

# Global Value Chain-Oriented Industrialization: Policies Revisited

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**ABSTRACT**- Industrial policies consist of a wide range of measures that seek to structurally guide an economy onto the next level of development. They can be formulated by the state or government to substantially transform the state of a non-existent, nascent or ailing industrial sector and, more broadly, an underdeveloped nation's economy towards a structure of production that offers better prospects for economic growth. Global value chains (GVCs) are coordinated by transnational corporations (TNCs), which constitute larger, internationalized firms, while small and medium-sized enterprises (SMEs) are generally scattered along the chain, filling in where they possess a comparative advantage. Though GVCs provide a landscape within which firms may thrive, the rewards are usually reaped by the larger firms at play. There is room, therefore, for industrial policies to address the status of SMEs in GVCs, facilitating their sustainable and profitable insertion without sufficiently interfering to negate the virtues of the free market.

**Keywords:** Global value chains, industrial policies, SMEs, transnational corporations.

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## 1. INTRODUCTION

Industrial policies consist of a wide range of measures that seek to structurally guide an economy on to the next level of development. In particular, they can be formulated by the state or government with the intention of substantially transforming the state of a non-existent, nascent or ailing industrial sector and more broadly, an underdeveloped nation's economy towards a structure of production that offers better prospects for economic growth. For latecomer economies, designing industrial policies is the key to enabling autonomy over their sustainable economic development. Thus, given their fundamental place in sustainable economic development, the question, especially for least developed countries (LDCs), is not whether there should be industrial policies in place, but rather to what extent and in what manner such policies should be implemented to achieve optimal outcomes.

Naudé (2010) identified five new challenges for industrial policies relevant to the debate on the issue. These included (i) globalization and the rise of global production networks or GVCs, (ii) crises in food, fuel and financial markets, (iii) climate change, (iv) the rise of China and India, and (v) the rise of the “entrepreneurial economy”. These, together with the emergence of the fourth industrial revolution (4IR) and increasing significance of regional trade blocks, necessitate rethinking of country's overall approach towards industrialization. Because, in one hand governments need to incentivize private sector-led economic growth and national competitiveness, while on the other they need to address market failures and negative externalities associated with such growth. Likewise, governments often need to ensure an enabling environment for all market actors – large or small, home-grown or foreign – according to the needs of the industry and/or the development challenges of the country.

Among different approaches to industrialisation, industrial policies have emerged that both facilitate the development of global value chains (GVCs) and that intend to maximize the ensuing benefits. A GVC can be defined simply as “the full range of activities required to bring a good or service from conception, through the different phases of production and delivery to final consumers, and, finally, to disposal after use” (Gereffi and Fernandez-Stark, 2011, p. 3). What makes a value chain global is therefore the fragmentation of these activities across international borders. GVC-oriented industrial policies aim at reinvigorating the growth of the manufacturing sector and at promoting its linkages with international markets. Such

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policies regulate links to the global economy – especially through trade and foreign direct investment (FDI) – taking into account new end-markets, product development, skill requirements technologies, innovation and sources of credit (Singh, 2016). These are to be contrasted with traditional industrial policies within the import substitution industrialisation (ISI)<sup>2</sup> and export-oriented industrialization (EOI) frameworks<sup>3</sup>, where a more closed-off strategy is implemented, focusing on the development of local production capacity and final goods exports (Baldwin, 2011; Gereffi, 2014; Milberg and Winkler, 2013). Given the increasingly interconnected nature of the global market, the push for more innovative GVC-supportive industrial policies from many developing countries is stronger than ever – the hope being to upgrade their industries to higher value-added operations within rapidly expanding cross-border production networks (ESCAP, 2015).

GVCs are usually coordinated by transnational corporations (TNCs) which constitute larger, internationalized firms, while small and medium-sized enterprises (SMEs) are generally scattered along the chain, filling in where they possess a comparative advantage. Though GVCs provide a landscape within which firms may thrive, the rewards are usually reaped by the larger firms at play. There is room therefore for industrial policies to address the status of SMEs in GVCs, facilitating their sustainable and profitable insertion without sufficiently interfering to negate the virtues of the free market.

## 2. DIFFERENT APPROACHES TO INDUSTRIAL POLICY

Before presenting the concept of GVC-oriented industrial policy, this section presents four conventional types of industrial policy, namely: (i) horizontal industrial policy; (ii) sector-specific industrial policy; (iii) matrix industrial policy; and (iv) industrial cluster policy.

### 2.1 Horizontal Industrial Policy

A horizontal, or indiscriminate, industrial policy approach is a broad policy approach whereby the state indiscriminately offers general support throughout the economy, providing measures that regulate industries and enterprises (Warwick, 2013). With this type of policymaking, the state's role should involve creating general conducive conditions for industrial growth and efficiency, thus attracting investment and enabling the healthy evolution of market players. Horizontal industrial policy hinges on the notion that a homogenous approach has spill-over benefits with regard to ancillary aspects such as workforce attributes, market imperfections and research and development (R&D). In its broadest understanding, this type of policy would involve the framework of all enterprises, instituting the removal of administrative barriers, the proper rule of law and good

governance. *Table 1* summarises the definitions of horizontal industrial policy.

**Table 1: Definitions of horizontal industrial policy**

Author	Definition
<b>OECD (1975)</b>	Policies concerned with promoting industrial growth and efficiency.
<b>Curzon-Price (1981)</b>	Any government measure, or set of measures, promoting or preventing structural change.
<b>Adams and Klein (1983)</b>	Policies improving growth and competitive performance.
<b>Jacquemin (1983)</b>	Policies specifying and solving the problems of structural change in the economy [through creating] optimum conditions for the necessary structural transformations to be carried out.
<b>Rodrik (2004)</b>	Restructuring policies in favour of more dynamic activities, regardless of whether those are located within industry or manufacturing per se.

Horizontal policy includes the provision of subsidized credit to SMEs, labour training and wage subsidies, infrastructure in economic zones or industrial areas, state support to industrial research and education, incentivization of R&D, protection of intellectual property rights and more recently, competition-oriented policies. Though they are applied neutrally, horizontal policies are likely to have different impacts on different sectors, or may even be implemented in a targeted manner to achieve a nation's economic or industrial goals. For example, policy intervention to improve financial intermediary services offered by commercial banks will benefit those formal enterprises that have access to finance from the banking sector as opposed to smaller and less formal enterprises (Warwick, 2013).

The European Commission in the 1990s and the early 2000s followed a predominantly horizontal approach to industrial policy (Szalavetz, 2011). The United States which has traditionally not adopted an official industrial policy also recently launched an innovation strategy that implements classic horizontal measures offering support to infrastructure, education and public services (Warwick, 2013). North-East Asian economies such as Japan, the Republic of Korea and the Taiwan Province of China adopted several horizontal measures at certain stages of development as well. Policy measures included below market interest rates for long term and working capital, sector ally differentiated profits taxes, subsidized electricity rates, highly differentiated tariffs and non-tariff barriers, etc. (Noland and Pack, 2001). To control interest rates, South Korea and Taiwan nationalized all banks and closely regulated other financial institutions that helped them create, in effect, a three-tiered interest rate structure. Interest rates for important borrowers were about-fourth of market-dictated rates, while the real interest rates on foreign loans, reserved for firms

<sup>2</sup> Import substitution industrialization (ISI) refers to a trade and economic policy that attempts to bring greater economic independence by replacing imports with domestic production of industrial products. ISI often intends to build national capacity through policy instruments such as protective tariffs or special

preferences for domestically made goods to importing goods (Baer, 1972; FitzGerald, 2000).

<sup>3</sup> Export-oriented industrialization (EOI) refers to a policy designed to stimulate the growth of domestic industries through export to the developed markets (Milberg, *et al.*, 2013).

of targeted industries, were consistently negative (Amsden, 1990).

However, government support in these countries was not implemented as a one-sided affair: enterprises were expected to meet strict performance criteria and were penalized, in some cases even driven to bankruptcy, if the criteria were not met (World Bank, 1993). Big businesses that had received subsidized credit were prevented from raising their product prices and migrating capital. South Korea, for example, put in place price ceilings on a number of products and made illegal capital flight punishable with a minimum of ten years' imprisonment and a maximum of the death penalty. Likewise, while companies were allowed to hire labor with low wages, they were required to provide training and subsequently pay higher wages. Consequently, average real wages grew exceptionally fast by the standards of previous industrializations and other late-industrializing countries (Amsden, 1990).

## 2.2 Selective Industrial Policy

In practice, however, industrial policy is rarely purely horizontal. Selective industrial policy targets certain sectors and industrial activities, tailoring regulations and interventions in order to harness, amongst other things, increased productivity, capacity building and sectoral restructuring (Chang, 2006). A need is felt to supplement a wide regulatory approach with measures that address the specific requirements of certain sectors. In most countries, the intrinsic nature of products like agro-products, automobiles, medicine or chemicals come under the ambit of sector specific regulations that cater to the individual needs of that sector. For other countries with deregulation, sector specific policies may be adopted to address the needs of a certain sector that is deemed to be lagging behind or having untapped potential like the textile and electrical industries. Thus, industrial policy is not a term that can only be understood to indicate horizontal measures but would also include other sectoral and ancillary, or vertical, policies. *Table 2* presents the major definitions of selective industrial policy.

**Table 2: Definitions of selective industrial policy**

Author	Definition
Tyson and Zysman (1983)	Government policy aimed at or motivated by problems within specific sectors.
Krugman and Obstfeld (1991)	An attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth.
Evenett (2003)	Any type of selective government intervention or policy that attempts to alter the structure of production in favour of sectors that are expected to offer better prospects for economic growth.

Most economies have identified the need to customize industrial policy for certain capital intensive, strategically sensitive or public utility sectors such as electricity, mining, pharmaceuticals, automobiles and manufacturing (Chang, 2006; Warwick, 2013). Selective industrial policy measures include export subsidies or import tariffs where differential

rates are offered based on the level of productivity, temporary financial assistance and diversion of credit to certain sectors. Industrial policies within the import substitution industrialization (ISI) framework are regarded as examples of selective approaches, which are adopted extensively by economies in the early stages of industrialization to establish domestic production capacity instead of relying on imports. For example, Latin American countries in the 1950s and 60s adopted special preferences for domestic and foreign firms importing capital goods for new industries; preferential import exchange rates for industrial raw materials, fuels and intermediate goods; and soft loans by government-controlled development banks for favoured industries (Baer, 1972).

Most jurisdictions in South-East Asia and South Asia have also identified sectors within which they have a comparative advantage and pursued an export-oriented industrialization (EoI). In order to drive export, some of these countries maintain special focus on certain industries, while others have kept the options wide open. For example, Malaysia has focused on electronics, while Bangladesh works mainly on textile and garment, along with traditional exports (such as tea, jute and leather) and emerging ones (such as the pharmaceutical and IT). To further incentivize export, Bangladesh offers varied (often multi-layer) cash incentives on export of different targeted products. On the other hand, India focuses on stimulating their entire manufacturing industry with the intention of increasing exports. While some successful cases of Asian countries exist, whether it is universally accepted in practice is questioned for reasons such as informational asymmetries in selecting optimal target industry or lack of clarity of objectives (Lall, 2000).

Another form of selective policy is the choosing of national champions or the development of large domestic enterprises with the intention of eliminating foreign competition. A successful national champion approach can be best illustrated by the preferential treatment of top conglomerates such as Samsung and Hyundai in the Republic of Korea (Lin and Chang, 2009). Besides, strategic industrial policies have become common among many Asian countries. For example, in 2010, Japan also introduced an industrial policy that focuses on five strategic sectors: (i) green industries (including renewable energy); (ii) culture (e.g., fashion, food and tourism); (iii) pharmaceuticals; (iv) healthcare; and (v) technologically advanced areas intrinsic to Japanese industry such as robotics and aerospace (METI, 2010).

## 2.3 Matrix Industrial Policy

Matrix industrial policy is a combined policy framework between horizontal and selective industrial policies. It has been proposed by a number of countries focusing on coordinative and monitoring initiatives between centralized policies and more sector specific policies. As the industrial policies of states began to hinge more and more on encouraging innovation, stimulating cross-border trade and preparing their legal framework for this era of globalization, industrial policy became more difficult to be characterized as contemporary approaches as singularly horizontal or sectoral. This type of multi-faceted policy has been termed as the "matrix approach" (Aiginger and Sieber,

2006). Table 3 presents the major definitions of the matrix industrial policy.

**Table 3: Definitions of matrix industrial policy**

Author	Definition
Johnson (1984)	The initiation and coordination of governmental activities to leverage upward the productivity and competitiveness of the whole economy and of particular industries in it.
European Commission (2002)	Policies which bring together a horizontal basis and sectoral applications and takes into account the specific needs and characteristics of individual sectors.

The matrix approach is based on the understanding that though jurisdictions should maintain a horizontal approach to industrial policy promoting competitiveness, specific policy measures addressing the needs of certain sectors must also be implemented. The matrix approach makes use of a matrix indexed by policy instruments and sectors. The impact and relevance of an instrument on every sector can thus be located in the matrix to understand policy functionality (Aiginger, 2007).

This approach was initially designed by the European Union (EU), whose member states such as France had traditionally followed only the horizontal approach to industrial policy. In turn, it has entered the discourse of the region since the mid-2000s, in response to increasing globalization and consequentially intensifying global competition in both manufacturing and R&D (Szalavetz, 2011). In 2002 in particular, the EU first affirmed the necessity of acknowledging sector differences and designing complementary sector-specific measures (Aiginger and Sieber, 2006; European Commission, 2002). Launched in 2010, “Europe 2020,” the EU’s ten-year growth strategy, reaffirmed that general policies such as those relating to standardisation or patenting affect different sectors in different ways, and that different supports are required accordingly (Farla, *et al.*, 2015; Geoffrey, 2012). As there is no universally agreed upon definition of industrial policy, and as those policy measures originally designed to be horizontal have *de facto* vertical effects, the dividing lines between “horizontal” and “vertical” policies become increasingly blurred. Recognizing that the traditional horizontal/vertical dichotomy does not often reflect the complexity of economic systems has supported the newly developed idea that industrial policy can be better portrayed as a two-dimensional matrix.

### 2.4 Industrial Cluster Policy

The production of goods, especially in large, heavy or particularly complex industries, often has significant start-up or running requirements. Amongst other things, such requirements include factory installations, machinery, skilled or experienced workers, logistic support, a system of contracts and business practices that have evolved in a manner that caters to the industry specifically (Warwick, 2013). Because individual

businesses may not be able to obtain such inputs on their own, industrial policies that service *clusters* of relevant businesses are essential. These complex and comprehensive industrial policies are similar to selective industrial policy, though they specifically involve geographic concentration of industry to maximise synergy.

The propensity of interrelated enterprises and associated institutions to operate in spatial proximity is called “clustering” (Porter, 2000). Such agglomerations of associated enterprises or industries tend to have a competitive advantage and observable benefits when compared with stand-alone setups. Firms in a cluster may gain competitive advantages from their proximity to specialized suppliers, distributors and customers, pools of skilled workforces and their easy and fast transfers of knowledge. Particularly in the case of SMEs, clusters offer opportunities to overcome obstacles associated with size, transport costs and access to information and technology (Baptista and Swann, 1998; Ellison, *et al.*, 2010; UNIDO, 2004). Because of the side-effects of clustering, it is important to provide policies incentivizing the creation of such clusters or in some instances, special industrial areas or special economic zones (SEZs). It is important to note though that often, “the purely top-down approach to cluster creation should be exercised with caution” because “the formation of clusters takes time and needs an ecosystem based on market forces” (Zeng, 2011, p. 7). In effect, market forces are usually the best catalyst for the creation of an industrial cluster. Governmental policy and support are then best implemented to facilitate the development of clusters rather than to facilitate their inception. Conditions permitting, special industrial areas or SEZs can then be formed from these clusters so as to promote further industrial growth. Table 4 provides the definitions of industrial cluster policy.

**Table 4: Definitions of industrial cluster policy**

Author	Definition
Porter (2000)	Policy which aims at removing obstacles, relaxing constraints and eliminating inefficiencies that impede productivity and innovation in the cluster.
Ministry of Economy, Trade and Industry (METI) of Japan (2005)	To form industry-academia-government networks and industry-industry networks <sup>4</sup> for the purpose of forming industrial clusters, and to create new industries and business by promoting regional innovation.
The Board of Investment of Thailand (2015)	To boost the level of support and cooperation in all facets of the business, both vertical and horizontal, in order to strengthen the industrial value chain, enhance investment potentials and competitiveness, and expand socioeconomic development to regional and local levels.

The economic argument in favour of clustering is based on the identification of existing and nascent clusters rather than on

<sup>4</sup> The concept of “networks” shares linked phenomena with “clusters” as they can be formed between firms sharing common interests or needs while it is not necessarily required to operate within geographically concentrated clusters.

Networks can be horizontal and vertical, and often based on closed membership. Read UNIDO (2001) and Rosenfield (2005).

creating clusters where none yet exists. A policy that aims at creating groups of industries from scratch is a costly, high-risk policy measure that may have a counter-productive impact if policy incentives in many regions cater to similar sets of industrial enterprises. It is therefore difficult for a government to create and administer these complex systems by means of policy initiatives alone. Thus, the case in favour of clustering is limited to measures that facilitate existing or emerging industrial structures that the private sector leads principally (Warwick, 2013). However, SEZs are often initiated and developed by governments from scratch.

The fostering of industrial clusters is now a common phenomenon observable in a number of developed and developing economies and jurisdictions (Otsuka and Sonobe, 2011). Cluster initiatives can be introduced across a variety of domains but are usually characterized as location based (industrial areas, economic zones and planning exemptions) or system based (networking systems and cluster management firms). For example, the METI of Japan introduced its industrial cluster policy in 2001 and implemented 19 cluster projects<sup>5</sup> in 2009 in close partnership with its regional bureaus and private promotion organizations (METI, 2009) (also see in Annex 1). In India, the region around Bangalore city was developed as an ICT hub by the local government and stands as a prime example of cluster development enhancing industrial activities (Dijk, 2008). Thailand's 'one village, one product', or 'one *thambon*, one product' (OTOP) programme has also worked to strengthen the capacity of existing grass-root industrial clusters through government selection (Thaitambon.com, 2017).

### 3. GVC ORIENTED INDUSTRIAL POLICY

While traditional approaches to industrial policy do take international pressures and opportunities into account, targeting international markets is generally a consequence of these policy approaches rather than a principal concern. Given the

significant interdependence of neighbouring economies, industrial policies that focus on international or regional markets should make up an important part of their policy portfolios. In particular, industrial policies that focus on internationalization via GVCs are of paramount importance. Given that as of 2013, UNCTAD estimates that 60% of global trade is in intermediate goods (UNCTAD, 2013), GVCs – representing the avenues through which these goods are traded – provide ample opportunities for industrial policymakers to promote internationalization throughout their respective economies.

The emergence of GVCs in recent decades has provided a new challenge for industrial policymakers. Export-oriented economies, such as Hong Kong, China, India, Malaysia and the Republic of Korea, have experienced immense growth in certain industries. This has been aided by governments cultivating and strengthening links between suppliers and buyers thereby developing the role that they play in GVCs. This wave of vertically specialized industrialization has begun to feature as a key aspect of industrial policies (Milberg, *et al.*, 2013). GVC-oriented industrial policy requires the identification of international business linkages and the positions of lead firms within the overall value chain. It seeks the industrial "upgrading" of enterprises under its jurisdiction such that they may contribute to higher value addition. This combines disparate approaches to the industrial policy frameworks discussed in the second section, whilst prioritizing development issues. Gereffi and Sturgeon (2013) suggest three distinct features of GVC-oriented industrial policy: (i) the focus on attracting global suppliers rather than lead firms – in parallel with the international activities of lead firms<sup>6</sup>; (ii) the targeting of specialized niches in GVCs rather than the facilitation of fully vertically integrated domestic value chains; and (iii) the access to inputs and services of global suppliers (now established domestically) providing to local enterprises (Gereffi and Sturgeon, 2013).

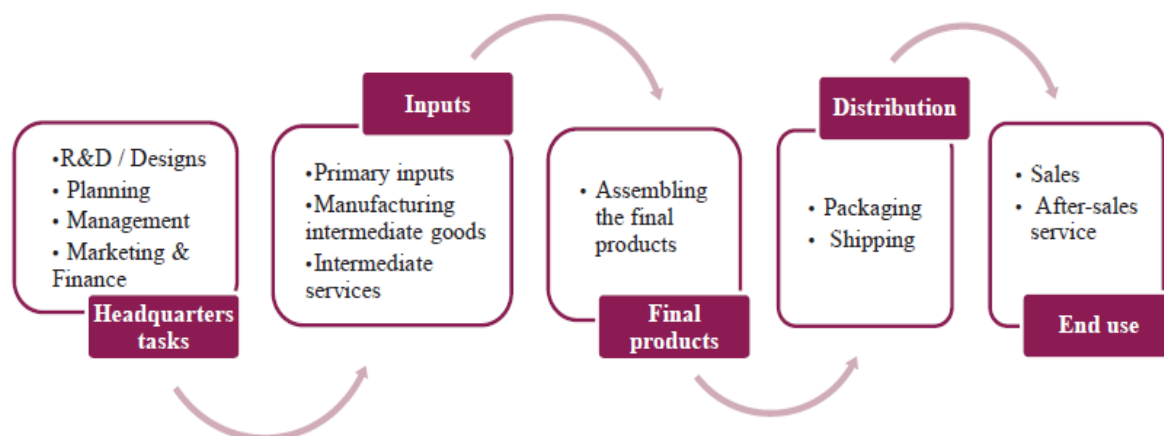


Figure 1: A Simplified Value Chain [Source: ESCAP (2015)]

<sup>5</sup> Nineteen industrial cluster projects led by the Government of Japan formed industry-university-government networks nationwide including 10 200 regional SMEs and more than 560 universities in total.

<sup>6</sup> Examples of global suppliers are Compal Communications Inc., which produces handsets for Acer and Nokia (see <http://www.compal.com> for more clients) and Foxconn, Apple's primary supplier (Gereffi & Sturgeon, 2013).

For SMEs, for example, a GVC-oriented industrial policy would address typical factors influencing the capacities of SMEs to interact with regional markets. These include internal factors such as the global mindset and entrepreneurial capacities of managers (Hutchinson, *et al.*, 2006; Lloyd-Reason and Mughan, 2002), as well as external factors such as hard and soft infrastructure, government policy and labour costs. SME development requires clustering, education support and vocational training of workforce, high quality physical and soft infrastructure for intermediate goods trade, together with trade and policy liberalization to attract FDI inflows, which are seed capital for the development of GVCs in a host country. Besides, required are elaborate policy approaches that promote full absorption of foreign technology, strong public governance that reinforces corporate codes of conduct and product certifications and process standards that encourage local firms to meet the standards of global buyers and lead firms (Gereffi, 2014). China is a prime example of success with a GVC-oriented industrial setup (Zeng, 2011). Here, stringent workforce regulation and flexibility in GVCs along with speedy responses to demands from international buyers are supplemented by state funding for infrastructure and cluster development.

The GVC phenomenon is closely related to the growing trade in intermediate goods and to the increasing manufacturing capacity among SMEs in developing countries (APEC, 2013; OECD and World Bank Group, 2015). Trade in intermediate goods in 2015 accounted for approximately \$7 trillion USD, while primary and capital goods were valued at less than \$3 trillion USD and consumer goods at slightly less than \$4 trillion USD (UNCTAD, 2016). Catalysed by the rapidly expanding range of activities that link up with multinational lead firms, SMEs in developing countries with cheaper labour costs and less stringent regulations play a major role in providing intermediate goods or services that are used to build the final products. On the other hand, many SMEs in higher-to-middle-income developing countries seek to upgrade their manufacturing capacity in order to be positioned as intermediate goods suppliers in higher value-adding tiers. Well-tailored SME policies, resulting in the creation of special economic zones (SEZs) and investment in skilled labours, can make GVCs more inclusive by providing opportunities for smaller players to specialise in niche intermediate tasks and by increasing technological sophistication of production. Emerging digital economy policies that incorporate information and communications technology (ICT) into SME operations, reducing costs in accessing and utilising ICT goods and

telecommunication services, may also be a key factor underpinning increased SME participation in GVCs (ADB, 2015a; OECD and World Bank Group, 2015).

A GVC-oriented industrial policy must address the issue of “industrial upgrading,”<sup>7</sup> in particular to enhance the competitiveness and international presence through the enhanced capabilities of the producer. It means that the producer enhances its capacity and capability overtime to take over more complex, high value-added functions in gradual steps. An initiative seeking growth in this direction is that of Industry 4.0.<sup>8</sup> Thailand has adapted this approach with Thailand 4.0, developing a set of policies aimed at helping Thailand transition to “a value-based and innovation-driven economy by moving from producing commodities to innovative products [and by] moving from a production based to a service-based economy” (BOI, 2017, p. 3).

Upgrading might not work in every economic context, and several companies in economies like the Taiwan Province of China have chosen to restrict themselves to the manufacturing of original equipment without attempting to upgrade their capabilities to design manufacturing. However, such an option may not always be an option for companies as is evident by the Indonesian Government’s initiative of industrial upgrading within the mining industry. The manner of upgrading will also vary - whether it is product upgrading, which adds new value to the product, or process upgrading, where the efficiency of the processes used are enhanced (Humphrey and Schmitz, 2002).

For an industrial policy to effectively and successfully orient itself in a GVC model, the focus of the policy should ideally shift from developing fully integrated industries to moving into higher valued tasks associated within the industry. However, this may not always be in the best interests of the industry. For instance, in the ready-made garments (RMG) sector of Bangladesh, the higher valued tasks lie in the marketing and sales sector, which are usually done by global apparel brands, while Bangladesh engages itself in the lower valued tasks such as the manufacturing of garments. Given the resources and capabilities, shifting the focus from manufacturing to marketing the garments would not be the wisest decision for Bangladesh to undertake, since their competitive advantage lies in manufacturing, and it would be better to develop fully integrated industries with backward and support industry linkages. The state will need to effectively facilitate networks participating in the GVCs and assess which form of upgrading

<sup>7</sup> A typical industrial upgrading pattern could be described as a process through which economies develop their operations from doing mainly assembly activities to more sophisticated own-equipment manufacturing to ultimately own-brand manufacturing (see Gereffi, 1999, for further details).

<sup>8</sup> Industry 4.0, or the fourth industrial revolution, is the strategic initiative pioneered by the German Government to integrate industrial manufacturing with ever-evolving innovative digital or ICT applications. This initiative is now stretching beyond Germany and changing the landscape of manufacturing throughout industries, clusters and GVCs. It refers to the industrial ecosystem where manufacturing and distributing processes and functions are connected and interacted with through digital networks. This new wave of manufacturing is based on digitalized factories which enhance speed, flexibility and efficient resource allocation. Industry 4.0 has also been driven by the exponential

increase of data flows and connectivity and digitally supported human-machine interactions (McKinsey, 2016). One of the core principles of Industry 4.0 rests on the integration of players within GVCs. Closely linked GVC players, such as lead suppliers, distributors and service providers, can achieve higher transparency, flexibility and efficiency by working as one entity. The stages of GVCs are digitally connected through ICT and logistics infrastructures and GVC players can exchange key business and technical information on product development and production systems. SMEs are one of the major target audiences of Industry 4.0, as they are expected to face challenges in absorbing fast-changing new industry processes through automation or digitalisation. Industry 4.0 is expected to offer unprecedented opportunities for SMEs by exhibiting highly efficient business models with reduced production costs and capacities to respond more efficiently to market requirements (GTAI, 2014).

or downgrading of industrial activity is needed for its domestic firms according to their comparative advantages. This is why GVC-oriented policy should rather aim to facilitate growth, rather than to create it from scratch (Zeng, 2011). Those states aiming at the upgrading process within a value chain may need to put policy priorities on SME development, infrastructure development, FDI promotion, and access to ICT goods and services to maintain or enhance their trade capacity (ESCAP, 2015). Those four policy priorities are briefly reviewed as follows.

Given the increasing role of SMEs within international production networks, the implementation of policy initiatives in line with SMEs' internationalization and their integration into GVCs is among the principal issues for policymakers. The GVC participation of SMEs in developing countries is especially important as SMEs constitute the main sources of national income and account for 80-90% of total employment (OECD, WTO and World Bank Group, 2014). However, integration of SMEs predominantly operating in the informal economy is challenging, not to mention upgrading their position from labour-intensive, low value-added activities. Along with traditional measures enabling capacity-building of SMEs to deal with prevailing challenges of finance, infrastructure or informality, GVC-oriented SME promotion policies in developing countries may require further attention to well-educated and trained human resources or managerial and entrepreneurial training (UNCTAD, 2013). Creation of industrial clusters for SMEs, again, could be one effective way to enable SMEs to get access to a pool of skilled workforces.

While government policies relating to enhancing public infrastructure are often categorised as "horizontal" as the benefits are shared across sectors, they are particularly important in facilitating developing countries' entries into GVC. Improved regional connectivity through investment in hard and soft infrastructure networks can substantially reduce the time and cost of transportation when trading (Pomfret and Sourdin, 2014). As fragmented production networks entail complex movements of goods and often require multiple border crossings, the improvements in physical infrastructure and services such as logistics and streamlined customs clearance are requirements for firms to stay competitive and better connected to GVCs (ESCAP, 2015).

The role of governments in designing industrial policies that promote FDI inflows is another key factor enabling local firms' integration into GVCs. For some developing economies, it is estimated that FDI is found to increase GVC participation (OECD, 2015). FDI is particularly attracted by pertinent government policies, such as trade liberalization and SEZ development. China, for example, has implemented a range of industrial policies - notably tariff liberalization, tax policies and SEZ development - which have aligned FDI more closely with

national development priorities (Du, *et al.*, 2014). This has carried a range of strategic implications for the Asia-Pacific region at large. It is an attractive destination for FDI with \$559 billion USD in total in 2015 (ESCAP, 2016)<sup>9</sup>, with other member states having joined forces with China through GVCs.

Another important determinant of SMEs' integration in GVCs is access to ICT goods and services, as they reduce the costs of coordination, facilitate the timely and efficient exchange of intermediate goods, and enhance supply chain management carried out in a geographically dispersed manner (Kosacoff, *et al.*, 2008; OECD, 2015). Access to digital products and services enables SMEs to tap into niches in GVCs and to directly access customers in global markets previously only accessed by larger firms (ICC, 2016). While the benefits for national economies<sup>10</sup> from leveraging digital technology are enormous, many developing countries and smaller local firms in the region are yet to seize the opportunity due in large part to a lack of digital infrastructure, skills, knowledge or government support services. Shaping GVC-oriented industrial policies therefore requires a fundamental understanding of the ICT sector for future development.

#### 4. CONCLUSION

Industrial policy discourse has been controversial and brought about debate for a long time, ranging from a fundamental question on its necessity to a question on which specific approach or what form of a mixture of multiple approaches works best in a certain country at certain stages of industrial development.

Based on the belief that well-developed industrial policies promote substantial transformation of an economy on to the next level of development, countries ponder on the ways to apply various policy orientations to maximize their effects. Traditional binary approaches of picking out one between horizontal and vertical have abundant stories of both success and failure. Fuelled by the lessons learned from those experiences and by attempts to cope with ever-growing intensity and complexity of today's global economic landscape, countries now often take more sophisticated and dynamic approaches such as industrial matrix, cluster or GVC-oriented policies.

In an era of increasingly fragmented and diversified production networks, GVCs-oriented industrial policy, in particular, is coming on the fore. Its primary focus ranges from identifying extraterritorial linkages and positioning of individual firms or a country as a whole in rapidly expanding international production networks to seeking "upgrading" to capture higher shares of value added therein. In this context, the GVC-oriented approach encompasses capacity-building for SMEs' internationalization, enhanced connectivity

<sup>9</sup> While the Asia-Pacific region remains a major destination for FDI, total inflows to the region accounted for approximately 32% of total global inflows (\$1.76 trillion USD) in 2015, which is a sharp decrease from 43% (\$533 billion USD) of total global inflows (\$1.23 trillion USD) in 2014 although the amount

of FDI inflows increased in dollar term from 2014 to 2015 (ESCAP, 2015; 2016).

<sup>10</sup> For example, according to A. T. Kearney (2016), ASEAN economies can expect to earn an estimated \$1 trillion USD between 2015 and 2025 through digital economy.

through improvement of both hard and soft infrastructure, creation of an enabling environment to attract FDI and technology transfer and innovation of SMEs through effective diffusion of ICT goods and services. Even for the policymakers in the countries participating in GVCs as the lowest-tier suppliers, special attention should be paid to formulate industrial policies that lie outside the traditional scope of obstacles, as labour-intensive and low value-added GVC activities are easily replaced.

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