equivalent was also created in the same year. To develop a national competitiveness strategy, potential new export growth industries were identified and bids for support invited from the private sector through their industry associations based on detailed business plans. Subsequently, this was matched by requests for innovative bids from mature export sectors. The government would fund 50% of the cost of the best bids. The plans contained in the successful bids formed the basis of industry programmes of 'productive transformation' launched in 2008. The government stressed the difference between this approach operating through the private sector via industry associations and traditional IP as practiced in Latin America, since the new policy was based on competitive bidding from the private sector and involved no tariff or tax concessions or subsidies, but rather an upfront commitment by the state to provide various public inputs in support of the sub-sectors concerned. However, other aspects of IP in Colombia suggest continued differential support unrelated to any discernible economic rationale, largely driven by cronyism, particularly through profit tax concessions.

In Chile in the mid-2000s, the National Council for Innovation and Competitiveness created an industry selection process for clusters to receive special support based on technical criteria. An innovative feature was that an international consulting firm, Boston Consulting Group, was employed to design the criteria. A twin approach was adopted based on projections of international market growth and indicators of the capability of the country in the various possible sub-sectors. Eleven possible sub-sectors were identified in the first round, with the number subsequently reduced to 8 to meet budget constraints. At a second stage, the value chains in the sub-sectors were examined to establish where the rents or highest profits were located, with an analysis of how local firms could capture these. The training requirements of the different sub-sectors were also considered. The programme was a departure from earlier IP which had been exclusively horizontal in approach. However, it was not sustained beyond one political cycle and was discontinued by the incoming administration.

Source: Melendez, M and G, Perry (2010) Industrial Policies in Colombia, IDB Working Paper 126, Inter-American Development Bank, Washington, D.C.
Agosin, M. C, Larrain and N, Grau (2010) 'Industrial Policy in Chile' IDB Working Paper Series, WP-170, Inter-American Development Bank

4.2 Labour market – middle stage IP

Box 12 Training public-private collaboration: Uruguay and Chile

The development of computer software in Uruguay has been based around a cluster of about 150 firms in Montevideo producing mainly for export. The supply of qualified software engineers originally came from the main national university, but the supply of graduates with the relevant expertise failed to keep up with demand. Private universities perceived this gap in the market and have expanded the number of courses, yet growth has been constrained by the expense of tuition fees that reflect the high cost of equipment and the earning potential of suitably qualified teachers. Initiatives to address this shortage included collaboration between the government, a public-private technology institute and some private sector firms to set up the Knowledge Development Centre, a training centre for IT specialists.

The mining sector in Chile has experienced a serious shortage of skilled workers. The government through Fundacion de Chile (a non-profit organization with public funding) at the request of the mining companies collected information on future staffing requirements in 15 categories and produced a study identifying the gaps between projected demand and supply for the different labour categories. This study led to the creation of the Mining Skills Council – a private body that works with all relevant government ministries and which has the responsibility to generate the number and quality of workers required by the industry. Its focus is training and setting standards for technical qualifications, with the objective of matching training needs and the demands of the industry.

Source: Crespi, G. E, Fernando- Aria and E, Stein (2014) Rethinking Productive Development: sound policies and institutions for economic transformation, Inter-American Development Bank, Palgrave MacMillan pp 156-157, 169-171.

At middle stage IP, training needs will be relatively more demanding given the more sophisticated structure of production. As in the early stage, market-based instruments like wage subsidies, training grants or tax holidays linked with employment creation, can be used. Public inputs involving the creation of training institutes for industry-specific skills in collaboration with the productive sector will be required, with the difference to the early stage being that a higher level of training will be needed in a range of tasks, particularly with a focus on IT skills. Successful experiences usually involve close public-private collaboration. For example, the productive sector may be involved in developing curriculum and assessment for technical courses delivered in public institutions. Large firms may enter partnerships with universities to provide technical knowledge, experts and equipment for courses offered either to their staff or suppliers. Alternatively, industry associations or skills councils may deliver the training with government support funded in part through payroll taxes. Box 12 illustrates the role of public

inputs in coordinating training in the case of the software cluster in Montevideo, Uruguay and the mining sector in Chile.

4.3 Capital market – middle stage IP

Whilst a shortage of credit for long-term investment may still be an issue in middle income economies, the system of financial intermediation will be better developed with a stronger commercial banking sector than at lower income levels and usually, an emerging system of private venture capital. Market-based measures such as interest rate subsidies and credit guarantees can still be used, but the expectation is that they will either be targeted at key high risk activities so the interest rate charged does not reflect the full risk premium involved or they will be explicitly used for social purposes like subsidising SME lending for employment generation objectives.

Public good interventions include setting a sound regulatory framework for the financial sector in general, either through the Central Bank or a separate financial authority, as well as supporting the development of the private venture capital sector for high risk investments. This can involve training, drawing on international best practice as well as matching potential entrepreneurs with venture capital investors, possibly as part of incubator programmes. The public good role of development banks in terms of investing in risky but high return activities and in supporting innovation and product diversification, remains important, although at this stage, it may be possible to involve private sector financial institutions in this process. When the private banking sector is reasonably well developed, development banks have the option of playing a traditional role of lending directly to borrowers (as a first tier bank) or lending to a private sector intermediary institution for on-lending (as a second tier bank) or a combination of the two roles. A traditional first tier role involves a development bank collecting market information and investing in a range of potentially high return activities which would not receive funding from a commercial institution because of either the perceived risk of the initiative, lack of borrower collateral or lack of adequate private sector sources of long-term credit. A second tier role allows the bank to channel loans through commercial banks, drawing on their expertise in credit assessment, local knowledge of borrowers and distribution networks. It can also draw on competition from commercial banks, for example, by auctioning public guarantees for loans, so that commercial banks bid for guaranteed loans (on the basis of the coverage rate of the guarantee relative to the size of the loan and the guarantee fee they will pay), which they then on-lend to producers. However, this second tier role does not ensure that lending follows developmental as opposed to commercial criteria, unless the performance of intermediaries is monitored closely and clear guidelines are issued in relation to priorities and

the pricing of loans. Box 13 describes some of the financial innovations introduced by NAFIN, the National Development Bank in Mexico, and BNDES, its equivalent in Brazil.

Box 13 Innovative development banking: Mexico and Brazil

NAFIN has introduced several initiatives to leverage the resources of the private sector to obtain the best credit terms for SMEs. For example, it has developed a hybrid credit guarantee scheme with a combination of first tier and second tier components. Under this scheme it preapproves a total or partial guarantee for firms which meet specific requirements. The firms are then free to contact different commercial banks to determine who will offer them the best terms to lend subject to this guarantee.

Another development is to utilize the process of 'factoring', whereby credit-constrained firms sell the right to funds to a factoring institution owing them (accounts receivable) in return cash paid immediately at a discount. The process is critically dependent on the credit worthiness of the original debtor since if there is risk attached to the accounts receivable, there will be a heavy discount involved. NAFIN has created a programme linking large credit-worthy buyer firms (including the government) and small suppliers. This allows small firms increased access to cash on the strength of the debts owed by these buyers and in effect allows them to enlarge their collateral and reduce their credit risk. NAFIN provides the financial infrastructure of the programme and acts as a second tier bank by lending to the financial institutions that buy the accounts receivable. It also encourages the participation of large credit-worthy buyers and provides training to the SMEs enrolled in the programme.

In 2003, the Ministry of Finance in Brazil launched a new credit line, Cartão BNDES, aimed at supplying credit to small and medium enterprises whilst avoiding bureaucratic delays and at the same time, encouraging domestic linkages. The credit line is distributed via VISA cards issued by BNDES and by participating commercial banks acting on its behalf. The credit must be spent on approved products (machinery, vehicles, raw materials and components) supplied by firms registered with BNDES, and registration requires a minimum national content of 60%. Loans are for a maximum of 4 years and are at an interest rate based on the rate for government bonds. Eligible borrowers must have a turnover below a minimum size. The interest rate is lower than market rates, but the main advantage is speed of processing, since borrowers do not need to undergo credit analysis for each operation, and the reduced transaction cost for customers and the participating financial institutions.

Source: Crespi, G. E, Fernando-Aria and E, Stein (2014) Rethinking Productive Development: sound policies and institutions for economic transformation, Inter-American Development Bank, Palgrave MacMillan pp 156-157, 169-171.
ILO (International Labour Organization), (2011) Brazil: An innovative income-led strategy, Studies on Growth with Equity, Geneva.

4.4 Land market - middle stage IP

All of the policy interventions discussed at the early stage of IP can apply here. In relation to market-based measures, land can be offered at reduced rental rates or made available for free, and tax and other incentives can be offered to locate in specific areas. In relation to public inputs, cluster programmes have been pursued by many countries in terms of special zones, with factory space and infrastructure provided by development agencies. The major difference at the middle stage of IP is typically a focus on higher technology activities for these zones in the form of science or technology parks or high technology economic corridors. These can offer a range of business and technology support services. This has often been combined with location of the successful zones in areas with good links to research institutes or universities to allow spill-over effects through interaction between entrepreneurs, technicians, researchers and academics. Box 14 highlights the efforts of Singapore (when it was still a middle income economy) and more recently, Malaysia, to develop high technology activities by attracting FDI in part through zoning policies.

4.5 Technology – middle stage IP

It is in relation to the potential for technology policy that early and middle stage IP differ most. Successful economies in terms of productivity growth have typically supported technological change through adoption of foreign technology followed by public investment in R&D, research infrastructure and human capital combined with incentives for private sector R&D. In general, experience suggests a need for policy coordination between different agencies of government and a form of public-private council which can take a strategic view of the overall direction of technology policy.

In terms of the instruments of IP, the main market-based measures to encourage private sector investment are either direct subsidy payments to innovating firms to cover specific innovation-related expenditure or tax relief on R&D expenditure. Direct subsidies transfer funds to firms on a commitment to undertake a defined innovation activity. In principle, they are preferable because they can be project-specific and can thus be targeted at activities that are likely to lead to high levels of dissemination or imitation, and at firms most likely to face difficulties in raising funds for innovation, such as new firms. In addition, to maximize the spillover effects of a successful innovation, they can also be targeted at groupings of firms which pool their efforts in research consortia. Some versions of technology subsidies require matching private sector funding, particularly where consortia are involved. Tax incentives, on the other hand, are a blanket incentive that is proportional to R&D expenditure and their impact will be closely linked with the tax position of a firm, which can lead to a bias in favour of large firms.

However, tax incentives are easier to administer and require no upfront budgetary allocation, although they create a fiscal commitment that will be unknown ex ante.

Public good inputs in technology policy involve a range of initiatives, including direct funding for research in universities and research institutes, public-private collaboration, for example, between universities and private sector firms and technology extension programmes. The former two interventions seek to create or adapt knowledge and successful experiences of countries' catching-up in the development of frontier technologies and have typically involved such initiatives. Extension programmes provide services to reduce the cost of searching for information on existing technologies, sometimes matching firms with appropriate suppliers. They can also provide support through hands-on training and pilot demonstrations and assistance in negotiating with technology suppliers. Technology extension programmes could be run by public sector institutes or by private providers, with IP providing vouchers for firms to use to purchase advisory services from accredited providers in either the public or private sector. Box 15 draws on East Asian experience to suggest routes for firms in middle income economies to access and apply best practice technology, some of which require support from IP.

Box 14 Promoting high technology activity: Singapore and Malaysia

Singapore was one of the first countries to engage in detailed dialogue between government officials and the private sector on obstacles to business. The investment promotion agency, the Economic Development Board (EDB), pioneered the concept of 'one-stop shop', and foreign company executives served as board members of the EDB. At several points over the last 50 years, strategic decisions were taken to develop new priority areas based principally on foreign direct investment. In the late 1960s, Singapore was one of the first countries to develop export platforms for labour-intensive manufacturing in electronics. This was followed in the 1970s and 1980s by moves into higher skill activities within electronics and more capital intensive activities like petro-chemicals. During the 1990s, the focus was on upgrading value chains (as in the Manufacturing 2000 programme), particularly in electronics, chemicals and biomedical sciences. In more recent years, the major focus has been on building a knowledge-based economy, with R&D and innovation at the centre of the economy.

As well as offering foreign investors high standard infrastructure, a stable and welcoming investment climate and access to regional markets through free trade agreements, these shifting priorities were backed by a series of IP interventions that aimed to steer private investment into priority areas. Firm-specific packages with differential rates of tax holidays, grants for new investment and support in terms of factory space were offered in the early years to encourage key firms to locate in Singapore. In addition, the EDB played the role of venture capitalist in key start-ups. Critically important is the point that through fiscal incentives and the provision of high standard infrastructure and human capital base, IP in Singapore encouraged multi-national firms to reconfigure their operations on a regional basis by relocating production parts of the value chain in lower wage economies of the region and concentrating activities at the higher end of the chain, in distribution, services and R&D in Singapore. The fact that many international firms have made Singapore their regional hub and have located their R&D development activity in the country is attributed to the high standard research infrastructure facilities developed with public funding, as well as the fiscal incentives offered to encourage R&D within the country. Moreover, there has been a churning of foreign firms, as those in declining sub-sectors for Singapore have left and those in expanding sub-sectors have grown. The government has implicitly encouraged this process of entry and exit since all incentives are for fixed periods.

Malaysia was also one of the countries that saw relatively early the potential for using foreign direct investment to develop an export-oriented manufacturing sector, particularly in electronics. Low wages and tax incentives rather than upfront grants were the principal incentive offered to foreign investors. In more recent years, major efforts have been made to develop more knowledge-intensive activities. For example, the Multimedia Super Corridor project had the ambitious objective of making the country a regional and global leader in information technology-based services. Incentives on offer within the 75 kilometre corridor included hard infrastructure, transportation and fibre-optic telecommunications, as well as soft infrastructure in the form of both tax incentives and a supportive legal and regulatory environment, with legislative changes introduced to protect new investors.

Firms supported under the project were required to meet employment targets and to specify how they would transfer technology or knowledge or otherwise contribute to the development of the corridor. National and foreign firms were given equal treatment, and in 2005, a majority of firms were locally owned.

In 2006, the government established Iskandar SEZ, which is three times the size of Singapore. The zone was identified as one of the key catalysts and high-impact developments under the Ninth and Tenth Malaysia Plan. A range of incentives are available through the Malaysian Industrial Development Authority for activities in promoted sectors (electricals and electronics, petrochemicals and oleo-chemicals, food and agriculture, biotechnology):

- 5 years pioneer status and tax exemption at 70% of statutory income;
- 60% investment tax allowance on qualifying capital expenditure incurred within 5 years, which can be set off against 70% of statutory income;
- Exemption from import duty and/or sales tax on plant and equipment, raw materials and components used in the manufacturing process.

A one-stop centre is available for obtaining approvals for planning and land matters, licenses and permits, immigration, business set-ups and incentives. Currently, the vast majority of jobs created have been in electricals and electronics.

Box 15 Technological catch-up in East Asia

East Asian experience clearly suggests that technological upgrading and movement into more sophisticated product lines do not occur automatically, but require a combination of risk-taking and learning strategies by companies and public policy support, particularly through public input measures. Successful firms need their own R&D facilities, but these need to be supplemented by access to external and foreign sources of knowledge. Several routes have been successful in different countries and sectors.

- Public-private research consortia

  Where firm capability is low, a public research agency will have to play the key role on the research side and transfer knowledge on findings and designs to private partners. Successful examples of this collaboration include the development of indigenous digital telephone switch technology in the Republic of Korea and technology for laptop computers in Taiwan, ROC in the 1980s. China's recent heavy public investment in solar energy technology falls into this category.
- Contracts with foreign R&D specialists

  Here, foreign technology partners are used to develop a technology in collaboration with national firms. A successful example is Hyundai's development of its own engine design in collaboration with a UK-based firm to unbind it from reliance on Mitsubishi technology.
- Learning from FDI

  Joint ventures with foreign firms can be used as a mechanism for technology transfer from the foreign firm to the local partner. In several industries, the Government of China has taken advantage of the size and importance of the domestic market to pressure foreign firms to transfer their technology to local partners which, for example, has led to the mastery of digital telephone switch technology by local producers. This route is open to only a limited number of countries, however, where domestic market access is of sufficient importance to create a strong incentive to share technology.
- Forward engineering

  Here, an academic research institution which generates scientific knowledge sets up an enterprise with government support to apply this knowledge in a commercial context. Chinese universities and research institutes have been active in commercializing new technologies, although this route is less common in Taiwan, ROC and the Republic of Korea.
- Mergers and acquisitions

  Foreign technologies and brands can be acquired through mergers and acquisitions. In China, this is part of an explicit technology strategy and is viewed as a means of rapid catch-up, saving the time and resources required to build up a firm's own brand and designs. Lenovo's acquisition of the personal computer division of IBM falls into this category.

Source: K.Lee (2014) Industrial Policies for the Upper Middle Income Countries, E15 Initiative Think Piece November.

5. Late stage IP

At the high income stage, IP principally focuses on innovation at the technology frontier in order to either catch up with market leaders or to innovate at the frontier. However, some aspects may be defensive in the sense of aiding the restructuring of declining activities where high income economies are no longer competitive. All the interventions in the different markets applied at the earlier stages can still be used. The current IP model in high income economies is based on the premise that for economies at or close to technology growth must be innovation-driven, as this provides the basis for long-term competitiveness. Slightly different variants exist in different countries, but the basic model is a combination of horizontal measures relating to the business environment, infrastructure provision, support for cluster development, training and improvements to financial intermediation, combined with specific measures to support innovation, including state funding for research as well as credit for higher risk innovative investment. In many countries, there are tentative moves to go beyond general horizontal support to highlight priority areas for innovation initiatives. Some of the less well-off EU Member States have used foreign investment to introduce best practice technology and management, and thus modernize their industrial sectors.

Box 16 highlights a few examples of IP in higher income economies.

5.1 Product market: late stage IP

High income economies tend to operate with low nominal tariff rates, so trade protection is rarely used to support new activities. However, under WTO rules, temporary trade restrictions have been used to prevent market disruption in traditional activities faced with competition from low wage suppliers. This defensive intervention has, for example, been applied to specific clothing and textile goods from China after the multi-fibre quota system ended. Furthermore, anti-dumping measures have been used by high income economies as alternatives to tariffs in industries like clothing and steel. Investment promotion measures—both market-based tax incentives and public provisions—have also been used, such as infrastructure and training facilities discussed in the case of middle stage IP. A policy of attracting foreign investors has been important in relatively small economies, like Ireland and the Czech Republic, as a means of diversifying the economy and developing manufactured exports, and has been used in the UK in part to create employment in high unemployment areas, like the North East and Wales.

5.2 Labour market: late stage IP

Again, as with middle stage IP, support can vary from tax incentives for job creation and training to public provision of training and education. At late stage IP, a major focus is on work-

based experience and technical education, usually with collaboration between public and private sectors. This can be pursued in a variety of ways. One model is industrial apprenticeships and training within enterprises with state funding or tax credits for each trainee. For example, the Chamber of Construction in the UK offers training programmes to all its members funded by a tax on the payroll of each company. Another is partnerships between enterprises and public higher education institutions, as is common in the Republic of Korea, where companies such as Samsung help develop the curriculum and provide trainers for programmes run in technological universities. A third is skills certification by leading international firms through virtual learning programmes. For example, Microsoft offers training in computer science and software in partnership with public and private sponsors.[9]

5.3 Capital market: late stage IP

At this stage, the system of financial intermediation is likely to be relatively well developed, with established enterprises able to access bond and equity finance as well as commercial bank loans and new enterprises funded by venture capital. It may be that in some circumstances, the latter may be focused excessively on short-term returns and may lack the vision to invest in genuinely breakthrough activities. There is therefore a case for public support for these initiatives, particularly as discussed below, where basic research on new technologies is involved.

In many cases, late stage IP tries to use market incentives to influence private sector lending in specific directions rather than use public funds. For example, treating investment in venture capital schemes are partly tax deductible, provided the equity is held for a minimum number of years. Similarly, commercial banks can be encouraged to lend to small businesses by a line of credit offered at below market rates, provided the funds are lent for this purpose. The alternative of 'directed credit' whereby targets are set for lending to SMEs or other priority areas is usually deemed inefficient by not allowing commercial banks to use their own criteria to assess credit-worthy borrowers

5.4 Land market: late stage IP

As in the case of middle stage IP, agglomeration economies are sought through a range of measures to promote clustering and regional development. Support can either be provided through market incentives, such as tax credits, or public provision of infrastructure. The

[9] This section draws on information in Crespi, G. E, Fernando-Aria and E, Stein (2014) Rethinking Productive Development: sound policies and institutions for economic transformation, Inter-American Development Bank, Palgrave, Macmillan.

difference is primarily one of degree, with the late stage policy focusing more on advanced technology activities and close links with universities and research institutes in science parks. Key sub-sectors will be eco-energy, ICT, micro-electronics, bio-medicine and knowledge-intensive business services.

5.5 Technology: late stage IP

It is in relation to technology policy that late stage IP is most obviously distinctive. At one level, IP can provide funds for the private sector for investments in commercial spin-offs from basic research. However, at another level, public funding can be used for basic research itself. This potentially very important aspect of IP in high income economies relates to what has been termed the 'entrepreneurial state'. This concept sees the state through its IP as the key innovator in an economy, as the state has the resources to fund basic research that is of a visionary nature. In this argument, state funding of basic research lays the ground for successful private sector applications. The development of the internet and the bio-technology and nano-technology industries, for example, is attributed to prior public investment, with private venture capital firms entering these industries nearly 20 years after initial public funding. This is the state acting as a catalyst for new product development, thus 'creating' rather than 'picking winners'.[10] The funding of basic research is an essential element of late stage IP and is an aspect of policy which only high income economies will be able to sustain.

[10] Mazzucato, M. The Entrepreneurial State, Anthem Press, 2014

Box 16 Recent IP in higher income economies

As regards support for new technology and innovation, France introduced a major initiative under the Sarkozy Presidency, with the launch of a Strategic Investment Fund in 2008, which allowed the government to provide funding to dynamic activities in need of capital. This was combined with a grand loan scheme of EUR 35 billion, focusing on commercial spin-offs from research, with priorities identified as the digital economy, nano and biotechnology, renewable energy, low carbon vehicles and innovative SMEs. Similarly, the UK, Japan and the Republic of Korea have all identified priorities within the sphere of innovative technologies. The UK created a Technology Strategy Board (now renamed Innovate UK) in 2007 to support innovation and the commercialization of research, particularly in small companies. It provides seed funding, encourages high-tech cluster development, funds feasibility studies and supports partnerships both between firms and between firms and academia. The concept of such a Board has been praised, but its funding remains modest and is likely to be too small to have a major impact. The US does not acknowledge any formal industrial policy, but there has been widespread debate about the consequences of off-shoring of much of US manufacturing, and in recognition of the need to keep at the frontier of technological development, a national innovation strategy was launched in 2011, which included a number of horizontal measures, a series of technology priority areas covering clean energy, bio and nanotechnology, space and advanced manufacturing. The model for technology development used extensively in the US involves government purchase of underlying R&D design for products that do not yet exist on the market, with this design then incorporated into government programmes. The experience of the US Defense Advanced Research Projects Agency is widely cited as stimulating a range of technologies through this procurement.

In a catch-up strategy, Ireland and to a lesser extent the Czech Republic and Spain, have used FDI as a major driver of industrialization and the major plank of their IP has been based on incentives to attract and influence this investment. Success in Ireland in transforming the production structure through foreign investment has been significant, although the country's economic reputation was badly damaged by the recent financial crisis there, despite the fact that this was due to problems in the banking sector, not in manufacturing. The Irish government had a clear vision that it wished to upgrade the production structure, and since the 1970s, the Industrial Development Authority (IDA) has operated an aggressive promotional policy aimed at attracting foreign direct investment into new sub-sectors, principally electronics, software and pharmaceuticals. The fiscal incentives on offer combined automatic and discretionary incentives. The automatic feature was a low rate of profits tax initially at 10% and now at 12.5%, which is the lowest rate in the EU, and this low tax rate was combined with a series of double-taxation agreements. However, in addition, particular firms were targeted and offered discretionary packages. The IDA could negotiate upfront grants to cover a variable proportion of the planned investment, with the grant conditional on the firm creating an agreed number of jobs. What remains a concern is the relatively low technological depth of this inward investment, as measured R&D expenditure to sales.

Source: Weiss, J 'Industrial Policy in High Income Economies,' E15 Think Piece

6. Conclusions

This paper has set out a framework for considering different instruments of IP intervention by classifying them under five areas related to different markets in an economy and giving illustrations from each. The relevance of different instruments of IP will vary with the problem at hand - whether the need to reduce costs and raise product quality, to ensure that externalities and coordination issues are addressed or to provide affordable and adequate finance. Not all of the wide range of IP measures need be applied at the same time, and many are alternative ways of providing support. As a matter of principle, the instrument selected should be the one that most directly addresses the problem at hand. Hence, for example, if a key constraint is a shortage of skilled labour, this requires an intervention to improve training, not a general production subsidy or import tariff protection.

The starting point for IP must be an analysis of the key bottlenecks to be addressed and a clear rationale for why a specific form of intervention might be expected to remove the bottleneck. Dialogue with the private sector should be used to help identify and resolve problems. However, it will be critical that IP is not subject to 'policy capture', where it becomes a means of transferring resources to favoured firms or activities. To avoid this, it becomes important to limit the explicit or implicit subsidies offered by IP, so that they are not open-ended, and to provide a clear justification for their use. As far as possible, it is desirable to impose obligations on recipients of subsidies, whether for example in terms of employment, investment or output targets or in terms of matching funding.

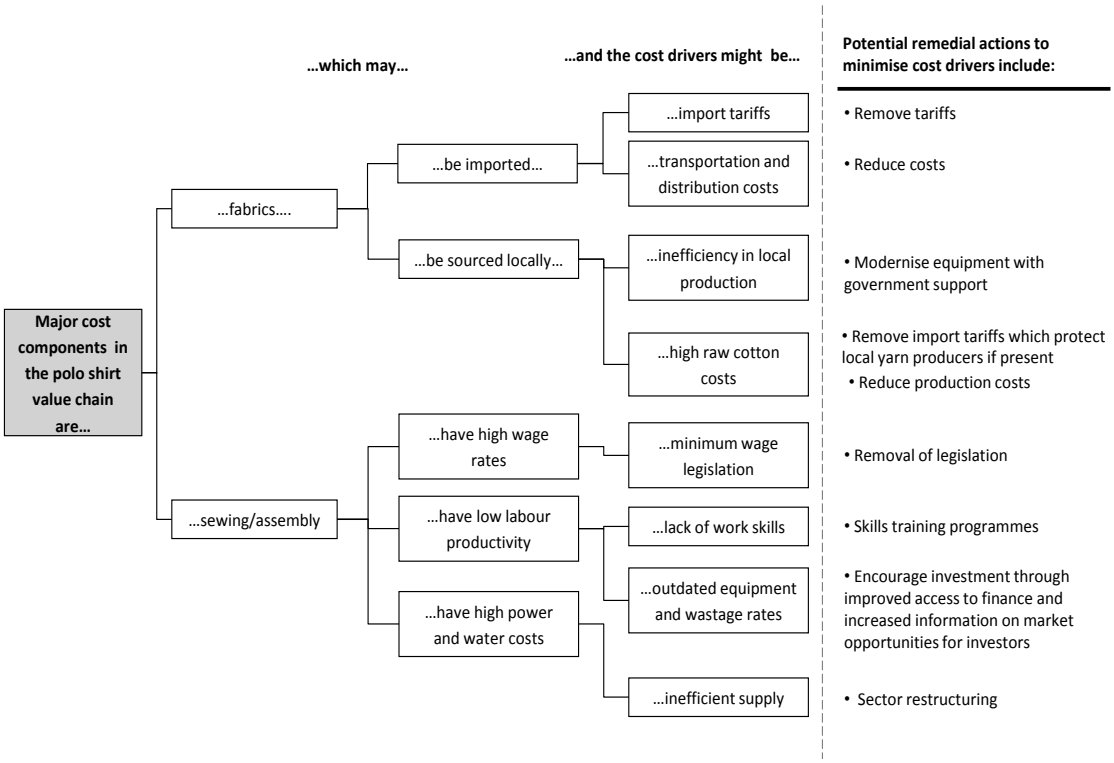
Whilst economic theory and historical experience provide a justification for IP interventions, successful application of such a policy is far from inevitable and there are many examples of policy failures as well as successes. Current thinking stresses that there is no unique set of interventions and that success is often linked with the manner and institutional context in which they are implemented. Thus, there is a need for an experimental approach which adjusts policy and changes its instruments and emphasis in the light of learning through application.[11]

[11]In the past, assessment of the outcomes of IP was often at a broad sector or macro-economic level, however, in the last few years, a number of impact evaluation studies have been carried out on specific instruments of the type discussed here, which can be used to inform policy debates in the countries covered. See, for example, the studies for Latin America surveyed in Crespi, G. E, Fernando- Aria and E, Stein (2014) Rethinking Productive Development: sound policies and institutions for economic transformation, Inter-American Development Bank, Palgrave, Macmillan.

Appendix 1 Problem Tree approach

For the application of IP, it is recommended for governments to undertake both regular consultations with the private sector, but in addition sponsor industry-focused reviews of the binding constraints as they affect enterprises in the industry. A useful way of organizing this is to use benchmark data from one or more competitor economies and to assess in a problem tree framework why costs or product quality in the economy concerned differ from the comparators'. Box 17 gives a simple illustration. Data such as this can provide the basis for government intervention to support the chosen areas, with intervention covering both policy change and financial support, as necessary.

Figure 2 Example polo shirt value chain cost drivers and cost reduction actions



Box 17 Cost comparison: Problem Tree illustration

For a given product, such benchmarking studies can compare unit costs at different stages in the value chain for firms in the economy concerned with those in a regional competitor or with the market-leading economy, which for an increasing number of goods is now China.

The data below give a simplified illustration for an item of clothing, a polo shirt.

Polo shirt value chain

	Country A		Country B		China
	US$	%	US$	%	US$
Fabric	3.355	0.55	2.652	0.51	2
Cutting/layering	0.122	0.02	0.052	0.01	0.(
Sewing/assembly	1.83	0.3	1.352	0.26	
Finishing	0.183	0.03	0.104	0.02	0
Packing/loading	0.122	0.02	0.104	0.02	0.1
Administration	0.488	0.08	0.936	0.18	0
Cost	6.1		5.2		

As the comparison is across countries, cost refers to an ex-factory price. A simple comparison shows country A to be more expensive than its regional competitor, country B, and China, and the issue is why. In the example, two factors drive this – the cost of fabric and the cost of sewing/assembly. A simple Problem Tree framework can be applied to these key parameters as illustrated in Figure 1 to highlight the implications for policy.

If fabric is imported to country A, is its cost high because of an import tariff or because of port to factory transport and distribution costs? If the former, should the tariff be removed? If the latter, what can be done to lower these costs? If fabric is sourced locally, is the cost high because of inefficiency in local yarn production or due to the high cost of raw cotton? Is this inefficiency due to old equipment and if so, can it be modernized with government support? Is there an import tariff that protects local yarn producers and can it be removed? Can raw cotton production costs be lowered?

Sewing and assembly is the other major cost component. Is the relatively high cost in country A due to high wage rates, to low labour productivity or high power and water costs? If productivity is the issue, how far is this due to the lack of worker skills and to what extent to outdated equipment with high wastage rates? How far can skills be improved by training programmes? Is lack of investment in new equipment due to lack of access to finance, to risk aversion or to lack of information on market opportunities?

The answers to these questions imply different things for policy intervention, but the key point is that it is clearly preferable to focus directly on the most binding constraint rather than to rely on indirect measures. For example, if the problem for polo shirt production is high cost local fabric, it makes little sense to fund investment in new sewing machines. Hence, a benchmarking focus within a value chain should assist the application of IP.

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