

EQuIP

Enhancing the Quality of Industrial Policies



TOOL 8

Industrial organisation and firm profiling
at sub-sector level

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EQuIP Tool 8:

Industrial organisation and firm
profiling at sub-sector level

Summary Sheet

Enhancing the Quality of Industrial Policies (EQUIP) – Tool 8	
Name of the tool:	Industrial organisation and firm profiling at sub-sector level
Objective:	The present tool aims to draw a detailed portrayal of industrial sub-sectors and, for that purpose, suggests a list of indicators on sub-sector characteristics related to industrial organisation and firm profiles. Such information on the industrial organisation and firm profiles of different sub-sectors not only deepens the analyses provided by EQUIP's diagnostic tools on different performance aspects of industrial development, but also provides the context for subsequent industrial strategy formulation exercises, especially when the industrial strategy approach also contemplates selective or targeted (i.e. sub-sector specific) measures.
Key questions addressed:	<p>What is the degree of market concentration or, conversely, firm competition in a given sub-sector? How has this changed over time?</p> <p>How attractive is the sub-sector to firms? Is investment dynamic?</p> <p>What are the basic characteristics (i.e. size, legal structure, average age) of firms in a given sub-sector? How has this changed over time?</p> <p>How do firms in a given sub-sector integrate globally?</p> <p>To what extent are foreign firms present in a given sub-sector?</p>
Indicators used:	<p>Total number of firms in a sub-sector</p> <p>Market share of the top-5 firms in a sub-sector</p> <p>Hirschman-Herfindahl Index (HHI) for competition in a sub-sector</p> <p>Gross fixed capital formation per establishment</p> <p>Firm characteristics (employment size, legal forms, age, quality management capability)</p> <p>Percent of firms exporting directly or indirectly (at least 1% of sales)</p> <p>Percent of firms using material inputs and/or supplies of foreign origin</p> <p>Proportion of total inputs that are of foreign origin</p> <p>Percent of firms identifying customs and trade regulations as a major constraint</p>

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1. Introduction

In addition to “horizontal” measures which aim at improving the general business environment or the “framework conditions” for economic activities, industrial policy also is about selective or targeted interventions. The target of such selective policies have typically been certain industrial sub-sectors, or certain (sub-)sectors of the economy more broadly. Industrial policies with such a selective orientation have therefore commonly been conceived as (sub-)sector-specific interventions. More recently, however, such selective policies have also begun to target certain technologies, supply chains and/or the collection of tasks and activities that make up the stages in a given value chain.

In the past, such targeted interventions have been quite contentious and have had their opponents. Critics particularly point to the risks of market distortions and political capture by vested interests, leading to rent-seeking behaviour on the part of influential entrepreneurs and companies. However, as the past has also shown, such targeting can also be successful, especially when it is done strategically, for instance on the basis of an industrial strategy which aims at altering the structure of production towards sectors that are expected to offer better prospects for inclusive and sustainable industrial development and economic growth more generally. For policymakers who contemplate formulating this type of industrial strategies that consider the deployment of selective or targeted industrial policies, it will be useful to collect information on the structural characteristics of their potential policy targets. That is, it will be useful for them to compile information on the industrial organisation and firm profile of different sub-sectors that they would consider supporting. Such a profiling will allow policy-makers to learn more about the potential beneficiaries of their policies, and it will help them design industrial strategies and shape their policies accordingly.

The present tool suggests a list of indicators on sub-sector characteristics that can feed into such a sub-sectoral industrial organisation and firm profile. This not only deepens the diagnostic analyses derived from applying previous tools in this toolkit, but also provides the context for subsequent strategy formulation exercises. For instance, small firms are likely to face very different obstacles to upgrading their technologies than medium and large firms. Multinationals may require a different set of labour skills than domestic firms in the same sub-sector. Barriers to entry and competition in an oligopoly are also not the same as those in a competitive market.

Since the manufacturing sector has played a key role in the structural transformation of developing economies, it will serve as the focus of this tool. The methodology, however, can also be applied to both the services and the agricultural sectors. Overall, the tool addresses the following key questions:

- What is the nature of firm competition in a given sub-sector? Is market power concentrated in the hands of a few firms only? How has this changed over time?
- How attractive is the sub-sector to firms? That is, are firms investing a lot in gross capital formation in the sub-sector?
- What are the basic characteristics (i.e. size, legal structure, average age) of firms in a given sub-sector? How has this changed over time?
- How do firms in a given sub-sector integrate internationally?
- To what extent are foreign firms present in a given sub-sector?

The rest of the tool is structured as follows. Section 2 presents the methodology. Section 3 analyses findings that result from the previous section. Section 4 identifies possible extensions to the current methodology. The final section links the tool to other areas of inclusive and sustainable industrial development.

2. Methodology

This section provides a guide to identify and to calculate relevant indicators on industrial organisation and firm profiling at the sub-sector level. Indicators are divided into two groups: (1) Industrial organisation indicators; and (2) Firm profiling. The section addresses questions such as: Which indicators can be used to shed light on the structure and organisation of sub-sectors and on firm characteristics? What is the rationale underlying the choice of these indicators? How are they calculated? Which data sources can analysts use? What are the analytical steps to be taken? The next section will outline how these indicators can be interpreted and what conclusions can be drawn for policy-making.

2.1 Industrial organisation indicators

2.1.1 Degree of competition in a sub-sector

This sub-section investigates the nature of competition in a sub-sector, that is, whether the sub-sector is dominated by only a few lead firms or is composed of numerous price-taking firms. The rationale here is that different types of market competition carry different impacts on economic efficiency. Monopolies, for instance, are known to result in higher product prices, lower output, and less allocative efficiency, compared to a competitive market. The industrial organisation of production in a given sub-sector, therefore, has important implications for a country's competition or antitrust law.

This sub-section suggests three indicators to shed light on the degree of competition in a given industrial sub-sector: total number of firms operating in the given sub-sector; market shares of the largest 5 firms; and the Hirschman-Herfindahl Index (HHI) for a sub-sector (see Table 1). Data for these are often only available from national statistics sources.

Looking at the total number of firms operating in a given sub-sector can help to understand to what extent the sub-sector is thriving and attractive for firms to invest in so that competitive forces are kept alive. A very small number would indicate that production is dominated by a few firms only. However, comparisons across sub-sectors can be difficult and often not very meaningful. Moreover, this indicator should be interpreted with a bit of caution since more firms is not always better (e.g. due to efficiency considerations or issues related to economies of scale). With this indicator it is, therefore, particularly useful to look at changes over time. This will give the analyst a better understanding about how easy it is for new firms to enter production in a given sub-sector whereby ease of entry would be an indication of competitive conditions and the absence of market dominance by a few producers only.

The second indicator gives a somewhat more refined picture. It looks at the market share of the top-5 firms in a given sub-sector. That is, it looks at how much of total revenues generated in a given sub-sector go to the five largest firms operating in that sub-sector; the higher this percentage, the more market power is concentrated in the hands of these top-5 firms. The indicator is calculated as follows:

$$\text{Market share of top 5 firms} = \frac{\text{Sum of revenues of top 5 firms in a sub - sector}}{\text{Total revenues of the same sub - sector}}$$

An even more precise method to calculate the degree of competition in a sub-sector is through the Hirschman-Herfindahl Index (HHI), which takes into account the shares in total sub-sectoral revenues of *all* firms operating in that sub-sector, not just the shares of the top-5 firms. It is

calculated by summing up the squares of market shares of all firms in the sub-sector. The index can take values that range from 0 to 1, moving from a perfectly competitive market ($HHI = \text{close to } 0$) to an absolute monopoly ($HHI = 1$):

$$HHI = s_1^2 + s_2^2 + \dots + s_i^2 = \sum_{i=1}^n s_i^2$$

where n indicates the number of firms in the sub-sector, and s_i denotes firm i 's share in the total market (i.e. its share in total sub-sectoral revenues).

The interpretation of this sub-section should first look at levels and changes in the total number of firms operating in a given sub-sector for all benchmarking countries. This partly informs analysts of the ease with which firms can enter and exit the sub-sector. For the latter two indicators, analysts should also explore their trend and compare their country's figure to those of competitors or role models. However, comparability across countries might be limited when national statistics are used as methods and formats of collecting and recording data sometimes differ significantly between countries; this caveat also applies to other indicators presented below where analysts have to rely on national data sources.

Table 1: Degree of competition in a sub-sector

Indicator	Variable	Source
Total number of firms	Number of firms operating in the sub-sector	UNIDO INDSTAT databases or National statistics
Market shares of largest 5 firms	Revenues of top-5 firms	National statistics
	Total revenues of sub-sector	National statistics
Hirschman-Herfindahl Index (HHI)	Sum of the squared shares of firms' revenues in total sub-sectoral revenues	National statistics
		National statistics

2.1.2 Gross fixed capital formation per establishment

To get an understanding of levels and dynamics of investment in a given sub-sector, analysts can look at gross fixed capital formation per establishment (i.e. per firm) operating in that sub-sector. Gross fixed capital formation refers to all investments in machines, equipment, factories, and other capital goods. Such investments reflect profit expectations on the part of companies (i.e. whether or not there is a sentiment among firms that there will be returns to their investments) and should result in an expansion (or at least preservation) of production capacity and an increase in productivity.

This indicator is calculated by dividing total gross fixed capital formation in a sub-sector by the number of firms operating in that sub-sector. It shows how much an average firm in a given sub-sector spends on investments in machines, equipment, factories, and other capital goods. An increasing indicator over time often implies a thriving and profitable sub-sector and that firms are expecting their investments to yield high returns.

To calculate this indicator, analysts need to have data on gross fixed capital formation of a sub-sector and on the number of establishments in the sub-sector (see Table 2). These data can be extracted from UNIDO's Industrial Statistics (INDSTAT) database.

The interpretation of this sub-section should first look at levels and changes in the total number of firms operating in a given sub-sector for all benchmarking countries. This partly informs analysts of the ease with which firms can enter and exit the sub-sector.

This indicator can be used for comparisons across sub-sectors within a country as well as for comparisons across countries. For interpretation of this indicator, analysts should benchmark a country's level to that of its competitors or role models but also look at its trend over time. If there are significant fluctuations in the trend line or a sharp decrease at some point, analysts should make further investigations to better understand the underlying causes. A continuous downward trend possibly reflects deteriorating sentiments among investors and companies and may point to upcoming problems with regard to production capacity, productivity and competitiveness. Finally, analysts can use the values observed in another country that serves as a role model for their own country in order to set targets for the coming year.

Table 2: Gross fixed capital formation per establishment

Indicator	Variable	Source
Average investment per firm	Gross fixed capital formation of a sub-sector	UNIDO INDSTAT
	Number of establishments in the sub-sector	UNIDO INDSTAT

2.2 Firm profiling

2.2.1 Firm characteristics

This sub-section looks at the key characteristics of firms that operate in a given sub-sector: firm size (employment size); ownership structure; average age; and quality management. These complement the analysis derived from applying of previous EQUiP tools, and have important implications for sub-sector interventions. Policy-makers, for instance, need to understand how upgrading obstacles of small firms are different from those of large firms in order to design effective upgrading policies. Meanwhile, the presence of foreign firms in a sub-sector raises issues about whether these foreign operations are “sticky” or rather “footloose” (see EQUiP tool 7), and about how much the country is gaining from their presence relative to the incentives given to these foreign-owned establishments. The average age of firms is indicative of their survival rate and to a certain extent their competitiveness. Finally, firms’ quality management is an important step to be able to participate in global value chains and take advantage of opportunities presented by globalisation.

This sub-section requires data on firms’ employment, ownership form, age/average age, and quality management. Detailed data for the first three indicators are often only available from national statistics, but analysts can also retrieve data on average firm age from the World Bank’s Enterprise Survey database. Data on the extent of quality management, as proxied by the percentage of firms in a sub-sector that have an internationally recognised certification (e.g. from the International Organization for Standardization, ISO), can be extracted from the World Bank’s Enterprise Survey database.

To be able to benchmark one country against other countries, analysts can use the popular World Bank classification of firm sizes: micro (1-9 employees), small (10-49), medium (50-300), and large (over 300) companies. In terms of ownership structure, one can distinguish between state-owned enterprises, cooperatives, domestic private firms, and foreign firms.

To interpret these indicators, analysts should look at levels and at how the indicators change over time. However, one issue is that data from the World Bank’s Enterprise Survey database is often only

available for a single year; this is due to the fact that the World Bank has started conducting such enterprise surveys only recently and does so only infrequently. Analysts should also benchmark the indicators for a country's sub-sector against those of its competitors or role models. Further, these indicators can also be linked to those from other dimensions of inclusive and sustainable industrial development, as suggested in the section titled "Link to other areas" at the end of this tool.

Table 3: Firm characteristics in a sub-sector

Indicator	Variable	Sources
Average firm size	Average employment per firm	National statistics or UNIDO INDSTAT
Ownership structure	Firm's ownership	National statistics
Age	Average age of firms	World Bank's Enterprise Survey database
	Firm age	National statistics
Quality management	Percentage of firms with an internationally-recognised quality certification	World Bank's Enterprise Survey database

2.2.2 International integration

This sub-section looks at how and to what extent firms in a sub-sector integrate internationally. It includes indicators on trade and on foreign firm presence or even dominance in a sub-sector. Together with the trade indicators from other EQuIP tools (particularly Tools 2 and 7), this sub-section assists the design of sound policy interventions in sub-sectors to promote international integration.

For the trade-related indicators presented here, analysts need to have data on the percentage of firms exporting directly or indirectly (at least 1% of sales), the percentage of firms using material inputs and/or supplies of foreign origin, the proportion of total inputs that are of foreign origin, and the percentage of firms identifying customs and trade regulations as a major constraint. This data can be extracted from the World Bank's Enterprise Survey database (see Table 4).

The first three indicators give an idea about the extent to which firms in a given sub-sector are participating in international trade, either by sourcing inputs from abroad or by selling their products to foreign customers. Firms sourcing inputs from abroad may thereby also get access to advanced foreign technology and knowledge while firms selling their products to foreign buyers demonstrate their capacity to find customers in foreign markets and to meet their requirements. These indicators also point to the degree to which producers in a given sub-sector are integrated into regional or global value chains.

Meanwhile, the fourth indicator sheds light on whether (or to what extent) firms face obstacles when trying to participate in international trade (either as importer or exporter). A high percentage of firms having issues with customs or trade regulations, for instance, indicate a bottleneck that policy-makers need to resolve.

Regarding the indicators on foreign presence (or dominance), analysts should collect data on foreign direct investment (FDI) at the sub-sector level, output of foreign firms in a sub-sector, and total output of the sub-sector. Data on the first indicator is available through the International Trade Centre's (ITC) Investment Map database. Data on the latter two variables are often only available from national statistics, and are used to calculate the output share of foreign firms in a sub-

sector (see Table 4). Higher levels of FDI and a higher share of foreign firms in total sub-sectoral output signal a larger foreign presence in that sub-sector. While such foreign presence may imply access to advanced foreign production know-how, technology and knowledge transfer, and higher productivity, in some cases this may also be indicative of dominance by or even dependence from foreign companies.

For interpretation of these indicators, analysts should look at how they change over time and benchmark a country's indicator with that of its competitors or role models. However, it is important to take into account certain country characteristics (such as country size or level of economic development) when interpreting the figures. For example, a small country is more likely to have more outward-oriented firms than a large country due to the limited size of the domestic market. Moreover, as already noted above, comparability across countries may be limited when national statistics are used as data collection and recording methods can differ considerably between countries.

Finally, these indicators can also be linked to other tools in the EQUiP toolkit. For instance, if a sub-sector enjoys growing exports (see Tool 2) but only a small percentage of firms are exporting, this may suggest further and better export promotion activities need to be carried out.

Table 4: International integration of firms

Indicator	Variable	Sources
Trade	Percent of firms exporting directly or indirectly (at least 1% of sales)	World Bank's Enterprise Survey database
	Percent of firms using material inputs and/or supplies of foreign origin	World Bank's Enterprise Survey database
	Proportion of total inputs that are of foreign origin	World Bank's Enterprise Survey database
	Percent of firms identifying customs and trade regulations as a major constraint	World Bank's Enterprise Survey database
Foreign presence in a sub-sector	FDI inflow at sub-sector level	ITC Investment Map
	Output of foreign firms in a sub-sector	National statistics
	Output of the sub-sector	National statistics

3. Interpretation of Findings and Conclusions

In the following, an exemplary analysis using the indicators presented above will be undertaken for the textile, leather and footwear sub-sector of Vietnam. Wherever data are available, figures for Vietnam will be compared and benchmarked against figures for three peer countries in the region: Cambodia, China and Thailand.

As can be seen in Table 5, the number of Vietnamese firms producing textiles, leather and footwear products has increased rapidly from 1,248 in the year 2000 to 7,320 in 2012. This represents an annual average growth rate (as measured by the Compound Annual Growth Rate, CAGR) of almost 16%. Yet, despite this growth, the number of Vietnamese firms is still far below the number of textiles, leather and footwear producers in China and Thailand. However, while the number of firms has gone down between 2006 and 2012 in both China and Thailand, it has continued to grow in Vietnam. In fact, almost 4,000 new firms entered the sub-sector in this time period, pointing to an increase in attractiveness but also competition.

Table 5: Number of firms operating in the textile, leather and footwear sub-sector

	2000	2006	2012	Compound Annual Growth Rate (CAGR) 2000-2012
Vietnam	1,248	3,371	7,320	15.9%
Cambodia	546	n/a	n/a	n/a
China	21,196	53,397	42,247	6.5%
Thailand	3,684	169,755	136,592	38.9%

Note: For China and Thailand, data for 2012 is actually from 2011; the reported CAGRs are, thus, for this time period.

Source: UNIDO INDSTAT2 database

That the textile, leather and footwear sub-sector in Vietnam is quite competitive can also be seen in Table 6 which shows that the largest five firms account for only 6-7% of total market sales. This finding is further confirmed by the HHI, which has remained close to zero during the period 2007-2011 (see Table 6).

Table 6: Degree of competition in the textile, leather and footwear sub-sector of Vietnam

	2007	2008	2009	2010	2011
Market share of largest five firms	6.6%	6.5%	7.1%	5.5%	6.3%
Hirschman-Herfindahl Index (HHI)	0.0017	0.0015	0.0020	0.0012	0.0016

Source: Vietnam Annual Enterprise Survey 2007-2011

In terms of investment activity, Vietnamese textile, leather and footwear producers significantly

lag behind their Chinese counterparts. Moreover, as can be seen in Table 7, this gap has widened considerably between 2006 and 2012. While in 2012 an average Chinese firm invested almost US\$ 4 million in gross fixed capital formation, the corresponding figure in Vietnam is less than US\$ 1 million. Even worse, while Chinese investment has grown by an annual average of close to 20%, it has decreased by about 4% a year in Vietnam during 2000 and 2012.

Table 7: Average investment per firm in the textile, leather and footwear sub-sector (in US\$)

				Compound Annual Growth Rate
	2000	2006	2012	2000-2012
Vietnam	1,306,405	1,165,022	830,581	-3.7%
Cambodia	225,922	n/a	n/a	n/a
China	n/a	1,888,984	3,858,691	19.6%
Thailand	n/a	n/a	n/a	n/a

Note: For China, data for 2006 is actually from 2007 and data for 2012 is actually from 2011; the reported CAGR is, thus, for this time period.

Source: UNIDO INDSTAT2 database

Let us now turn to analysing the characteristics of firms operating in Vietnam's textiles, leather and footwear sub-sector. In terms of firm ownership and size, overall, there has been no major change in the composition of firms between 2007 and 2011. Micro and small firms still make up the largest share, increasing from 88% in 2007 to 91% in 2011. In terms of ownership structures, domestic private firms are the most common type, accounting for 95% in 2007, and rising slightly to 96% in 2011 (see Table 8). It is also noticeable that the majority of state-owned enterprises are medium-sized and large firms¹, while domestic private firms are mostly micro- and small-sized. Foreign firms were mainly composed of medium and large firms in 2007, but of micro and small firms in 2011. This is due to a rapid growth in the number of foreign micro firms, which increased their share in the total number of firms from only 0.33% in 2007 to 0.90% in 2011.

Table 8: Firm ownership and size in the textile, leather and footwear sub-sector of Vietnam (percentage of total firms)

		State-owned	Private	Foreign	Total
2007	Micro	0.03%	54.83%	0.33%	55.20%
	Small	0.40%	31.19%	0.92%	32.51%
	Medium	1.04%	7.57%	1.23%	9.84%
	Large	0.66%	1.08%	0.71%	2.45%
	Total	2%	95%	3%	100%

¹ The largest one is the Vietnam National Textile and Garment Group (VINATEX), whose 'productive sector' contains 50 joint stock companies and 40 joint venture companies, mostly in textile and garment manufacturing.

2011	Micro	0.03%	60.96%	0.90%	61.89%
	Small	0.19%	28.17%	0.80%	29.17%
	Medium	0.46%	6.19%	0.83%	7.47%
	Large	0.28%	0.73%	0.46%	1.47%
	Total	0.96%	96.05%	2.99%	100%

Source: Vietnam Annual Enterprise Survey 2007, 2011

Comparing two further characteristics of Vietnamese textiles and garments firms with those of their Chinese competitors we find, first, that Chinese firms on average have been in business for longer and, second, that quality management is much more widespread in China than in Vietnam (see Table 9). More precisely, the average age of Chinese firms in the textiles and garments sub-sectors is more than 12 years versus less than 10 years in Vietnam. Moreover, while more than 55% of Chinese firms have an internationally recognised quality certification, in Vietnam this share is a mere 15-19%. Compared to one of its key competitor, Vietnam thus has quite some catching up to do.

Table 9: Firm characteristics in the textiles and garments sub-sectors of Vietnam and China

Sub-sector	Vietnam (2009)		China (2012)	
	Average age of firms (years)	Percent of firms with an internationally-recognised quality certification	Average age of firms (years)	Percent of firms with an internationally-recognised quality certification
Textiles	9.9	19.1	12.6	55.4
Garments	9.5	15.8	12.3	56.4

Source: World Bank's Enterprise Survey database

Finally, looking at the degree of international integration of textiles and garments firms, we interestingly find that the percentage of firms exporting directly or indirectly at least 1% of sales is higher in Vietnam than in China (52% vs. 40% in the textiles sub-sector and 72% vs. 38% in the garments sub-sector; see Table 10). While at first glance this may seem surprising or at least intriguing, this difference might simply reflect that the domestic market plays a more important role in China than in Vietnam.

A similar picture arises when looking at backward linkages to foreign suppliers. While 71% of Vietnamese textiles producers and 80% of Vietnamese garments firms use material inputs and/or supplies of foreign origin, the corresponding figures for their Chinese counterparts are merely 5% and 14%, respectively. In fact, whereas around half of all inputs were sourced from foreign suppliers by Vietnamese textiles and garments firms, less than 5% of all inputs used by Chinese firms were of foreign origin. These figures indicate that Vietnamese firms are well integrated into global or regional value chains. However, compared to their Chinese counterparts, they are more reliant on foreign buyers (and sell less to the domestic market) and foreign suppliers (reflecting a possible opportunity for policymakers to support the strengthening of local backward linkages).

Overall, both in Vietnam and China firms seem to be happy with their countries' trade regulatory

frameworks. In Vietnam, only around 5% of firms identified customs and trade regulations as a major constraint to doing business. Thus, there seems to be hardly any room for improvement for Vietnamese policymakers, although in China the percentage of firms pointing to customs and trade regulations as a major constraint is even lower and, in fact, close to zero (see Table 10).

Table 10: International integration of Vietnamese and Chinese firms in the textiles and garments sub-sectors

Country	Sub-sector	Percent of firms exporting directly or indirectly (at least 1% of sales)	Percent of firms using material inputs and/or supplies of foreign origin	Proportion of total inputs that are of foreign origin (%)	Percent of firms identifying customs and trade regulations as a major constraint
Vietnam (2009)	Textiles	52	70.9	46.1	4.5
	Garments	71.9	80.0	55.6	.7
China (2012)	Textiles	40.1	5.0	1.3	0
	Garments	38.2	14.1	3.1	1.0

Source: World Bank's Enterprise Survey database

4. Possible Extensions

One possibility to extend and refine the analyses suggested here would be to analyse how much of the value-added (as opposed to gross revenues or sales) in a given sub-sector is contributed by different types of firms. For example, it would be interesting to calculate and monitor the share in sub-sectoral value-added that is contributed by foreign firms or by state-owned enterprises. Comparing these shares with the corresponding shares that these types of firms have in total gross revenues (see Table 1) can help the analyst to identify technological or productivity gaps between different types of firms. If, for example, foreign firms' share in total value-added significantly exceeds their share in total revenues, this means their activities generate more value-added per unit produced and, thus, are more productive, which possibly points to the technological edge they have over local firms. In such a situation, policy-makers may want to try to instigate technology transfer and knowledge spill-overs.

Moreover, it would be insightful to extend the methodology presented here with methods that more explicitly assess the possibility (or extent) of a technology gap between foreign- and domestically owned firms. Are foreign-owned firms typically characterised by higher productivity and higher technology intensity in production compared to domestic firms? And if there is a gap, is it narrowing or widening? One could try to capture such a gap by comparing the unit values of foreign-owned firms with those of joint venture and domestically owned firms. However, data availability, especially time series, is a very common issue.

It would also be interesting to analyse energy efficiency (or resource efficiency more generally) according to different types of firms that operate in a given sub-sector. Insights from such an analysis could be used by policy-makers to identify those groups or types of firms that have a lot of catching up to do with regard to energy or resource efficiency and, thus, would benefit most from targeted government support.

The sub-sectoral portrayals could also be enriched by adding a “resource input profile” that identifies the main factor inputs of production (e.g. water, energy, skills, capital, technology, etc.) in the sub-sector concerned and that helps to determine its water intensity, energy intensity, or skill intensity compared to other sub-sectors. This information might come from input-output tables² or input-output analysis, for example.

² An input–output table is a quantitative technique in economics that represents the interdependencies between different branches of a national economic system. It can also be boiled down to the level of the industrial sector where it depicts inter-industry relationships within an economy, showing how output from one industrial sub-sector may become an input to another industrial sub-sector. Such input-output tables, thus, show how dependent each sub-sector is on every other sub-sector, both as a customer of outputs from other sub-sectors and as a supplier of inputs.

5. Link to Other Areas

This tool is somewhat different from many of the other tools in the EQuIP toolbox in that it is not concerned with measuring industrial performance and outcomes. Rather, it aims to draw detailed portrayals of different industrial sub-sectors, compiling information on structural characteristics such as sub-sectoral industrial organisation and firm profiles. In a sense, it thereby sheds light on certain “input factors” that influence industrial performance and outcomes. Such sub-sectoral portrayals can play an important role in informing industrial strategy design.

The information that this tool suggests to collect can be related to performance outcomes. The most obvious link is, thus, to sub-sectoral performance indicators. For example, sub-sectors that see fast rates of gross fixed capital formation are more likely to also see increases in capacity and maybe also productivity (see EQuIP Tool 2). Moreover, the information on typical firm size and ownership compiled with the help of this tool can serve to explain whether or not a given country has been able to increase its export capacity and/or its world export market share in a given industry sub-sector. Micro-, small- and medium-sized firms often struggle to enter export markets. Therefore, sub-sectors where also larger companies operate might see a more favourable export performance. Similarly, many foreign-owned firms are engaged in business transactions with their parent company or other firms in their home country, which again might be reflected in stronger export outcomes (see EQuIP Tool 2).

Depending on how dominant these foreign-owned firms are, and depending on how focused they are on their home market, this may or may not lead to export market diversification (see EQuIP Tool 4). To the extent that these foreign-owned firms spur technology transfer and spillovers, the overall productivity and capacity in the sub-sector might increase. This might also be reflected in sub-sectoral upgrading. A healthy degree of competition in a given sub-sector can be a similar driving force for productivity increases. At the same time, product upgrading could also be the result of firms adopting quality management practices (see EQuIP Tool 3).

The ownership structure of firms in a given sub-sector can also be an important determinant of the density of backward and forward linkages that the sub-sector has or develops to other sub-sectors. In those cases where foreign firms start operations in a country primarily motivated by exploiting cheap labour (or resource endowments), they probably will not be very interested in building backward linkages with local suppliers or forward linkages with local processors (see also EQuIP Tool 7). Upgrading towards higher value-added activities is also rather unlikely in such a scenario.

At the social front, this might lead to employment generation – but not necessarily productive employment generation (in the sense that there are not only increases in employment but also in labour productivity) or decent jobs (i.e. jobs with decent wages). In particular, if foreign-owned firms operate primarily in special economic zones (SEZs) or export processing zones (EPZs), where special labour laws apply and where most production consists of assembly activities for foreign customers, then both local linkages and positive social outcomes will likely be meagre (see also EQuIP Tool 5).

Conversely, if a sub-sector is dominated by state-owned enterprises (SOEs) and domestic-owned firms, i.e. by domestically embedded firms, it might have stronger linkages to other sub-sectors. A strong presence of SOEs, where employment considerations are often higher on the agenda than in other types of firms (particularly foreign-owned ones), might also imply a higher degree of employment intensity (although not necessarily productive employment generation). Moreover, sub-sectors where export orientation and/or exposure to foreign competition are not so pronounced and where, thus, labour costs are not such an important determinant of international competitiveness might see more favourable wage dynamics. Similarly, the presence of certain types of firms – such as collectives – might also inherit implications for the wage structure and level of a given sub-sector.

In addition, the degree of competition as well as the typical firm size and ownership structures can be important explanatory factors for the resource efficiency (including energy efficiency) performance of a given sub-sector (see also EQuIP Tool 6). In sub-sectors with stiff competition, firms may be incentivised to improve their resource and energy efficiency for cost-saving reasons. Larger firms are typically more efficient in their use of resources while smaller firms often have more room for improvement. Finally, foreign firms may be more efficient than local firms if they use more advanced technology transferred from their home country. However, in those cases where the motivation of foreign firms to start production stems from lax environmental regulation or subsidised energy supply in the host country, improvements in resource or energy efficiency are less likely to materialise.

The information on the international integration of firms collected here can also complement the analyses undertaken in EQuIP Tool 7 on Global Value Chains (GVCs). Looking at the share of exporting firms and the proportion of inputs of foreign origin in a given sub-sector can illuminate the degree and deepness of the country's participation in GVCs and its position therein.

Furthermore, this tool is also closely linked to EQuIP Tool 9 on industrial capabilities. In fact, many of the firm characteristics and industrial organisation issues discussed here have important implications for the dynamics of industrial capabilities accumulation processes. For example, such capabilities accumulation processes can be (but are not always) driven by high rates of (foreign and domestic) investment, efforts to enter export markets, competitive pressures (resulting from a high degree of competition in a sub-sector, or presence of foreign firms (if they transfer knowledge and technology).

6. Possible Data Sources

UNIDO INDSTAT2 and INDSTAT4 databases: CD-ROM and <https://stat.unido.org/>

World Bank Enterprise Survey database: www.enterprisesurveys.org (data available for free upon registration)

ITC Investment Map: www.investmentmap.org (data available for free upon registration)

OECD database (SDBS): http://stats.oecd.org/Index.aspx?DataSetCode=SSIS_BSC

National data sources

7. References and Further Reading

Islam, R. (2004) *The Nexus of Economic Growth, Employment and Poverty Reduction: An Empirical Analysis*, Discussion Paper, Geneva: International Labour Organization.

McKinley, T. (2010) *Inclusive Growth Criteria and Indicators: An Inclusive Growth Index for Diagnosis of Country Progress*, Manila: Asian Development Bank.

World Bank and International Finance Corporation (2012) *Enterprise Surveys: China Country Profile 2012*; Enterprise Analysis Unit of the World Bank, Washington DC: World Bank.

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