

## Chapter 17

# Making Global Value Chains Work for Development in the Age of Automation and Globalisation Scepticism

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### Abstract

How countries engage with global value chains (GVCs) determines how much they benefit from them. For an effective and sustainable strategy of GVC participation, governments must identify key binding constraints and design the necessary policy and regulatory interventions, including investing in infrastructure and capacity building. Countries that understand the opportunities that GVCs offer and adopt the appropriate policies to mitigate the risks associated with them have the opportunity – through GVCs – to boost employment and productivity in agriculture, manufacturing and services. The new policy framework that allows developing countries to maximise the gains from GVC integration is one in which a ‘whole of supply chain approach’ must be adopted. This reflects the fact that in a world economy where GVCs play a dominant role, imports matter as much as, if not more than, exports, and the flows of goods, services, people, ideas and capital are interdependent and must be assessed jointly. However, in the context of increased automation in many of the entry stages of GVC production in most industries, as well as rising protectionism in advanced countries, developing countries’ efforts to engage and upgrade in GVCs face a more challenging global trading landscape than in the past.

### 17.1 Introduction

Effective global value-chain (GVC) engagement can provide countries with the opportunity to

leapfrog their developmental processes. This is because developing countries that connect with GVCs in an effective way generally produce more and create better jobs, provide greater opportunities for domestic suppliers to trade, benefit from increased exports and, finally, experience higher productivity gains. The new GVC-enabled flows of know-how from high-income countries to low- and middle-income countries is a key mediating factor in determining the role of GVCs in industrialisation and development.

From the perspective of a developing country’s policy-makers, the critical issue nowadays is how to effectively integrate a GVC-led development strategy into the economy as a whole and therefore how to maximise the benefits from technology transfers, knowledge spillovers and increased value addition. Policy-makers need to put in place appropriate policies to ensure that participation in GVCs benefits domestic society through more and better-paid jobs, better living conditions and social cohesion.

Finally, with increasing automation of GVC production in most industries and products, and rising protectionist forces in advanced countries, developing countries’ efforts to engage and upgrade in GVCs face increasing challenges. This contribution reflects on how to more effectively engage with GVCs to make them work for development in a time of increased automation as well as scepticism

regarding the forces unleashed by the globalisation process.

## 17.2 Why global value chains matter for development

Companies used to make things primarily in one country, but nowadays this has all changed. Today, a single finished product often results from manufacturing and assembly in multiple countries, with each step in the process adding value to the end product. As a result, GVCs lower the threshold and costs for industrial development. Low- and middle-income countries can now industrialise by joining GVCs without the need to build their own value chain from scratch, as Japan and the Republic of Korea had to do in the twentieth century.<sup>2</sup> The reductions in thresholds and costs that have arisen enable low- and middle-income countries to focus on specific tasks in the value chain, rather than producing the entire product, while still reaching the scale necessary to produce profitably thanks to the access to the global markets intermediated by the GVC.

Through GVCs, countries trade more than products; they trade know-how and make things together. The new GVC-enabled flow of know-how from high-income countries to low- and middle-income countries is the single most important reason why GVCs matter for development. Low- and middle-income countries can benefit from foreign-originated patents; trademarks; operational, managerial and business practices; marketing expertise; and organisational models. Large multinational corporations (MNCs) establish highly sophisticated processes and flows, where parts and components produced in geographically distant facilities can be seamlessly integrated and customised for different world markets.

To facilitate this integration, MNCs also take an active role in seeking to improve local innovation, knowledge-based capital and competencies. A few examples are illustrative.

The Samsung Group – which employs 369,000 people in 510 offices worldwide – worries about shortages of technical and engineering skills in Africa and how those shortages affect its efforts to embed its African workforce in Samsung's global production networks (ACET 2014).

Other corporations are investing in building the skills base in low- and middle-income countries too (Dunbar 2013). For example, Lucent Technologies supports education and a range of learning programmes, including promoting educational reform, science and maths, and developing teachers and young leaders, in 16 countries throughout Africa, Asia, Europe and Latin America; Nike and the United Kingdom's Department for International Development run a programme to support access to economic assets for adolescent girls; Microsoft provides support to incorporate information technology (IT) into the daily lives of young people in the Philippines, Poland, the Russian Federation and South Africa; CISCO provides funds, expertise and equipment to create national networks of IT training centres in India, Mexico, Palestine and South Africa, in addition to the work of the Cisco Networking Academy, which has 10,000 academies in 165 countries; and, finally, Nokia enhances the life skills and leadership skills of young people in several countries, including Brazil, China and Mexico.

Countries that understand the opportunities that GVCs offer and adopt the appropriate policies to mitigate the risks associated with them have the opportunity – through GVCs – to boost employment and productivity in agriculture, manufacturing and services. The new policy framework that allows developing countries to maximise the gains from GVC integration is one in which imports matter as much as, if not more than, exports, and in which the flows of goods, services, people, ideas and capital are interdependent and must be assessed jointly.

Job creation and labour productivity growth are sometimes viewed as competing goals,

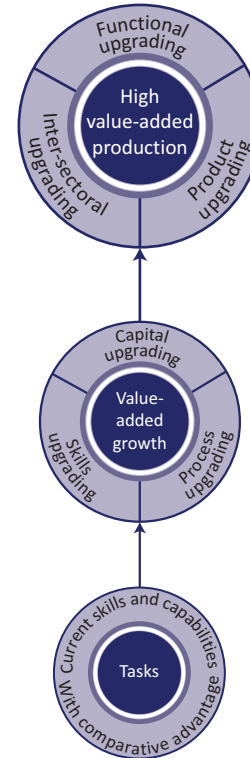
as higher labour productivity enables firms to produce a larger amount of value added without necessarily increasing the number of workers at the same rate (static productivity effects). Research, however, shows that GVC integration leads to more net jobs but lower job intensity (Cali and Hollweg 2015) and has strong potential for productivity gains via several transmission channels (dynamic productivity effects), which go hand in hand with increased labour demand caused by more vertical specialisation and higher output in GVCs.

### 17.3 What upgrading trajectories do we observe?

Drawing on earlier work by Humphrey (2004), Taglioni and Winkler (2016) differentiate between three types of economic upgrading based on productivity, comparative advantage, skills and capabilities: product upgrading, which entails moving into more sophisticated products within an existing value chain; functional upgrading, involving increasing the proportion of value added by moving towards more sophisticated tasks; and intersectoral upgrading, which involves moving into new supply chains with higher proportions of value added (Figure 17.1).

The ability of firms to upgrade is determined by improving the skills of workers (skills upgrading), improving the absorptive capacity and technology of firms (capital upgrading) and increasing productivity in existing tasks (process upgrading). Lead firms can play an important role here by setting detailed specifications and requirements that exceed local norms and create opportunities for improving capabilities, technology and assets. However, this is not always the case: the complexity of GVCs and the power dynamics within their governance structures can often lead to processes of downgrading or stagnation (Rossi 2013; Blažek 2015).

**Figure 17.1** Achieving functional, product and intersectoral upgrading through skills, capital and process upgrading



**Source:** Taglioni and Winkler (2016).

While heterogeneity exists in how countries engage and upgrade in GVCs, some regularities in the trajectories of development can be identified. In Table 17.1, we sketch some of these regularities observed from field work and case-study literature. Reflecting their comparative advantage, low-income countries tend to engage in GVCs in industries of limited complexity, such as agriculture and manufacturing. These are also industries in which buyer–seller relations tend to be at arm’s length more frequently than in other settings. Firm size is not a constraint, so even small firms can easily engage.

Once countries graduate to middle-income status, they start integrating in GVCs, with functions in advanced manufacturing and/or professional, modern services, including

Table 17.1 Trajectories in GVC engagement

| Income group                  | Low income                          | Middle income                                       | High income                                                |
|-------------------------------|-------------------------------------|-----------------------------------------------------|------------------------------------------------------------|
| <b>Industry complexity</b>    | Agriculture and light manufacturing | Advanced manufacturing and services                 | Co-ordination of manufacturing and services, R&D, branding |
| <b>Buyer–seller relations</b> | Market relations                    | Relational/captive/ hierarchical                    | Primarily buyer, modular                                   |
| <b>Firm size</b>              | Small                               | Large                                               | Lead firms, conglomerates                                  |
| <b>Mode of competition</b>    | Price-to-quality competitiveness    | Increasingly diversified, non-price competitiveness | Highly specialised, technology frontier                    |

**Source:** Engel and Taglioni (2017).

pre- and post-production high value-added services. In these GVCs, buyer–seller relations tend to be more relational, captive or hierarchical, as substantial know-how transfer takes place. The size of participating firms tends to be medium to large, particularly in manufacturing (Cusolito *et al.* 2016), and competition between firms is based on non-price features such as quality, degree of customisation or responsiveness and timeliness in delivery to clients.

Finally, once countries reach high-income status, their engagement in GVCs is predominantly specialised in tasks of co-ordination, and high value-added services, such as research and development (R&D) and branding. Firms are primarily buyers of inputs and components and sellers to end markets, and/or engaged in modular relationships. These firms' comparative advantage is based on offering highly specialised products, at the technology frontier.

#### 17.4 What factors are likely to influence countries' engagement in global value chains?

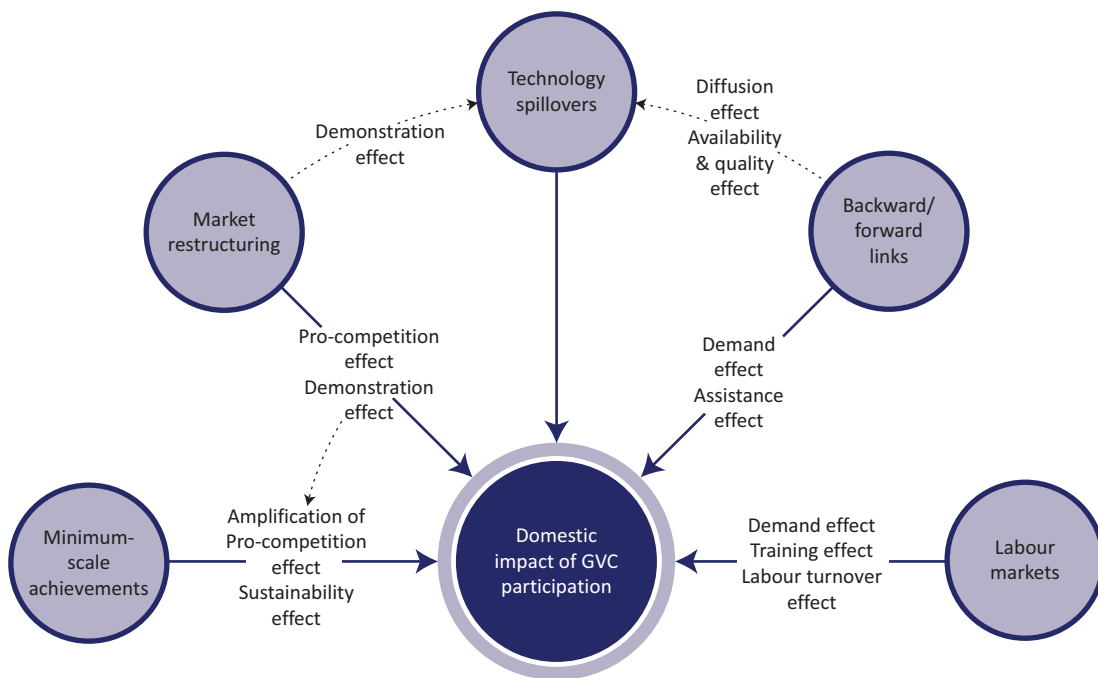
There is an extensive literature on the factors that are likely to influence countries' abilities to upgrade within GVCs, although this is primarily based on case studies, with few econometric analyses conducted until recently. However, in analysing the empirical relationship between GVC integration and the middle-income trap, it is important to note that, despite some caveats

(see Rodríguez-Clare 2007), overall empirical evidence shows that open economies tend to grow faster and have higher-income levels than closed economies (Wacziarg and Welch 2008, Gill and Kharas 2015).

Taglioni and Winkler (2016) argue that there are five main transmission channels through which GVC participation could lead to higher output, productivity and value added: backward and forward linkages; the creation of pro-competitive market restructuring effects; technology spillover; minimum-scale achievements that amplify pro-competitive effects; and, finally, labour-market effects including demand for skilled workers and their training, as well as turnover when trained workers move to local firms. Figure 17.2 provides an overview of these and shows the complex and frequent intermediating effects that individual channels have on one another. Kummritz *et al.* (2015) identify three main factors that link value-chain integration to productivity. These are the roles of foreign direct investment (FDI), exporting and importing inputs.

In the case of FDI, the impact of spillovers on productivity is not conclusive (Görg and Greenaway 2004; Paus and Gallagher 2008). In the case of the link between exporting and economic upgrading, Bernard and Jensen (1995) demonstrated that exporters outperform non-exporters in the same sector and country in terms of productivity, skills and wages. This led to questions about the role of self-selection

Figure 17.2 Transmission channels from GVC participation to the domestic economy



Source: Taglioni and Winkler (2016).

or ‘learning-by-exporting’ (LBE). In the case of the former, the assumption is that only more productive firms are able to absorb additional trade costs. The LBE literature argues that exporting improves the productivity of firms over time. These findings have been most robust for developing countries and nascent industries. Recent literature has questioned the robustness of early LBE studies (see Clerides *et al.* 1998), but LBE effects have been found by Lileeva and Treffler (2007) for Canada, and Fernandes and Isgut (2015) for Colombia.

Finally, for the third channel, the role of importing inputs on productivity, there is a breadth of literature, albeit primarily focused on developed countries. There are three main feedback loops through which importing is seen as improving key aspects of competitiveness: productivity, innovation and skills. In the case of productivity, several studies have shown that easier access to imports tends to improve firm productivity. Grossman and Rossi-Hansberg (2008) show

that offshoring can entail productivity gains similar to technological progress for offshoring nations through lower input costs. Amiti and Konings (2007) show that a 10 per cent fall in input tariffs leads to a 12 per cent improvement in productivity for importing firms. Bas (2012) demonstrates that, for a sample of Argentinian firms, input tariffs facilitate entry into export markets. In the case of innovation, MacGarvie (2006), drawing on French trade and citation data, and Bøler *et al.* (2015), using a sample of Norwegian firms, find importers to be more innovative and profitable. Finally, there is an emerging literature showing that skills are relevant for importing and also complementary to it. Koren and Csillag (2011) show that importing more sophisticated machinery requires higher skills to operate it and, in turn, increases returns to skills.

To actually test the effects of GVC participation in terms of whether this has enabled countries to economically upgrade, Kummritz *et al.* (2016) use foreign value added in exports and

domestic value added re-exported by third countries as measures of backward and forward GVC integration, respectively, and domestic value added generated by a specific sector as the measure of economic upgrading. Using a standard fixed-effects model, they test the impact of a series of national characteristics that may be associated with economic upgrading via GVC participation, to capture a country's infrastructure, connectivity, investment and trade policy, business climate and institutions, financial and labour markets, skills and education, innovation and product standards, and labour, social and environmental standards.

Using the Organisation for Economic Co-operation and Development's Inter-Country Input–Output (OECD ICIO) database for 61 countries and 34 industries in 1995, 2000, 2005 and 2008–11, Kummritz *et al.* (*ibid*) find that overall GVC integration increases a country's domestic value added. Splitting the sample into income groups, they find that this does not substantially change results, although GVC integration as a buyer (i.e. via foreign value added) is more significant for low-income countries and low- and middle-income countries; for upper middle-income countries and high-income countries, selling into GVCs has a greater impact. On the buyer side, airfreight infrastructure and road network quality are of particular importance, while connectivity, education and skills, and the level of standards compliance, are most important for countries selling into GVCs. This leads the authors to conclude that the policy areas hypothesised to be significant for economic upgrading within GVCs do in fact largely have the expected impact.

Boffa *et al.* (2016) build on these findings to focus specifically on the relationship between GVC integration and the 'middle-income trap', and – more broadly – on the role of GVC integration in supporting countries to graduate to a higher-income level. As can be seen in Figure 17.3, the magnitude of the correlation between GVC integration and

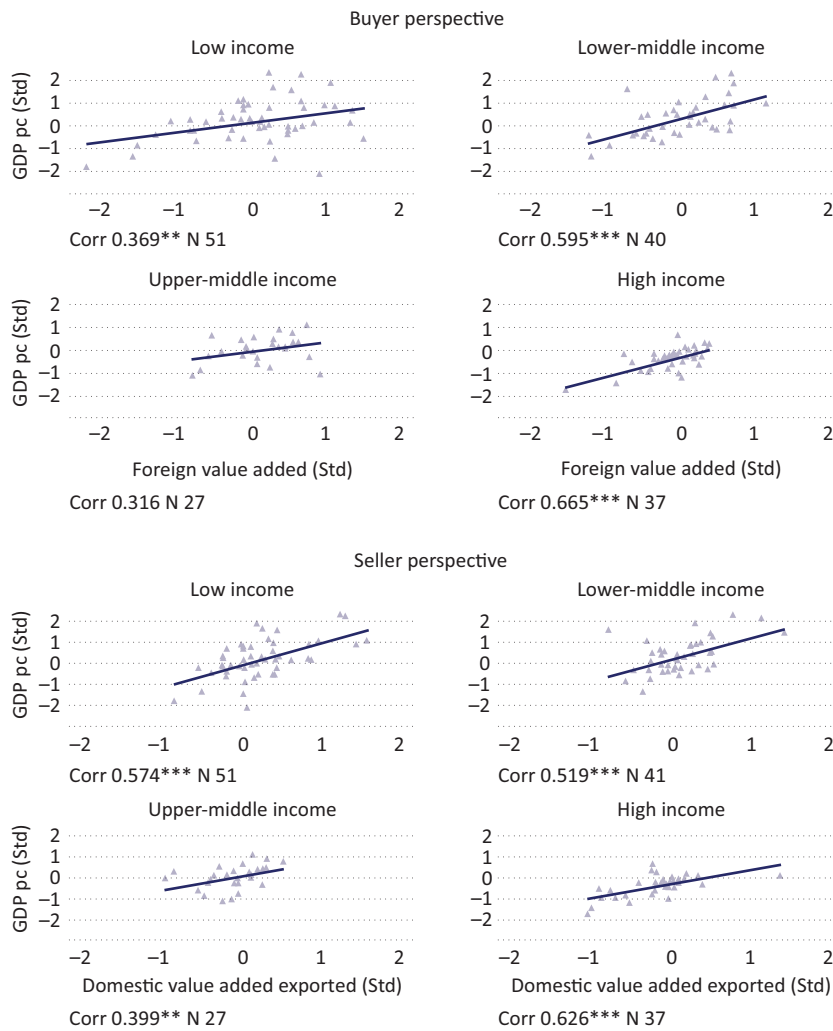
gross domestic product (GDP) per capita depends on income status and the type of integration. Moving from these findings of correlation, the authors use a logit (probit) model for income-group transitions and find that GVC integration increases GDP per capita, but that gains diminish as income increases. Similarly, growth in output per capita is highest for lower-income groups. Certain channels between GVC integration depend on industry similarity, with linkages assumed to be easier when trade is intra-industry. They also find that manufacturing leads to higher GDP gains for buyers, but that for services both types of integration – forward and backward – lead to similar GDP increases.

However, these studies – while providing an important foundation for better understanding what variables are significant for upgrading – suffer from two main limitations. First, due to the lack of value-added trade data prior to 1990, they only allow analysis of the last 20 years, while much of the middle-income trap literature goes back 50 years and more. Second, the studies provide a helpful overview of what kind of institutions and policies are associated with upgrading and income transitions, but they do not specify the global environment conditions under which specific types of institutions and policies lead to greater gains from GVC participation. While some of these opportunities may have been available 20 years ago, they may no longer be available for new entrants today, or even feasible, given that most late industrialisers nowadays tend to be small, both geographically and economically, as well as distant from end markets and the current hubs of global economic activity.

## 17.5 GVC participation in the context of technical progress and globalisation scepticism

As the aforementioned study by Boffa *et al.* (2016) has pointed out, there is a positive and

Figure 17.3 Growth of GVC integration and GDP per capita by income category



**Source:** Boffa *et al.* (2016).

significant relationship between GDP per capita and integration into GVCs, although this correlation diminishes at higher-income levels. This points to questions around the gains of GVC trade for workers in countries at the middle–high income threshold. Over the past few years, there has been a proliferation of reports<sup>3</sup> investigating the impact of technological change on production, trade and labour markets. The authors focus particularly on the rapid technological advances in automation, big-data analytics and digitisation, as well as manufacturing responses to climate

change and other environmental- and resource-related risks. These responses include transitions towards additive manufacturing through 3D printing technologies and the growth of the circular economy paradigm, which is likely to require manufacturers to design products for several cycles of disassembly and reutilisation.

As Antràs (2015) notes, GVCs are characterised by four features: customised production; sequential production decisions going from the buyer to the suppliers; high contracting

costs; and global matching of goods, services, production teams and ideas. All four of these point to the significant power that MNCs co-ordinating GVCs have in the selection of where geographically to locate individual production tasks. Technological improvements are likely in each of these cases to increase both the sophistication of buyer demands and the level of supplier capabilities required to meet them. A full exploration of these issues is beyond the scope of this chapter, but, given their implications for the relationship between GVC participation and declining economic growth and structural stasis experienced by many middle-income countries, it is worth addressing two aspects of these medium-term developments in the context of the preceding discussion.

First, the workforce skills required to participate in manufacturing of even relatively unsophisticated products are likely to increase substantially, requiring not only higher levels of education, but also the ‘cross-domain’ skills and tacit knowledge necessary for using new equipment and thinking computationally and analytically, as well as high levels of technical and engineering knowledge. For many middle-income countries, this will require a fundamental upgrading of education systems, research institutions and innovation systems. Therefore, the already diminishing advantage that labour-abundant, low-wage countries currently possess for low-skill manufacturing is likely to diminish further.

Second, and related to the previous point, the incentives to ‘re-shore’ production to developed economies given both the need for highly skilled workers and – more importantly – the ability to automate many tasks, is likely to become even greater in coming years, a trend likely to be reinforced by the rapidly growing political backlash against globalisation and rising economic nationalism in many Western countries. World Bank (2016) research has found that, in China

and India, the jobs of 77 per cent and 69 per cent of workers, respectively, are at risk due to automation. In this context, trade in data and information, which is rapidly growing in importance, is likely to further increase the modularity of work processes even within production and manufacturing, and to bypass all but the most sophisticated middle-income countries.

Collectively, these issues are likely to reinforce trends towards ‘premature deindustrialization’ (Rodrik 2016), with countries running out of industrialisation opportunities sooner and at lower levels of income than earlier industrialisers – a trend that has hit Latin American middle-income countries particularly hard, both economically and in terms of risk towards political stability and democratisation. Thus, while it was only recently that firms and governments in developed and developing economies were coming to terms with the fact that the ‘GVC revolution’ required a fundamental rethinking of trade and, more broadly, industrial development, these new, disruptive technological changes will again require new policies and strategies to enable firms and governments to adapt.

This in turn points to the challenges for ensuring that the gains from GVC trade for industrialising countries in fact benefit workers and households. Given the complex political economy of globalisation emerging, particularly for industrialising countries, there is a need for a greater understanding of what automation is, as well as the meaning of globalisation itself, given that narratives have profound political consequences. Finally, there is a need for a greater focus on the distributional effects of GVC trade, adjustment costs and displacement. Closer attention must be paid to the labour-market impacts and to the risks of downgrading within GVCs for certain workers, even as countries overall, upgrade.

## 17.6 Policy frameworks

How countries engage with GVCs determines how much they benefit from them. While policy needs to adapt to a rapidly changing world, it remains valid that, for an effective and sustainable strategy for GVC participation, some areas of policy remain key. Identifying binding constraints and designing the necessary policy and regulatory interventions will help achieve distinct objectives and address country-specific challenges in relation to:

- participating in GVCs, including attracting FDI and facilitating domestic firm entry into GVCs;
- expanding and strengthening existing GVC participation, including promoting economic upgrading and densification, and strengthening domestic firms' absorptive capacity; and
- ensuring sustainability and transforming GVC participation into inclusive growth by fostering economy-wide productivity spillovers, social upgrading and welfare improvements.

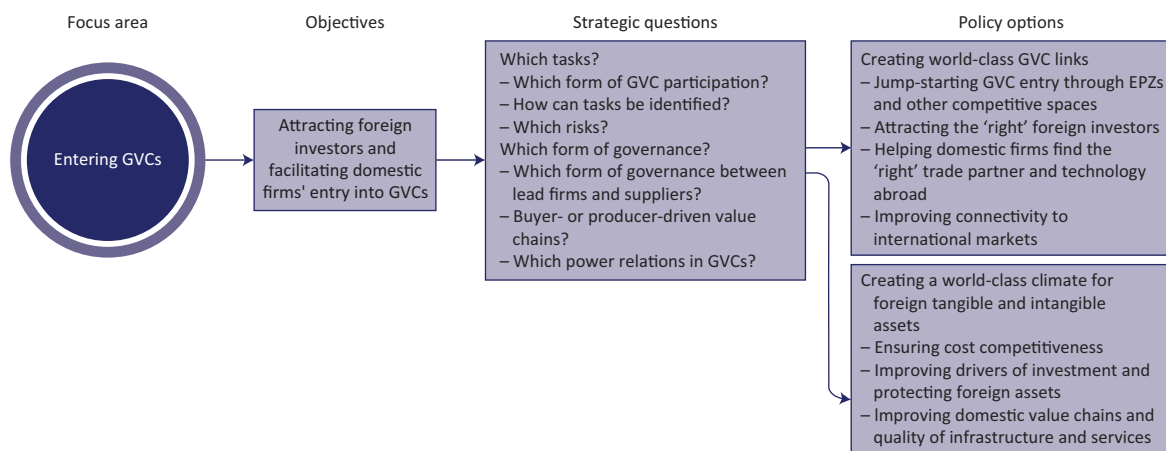
By integrating their domestic firms (suppliers and final producers) into GVCs, developing

countries can help their economies industrialise, become services-oriented more quickly and move closer to their development goals. Taglioni and Winkler (2016) suggest ways of assessing various aspects of GVC participation (including the rate, strength and consistency across sectors and industries), and thus of identifying key policy needs. They suggest strategic questions and approaches to addressing such policy needs and offer policy options. These are summarised in Figures 17.4–17.6.

Figure 17.4 shows ways for countries to enter global production networks. Those avenues include ways to attract foreign investors, as well as strategies to enhance the participation of domestic firms in GVCs. Suggestions for entering GVCs encompass measures to ensure that the country can offer world-class connectivity to the global economy and create a friendly business climate for foreign tangible and intangible assets.

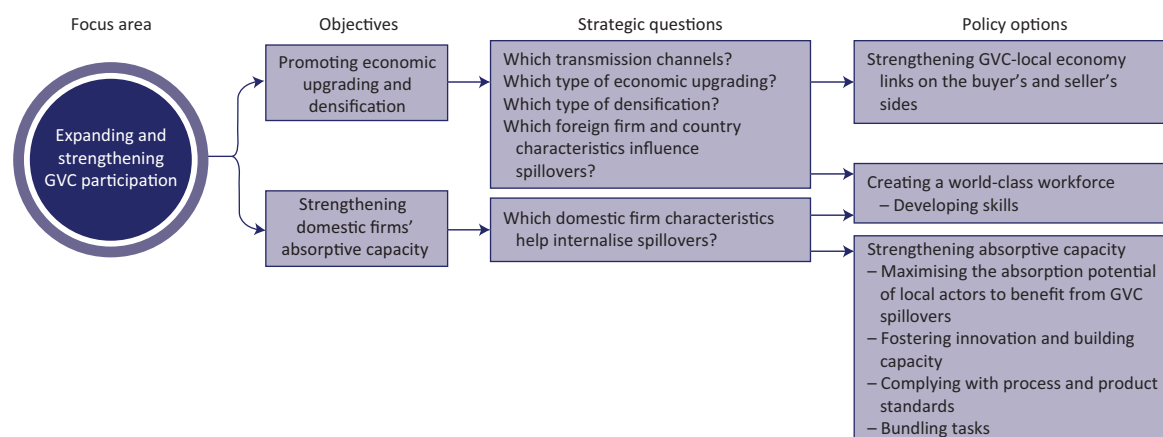
However, GVC participation is a necessary but not sufficient condition for development. Although GVCs open doors, they are not magical. Most of the hard work still has to be done at home, with domestic pro-investment, pro-skills, pro-jobs and pro-growth reforms.

**Figure 17.4** A policy framework for entering GVCs



**Source:** Taglioni and Winkler (2016).

Figure 17.5 Policies for strengthening participation in GVCs



Source: Taglioni and Winkler (2016).

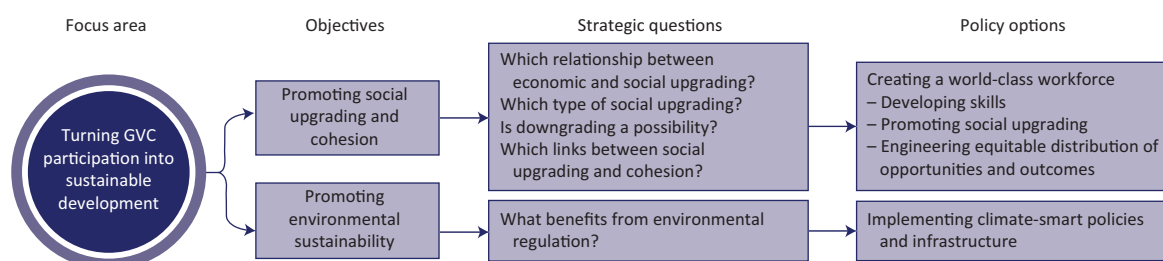
Creating demand for high-productivity workers must be matched with a supply of capable workers who have the relevant skills. In other words, when thinking about the first step in facilitating GVC entry, policy-makers must have a clear road map of how entry will lead to strengthened and broader participation, and economic and social upgrading. Policy-makers must keep a keen eye on the workforce's competencies and how they match up with foreign investment.

Figure 17.5 shows that expanding and strengthening participation in GVCs require countries to lever their position and enhance domestic production, achieving higher value addition through economic upgrading and densification. The concept of economic upgrading is largely about

gaining competitiveness in higher value-added processes, products, tasks and sectors. Densification involves engaging more local actors (firms and workers) in the GVC network. Raising domestic labour productivity and increasing skills contributes to the overall goal of increasing a country's value added that results from GVC participation.

Finally, countries also need to tackle the challenge of turning GVC participation into sustainable development (Figure 17.6). Three areas of sustainable development are important: macroeconomic sustainability, social sustainability and environmental sustainability. Not only are they important development objectives per se, but they also ensure the sustainability of a GVC-centric

Figure 17.6 Policies for turning GVC participation into sustainable development



Source: Taglioni and Winkler (2016).

approach to development. Labour market-enhancing outcomes for workers at home and more equitable distribution of opportunities and outcomes create social support for a reform agenda aimed at strengthening a country's GVC participation. Climate-smart policy prescriptions can mitigate the challenges for firms from climatic disruptions, as those firms seek to ensure the long-term predictability, reliability and time-sensitive delivery of goods necessary to participate in GVCs. Because climatic disruption can impair firms' ability to access inputs and deliver final products, countries' preparedness is an increasingly critical factor in firms' location decisions.

## 17.7 Conclusion

This chapter has surveyed and assessed the relationship between GVC participation and economic development. Specifically, we have examined the channels and circumstances through which GVC engagement may assist countries in advancing their economic development objectives. In this context, it is useful to restate a few of the key assumptions underpinning this chapter. First, the types of policies and the quality of institutions required for successful GVC participation play an important role in determining economic development. However, 'graduating' to high-income status remains difficult: the types of capabilities, policies, investment decisions and institutional processes are highly complex and interact in unpredictable and dynamic ways. Moreover, they are often unique to the country, sector and product context in question. Emergent technological changes are likely to further complicate the ability of countries to integrate into and upgrade within GVCs.

This in turn informs a series of more specific policy recommendations of how to move towards a less zero-sum view of the emergent paradigm of industrial development in an

age of globalised production networks and increasing automation. For one, policy-makers and companies in the digital era – in developed and developing countries alike – will have to focus on the key features of the twenty-first century economy. These include the interplay between technological (digital) innovation and globalisation (increased connectivity and GVCs), and strengthening an environment conducive to diversification, innovation and productivity in the era of digital innovation.

In this context, policy-makers should consider the following issues as priorities:

- *Investing in digital technologies* – newcomers should not favour manufacturing over services and innovation functions, and early developers and newcomers alike should balance policies that support connectivity infrastructure building and the deployment of leading-edge information and communications technologies (ICTs), with those that support the development of the domestic ICT sector (reaching a balance is likely to present a challenge).
- *GVCs and the enabling environment* – to be competitive in the new ICT-dominated environment, countries and companies will need to be part of global production and knowledge networks, upgrade infrastructure and connectivity systems, and ensure regulatory certainty.
- *Human capital* – countries will need to develop the necessary talent through technical skills acquisition and, crucially, soft skills (managerial skills, strong foreign-language skills, etc.)
- *Reducing barriers to knowledge* – they will also need to reduce barriers to foreign skilled personnel and individual services. One dimension of this could be mutual recognition arrangements for professional services, which could help to facilitate the

movement of global talent into the home country. Reducing barriers to knowledge also involves establishing strong intellectual property rights to attract technology-intensive foreign investors.

- *Focus on workers, as well as jobs and firms* – ensure that the link between productivity and distribution, and that between economic and social impacts, works. This requires ensuring social cohesion through policies that focus on workers and not on jobs (retrain, educate, support mobility and income, perhaps associated with well-targeted and non-distortive vertical interventions), as well as package policies for openness with social, governance and infrastructural support at the regional level (the EU single market is possibly the best example of successful opening and avoidance of the middle-income trap for most members). This also applies to industrialised countries and includes supporting workers who have suffered wage cuts and/or job loss due to technical progress and globalisation.
- *Deep integration agreements with knowledge clusters* – new technologies, new processes and new products require a fair amount of decodification and recodification according to innovative criteria. Therefore, they tend to arise from existing knowledge clusters, where the pool of skills and support functions is both deep and broad. The activity of decodification and codification of new processes also implies that such clusters are natural standard-setting bodies. The role of knowledge clusters can therefore be self-reinforcing.
- *Contract enforcement and governance* – cutting-edge digitally powered goods and services are likely to be outsourced, based on sophisticated contractual arrangements. This means that areas such as contract enforcement and the rule of law are again important foundational areas.

- *Infrastructure investment* – this can help prevent the digital revolution creating a wedge between the networked (countries, individuals, firms) and the non-networked. Infrastructure (physical, digital and institutional) building that connects global hubs with peripheral countries, and global cities with both smaller centres and rural areas, opens opportunities and ensures that the development potential of digital technologies reaches a large fraction of the world's population. Without infrastructure building, the matching of technologies, services and talents at the global level unleashed by the interplay between digital innovation and globalisation would lead to distributional effects, including shifts in global income towards the networked (countries, individuals, firms) and a task remuneration structure that further tilts away from production functions to services, innovation and core R&D functions.

## Notes

- 1 World Bank, Washington, DC.
- 2 See Baldwin (2012) and 'developmental state' literature (Amsden 1992; Wade 1990; Johnson 1995).
- 3 For example, by Brookings (West 2015), McKinsey (Chui *et al.* 2015) and KPMG (2016), as well as numerous papers (see Autor 2015; Beaudry *et al.* 2016; Eden and Gaggli 2015; Morikawa 2016; Pikos and Thomsen 2016).

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