

ASEAN BRIEFS

Global Production Networks:
Implications on Trade, Industry, and Development



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ASEAN Briefs is a regular publication about current developments on ASEAN regionalism, especially in the Political-Security, Economic as well as Socio - Cultural Pillars.

**The Habibie Center -
ASEAN Studies Program ASEAN Briefs**

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Executive Summary

Trading between nations shape development. Since the latter part of the 20th century, due to the steep relative decline of transportation, trading, and coordination costs, production processes can now be separated between countries and continents to places with lowest marginal costs, giving rise to global production networks (also called value chains or global supply chains, henceforth as GPNs). We will argue that the recent proliferation of GPNs requires the rethinking of development strategies and increases the urgency for smarter national and regional governance.

This issue of **ASEAN Briefs** will first introduce the concept of production networks and discuss its importance for ASEAN with specific illustrations from Indonesia. This brief will then focus on GPNs' effects upon the economy and how national governments could develop policies that will increase the benefit of their countries' participation in GPNs.

We will argue that the high stakes of coordination failure between ASEAN member states to regulate GPNs weighs for better *regional* governance, precisely because the 'global' in GPN imply that the unilateral regulation of these networks could be inadequate or even backfire.



Introduction:

What are Global Production Networks?

GPNs arise when a range of production activities (from research and development to production and assembly and finally logistics and post-sale services) are separated among countries in stages, called a ‘value chain’. Value chains are not a new phenomenon, but value chains at a global scale have only been enabled by the combination of the relative decrease in the cost of transporting goods due to economies of scale in logistics, reduced trading costs caused by concerted efforts at trade liberalization, and the ever increasing efficiency of coordination ushered by the rise of information and communication technology.¹ Rather than producing a product from start to finish in the auspices of a single company (or at least a single country), the production process of GPNs are separated into distinct stages and distributed to suppliers and other affiliates in which that particular stage is cheapest to produce, taking into account the various costs of having to ship to and coordinate with remote affiliates.

Take your phone or computer.² The research, development, and design for the phone were done either in the United States, Japan, or some other advanced economy where a company’s headquarters reside; the sophisticated semi-conductors were made either in Taiwan or South Korea, which are then assembled in factories in China along with materials and components sourced from all over the world; then the marketing, advertising, logistics, and post-sales services are done by those headquarter countries with the help of affiliates in final-destination countries and outsourced service providers in India. We can find similarly complex links for the manufacture of cars, clothing, airplanes, electronics, and even food. The resources that were spent to organize the fragmented process as well as transporting goods back and forth are worth the efficiency gains that vertical

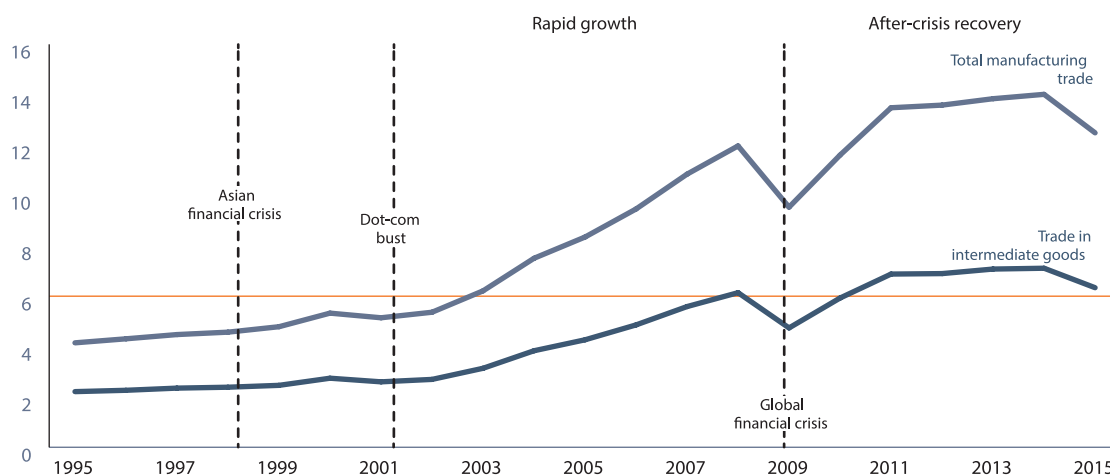
specialization of a specific industry among countries enables. It is the complexity that emerges from the (re)export and (re)import of goods at various stages of production that requires us to change our understanding of trade and industry for us to craft policies that would capitalize the opportunities of GPNs while mitigating its many risks. Although it is goods that cross borders, nations essentially trade ‘tasks’.³

‘Value-added Trade’ and the Importance of the Services Sector

This sequence of import, export, and reimport of goods in different stages of production has required the development of a new concept called ‘value added trade’. Back when countries only traded in final products, *gross* trade statistics was sufficient to show which countries specialized in what products, and relatively simple models of trade⁴ were enough to explain the patterns of trade. However in a world where goods move back and forth between countries, one must be careful to distinguish between the import of goods that is ready for consumption (final goods, e.g. packaged foods) and goods that will be processed further (intermediate goods, e.g. microchips for smartphones)

In **Figure 1**, because of the re-import of goods that already has some domestically-produced content and, conversely, the export of goods that has foreign-produced content, ‘total manufacturing trade’ does not capture ‘value-added trade’ due to multiple-counting. Global trade in intermediate goods, however, better captures how over the past two decades the manufacturing sectors of the world economy are increasing their participation in cross-border vertical specialization. Johnson and Noguera (2014), using the World Input Output Database, estimated that value-added trade accounted for about 76 percent of gross

Figure 1. Trends in Manufacturing Trade, 1995 – 2015



Source: World Bank (2017)

global trade.⁵ As gross trade statistics are unable to measure the back and forth of such a large proportion of trade, one should also be careful in interpreting trade deficit/surplus statistics as well.

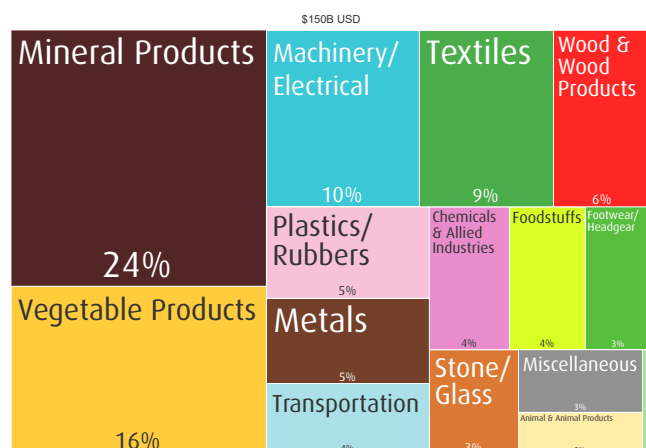
Also consider the difference between the goods that Indonesia exported in 2015 and what it exported *on net* (cleared of imported content) as in **Figures 2 and 3** respectively below. Gross exports were valued at US\$ 150 billion whereas net exports were at US\$ 100 billion, meaning that the US\$ 50 billion discrepancy is the foreign-produced content (imported parts) of the goods the country exported. For a further example, the gross export of machinery and electrical equipment was valued at US\$ 15 billion, but, taking away the imported part of that value, Indonesia's value-added for machinery and electrical equipment was a much smaller US\$ 2 billion.

Another feature of GPNs, and why the concept of value-

added trade should not be ignored is the importance of the services sector. Even though GPNs deal with trade in intermediate *goods*, services are an *input* to the many stages of manufacturing, a subtlety that would not be captured by gross trade statistics. A statistic called the VAX ratio measures the domestically produced content of gross exports, and as seen in **Figure 4**, the role of the services sector is significantly underrepresented in gross trade statistics.

As apparently the services sector plays a large and growing role in a country's participation in GPNs, a developing country which would like to increase its role in GPNs must not discount the importance of having a coherent industrial strategy regarding its services sector as well as the manufacturing sector - which is usually seen as the main driver of development. If a country would like to participate more in GPNs, restriction on the services sector must be minimized and the red tape on

Figure 2. Indonesia's Gross Exports, 2015



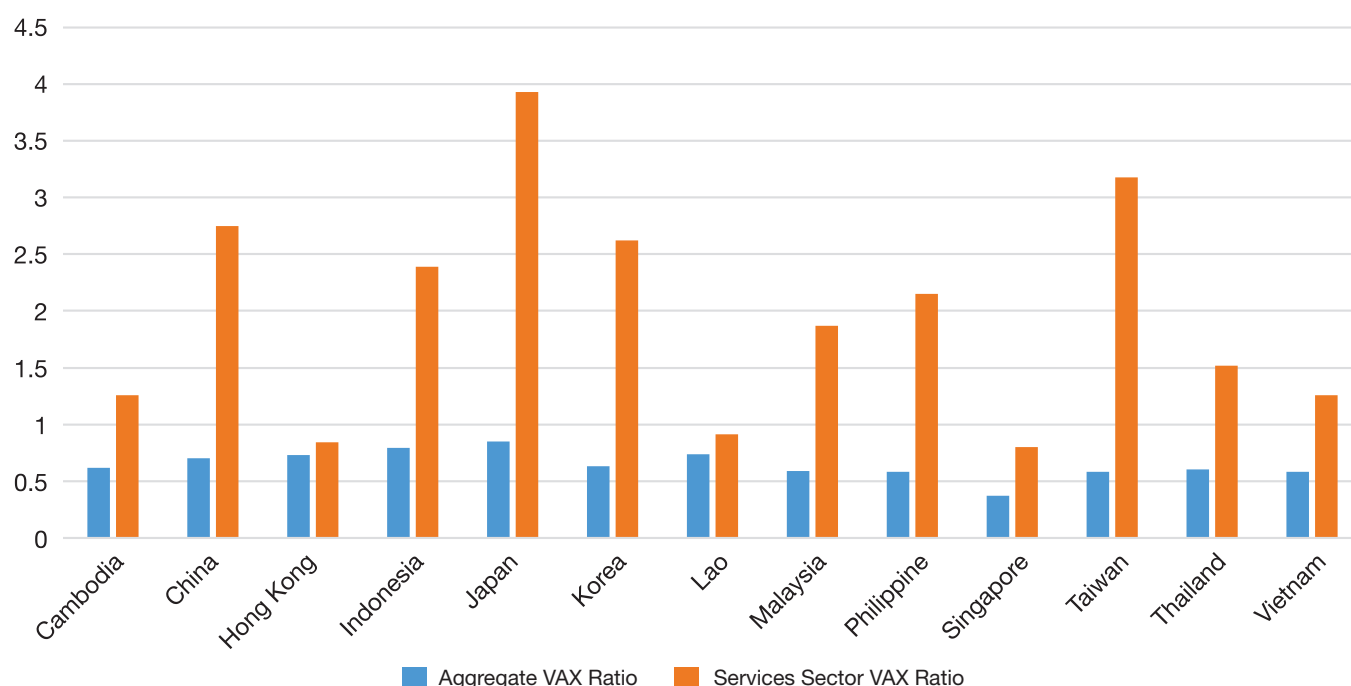
Source: Harvard Center for International Development (2017)

Figure 3. Indonesia's Value-Added Exports, 2015



Source: Harvard Center for International Development (2017)

Figure 4. Aggregate and Service Sector VAX Ratios of Selected Asian Countries, 2004



Source: Johnson and Noruega (2014)

services licensing must be optimized. ASEAN's relative restrictiveness on trade in services⁶ has been holding ASEAN back from fully participating in GPNs.

The Smile Curve, Economic Upgrading, and Diversifying the Product Space

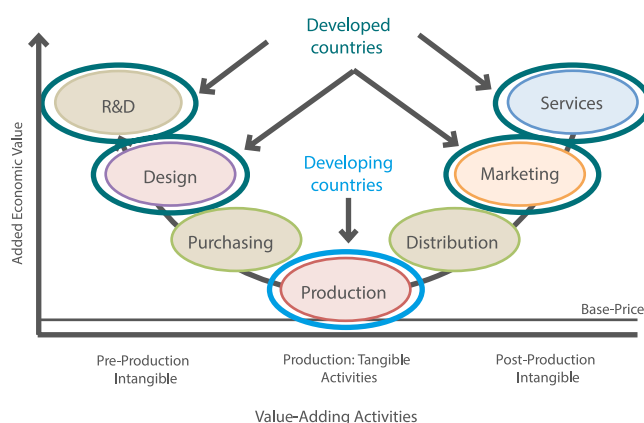
Although GPNs break how trade used to be done and thus how it must be analyzed, it does null the old insight that industries within a country specialize in the tasks in which they have the most comparative advantage. In the era of GPNs, this is manifested in the logic of the 'smile curve'. Developed countries, with its relatively more educated workforce specialize in tasks such as research, development, design, and other tasks that are relatively more human capital-intensive. Developing countries, on the other hand, specialize in tasks that are more suitable for workforces with a smaller number of skilled workers, such as factory assembly.

For example, Meng, Ye, and Wei (2017) estimated the smile curve of China's electrical and optical equipment exports of 2009 (which include phones) and found what resembles **Figure 5**.⁷ Countries like the United States, Japan, the Netherlands, and France were either in the extreme upstream or downstream part of the supply chains and enjoyed higher compensation per hours worked, meaning that they are responsible for a disproportionately larger part of the final price of the product. On the other hand, China and other developing

countries were clustered in the middle of the supply chain and had lower compensation per hour, meaning that even though they may have contributed larger man-hours, they were responsible for a smaller part of the good's price.

This brings us to the goal of economic upgrading. Obviously, developing countries would like to 'graduate' from working the assembly lines to working at tasks that are higher paying. Hausmann, Hidalgo, *et al.* (2011) found that the key for countries to move up the GPNs ladder

Figure 5. The Smile Curve



Source: Duke Center on Globalization, Governance, and Competitiveness (2016)

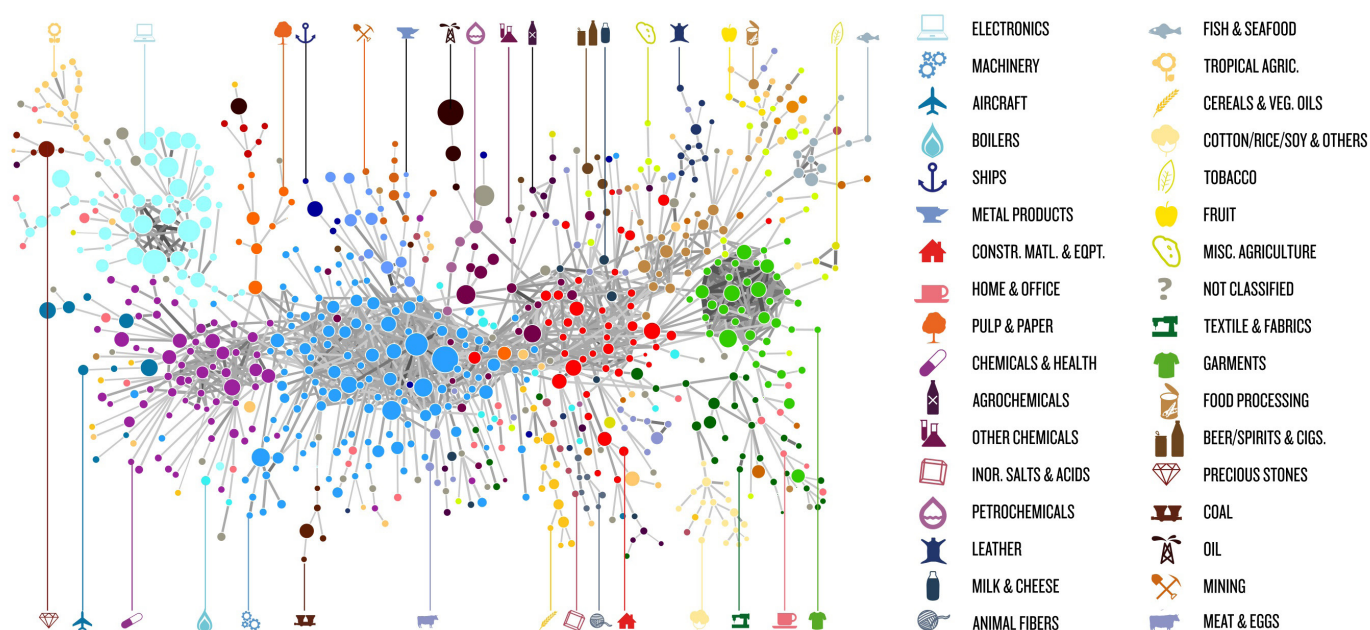
into either direction necessitates a country to learn how to do new tasks and produce goods before which they relied on technologically more advanced countries to produce, i.e. more complex products.⁸ In Hausmann, Hidalgo, *et al.*'s framework, an economy is essentially a collection of capabilities to produce certain goods and the entire collection of goods that can be produced is called the product space. The specific combination of capabilities of a country determine what kind of goods that they ultimately help to produce and that a country's endowment of capabilities also determines what sort of goods that would be most efficient for them to learn, as the production of some goods require related capabilities that other goods may not. Advanced and complex economies are those that have the capability to successfully export products that few other economies could. Their research has also found that economic complexity (the various capabilities a country has) is a much better forecaster of economic growth compared to, say, the level of education,⁹ thus it highlights the need for governments to not just focus on production and export *volume*, but also its specific variety.

Figure 6 below is a representation of the product space. Each node represents a good and the colors represent the industry classification of the good. The gray links represent how one good is related to other goods in terms of the capability required to produce such a good. The size of the nodes represents the complexity of producing that specific good. Nodes that are far apart

from another means that the capabilities required to produce these products are very different, while closely related nodes mean that they share many of the same capabilities.

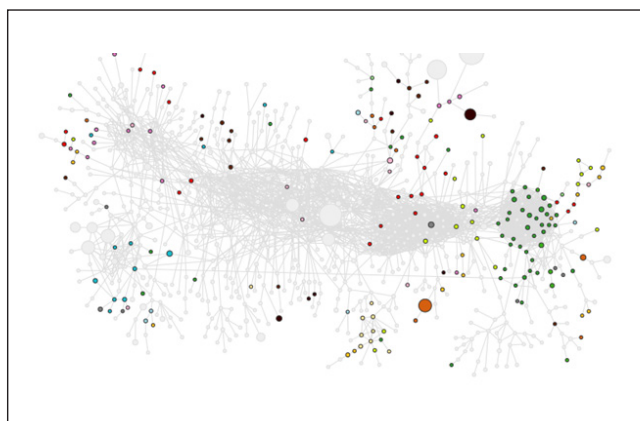
Hausmann, Hidalgo, *et al* have also shown that there exists a correlation between complex products and products that are densely connected with other products, implying that if a country wished to upgrade their share in GPNs (create more complex products), it would be easier if they started with producing simpler products that are closely connected to the complex products that they would ultimately like to produce. Products such as petroleum and rice tend to be simple products and have very few nodes attached to them, meaning that they represent developmental dead-ends if countries persist in specializing in such goods. Garments and food processing are at the middle part of the complexity-connectedness scale, which means that they may be good stepping stones in a country's capability development, but may not be relied upon for developing to even further levels of complexity. Electronics and chemicals, although complex, are not as connected as machinery, which is represented by the large and densely packed blue nodes in the figure above. Countries whose product space clusters in machinery are therefore complex economies which can create a wide variety of related products, e.g. Japan and Germany.

Figure 6. The Product Space



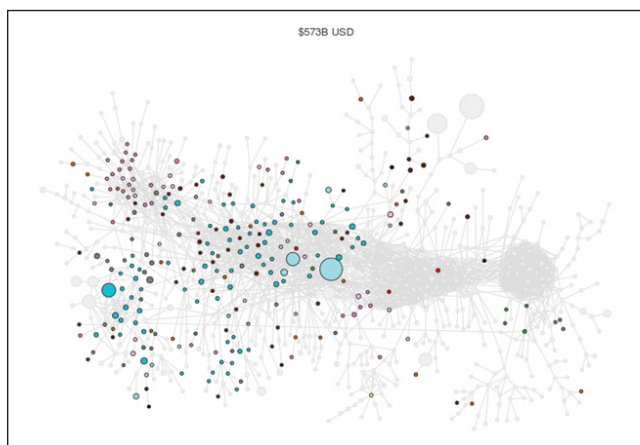
Source: Harvard Center for International Development (2016)

Figure 7. Indonesia's Exports in the Product Space, 2015



Source: Harvard Center for International Development (2016)

Figure 8. Japan's Export in the Product Space



Source: Harvard Center for International Development (2016)

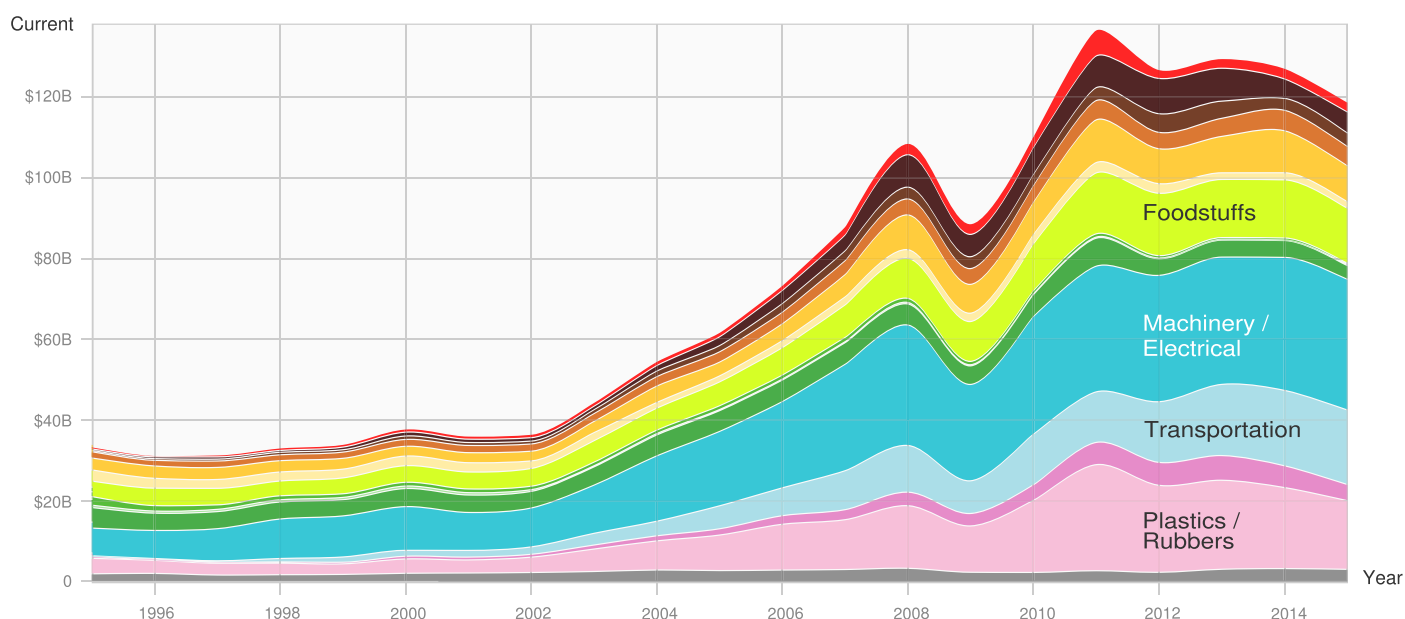
Figures 7 and 8 beside compares Indonesia, ranked 62nd in the world in its economic complexity, and Japan, the most complex economy.

Indonesia's nodes are clustered in the peripheries of the product space, meaning that Indonesia's comparative advantage in exports are still concentrated in goods that have relatively little relation to the more complex products located in the center. Japan product space, on the other hand, are concentrated in the complex and highly connected machinery, electronics, and chemical industries, mirroring their location in the smile curve. If Indonesia and other developing ASEAN countries would like to upgrade their participation in GPNs and thus develop their economies, it must perform move on to learn to produce the goods located in the central part of the product space and gradually leave the peripheries, much like how Thailand managed to do so between 1995 and 2015 in **Figure 9** below.

Governance of Global Production Networks: Cascading Trade Costs and Bad Neighbors

The competitiveness of domestic firms as well as the ability of countries to join and upgrade themselves in GPNs depends on trade costs.¹⁰ Although formally assigned trading costs such as tariffs have declined substantially with much of the world's concerted effort in liberalizing their goods markets, many non-tariff costs are still large. These costs include transportation costs (which can never be zero, but are still large due to poor infrastructure in developing economies), transportation

Figure 9. Thailand's Value-Added Exports, 1995 – 2015



Source: Harvard Center for International Development (2016)

insurance costs, and other cross-border fees. Some of these costs may even be intangible, such as the information costs of exports and imports, regulation, licensing, and weak institutional governance.

For complex GPNs that require the back and forth of intermediate goods between borders, these non-tariff and intangible costs may be at least as high as the remaining tariffs. Since these non-tariff costs can be considered as *ad valorem* duties on cross-border trade, these costs can cascade, which is why countries with high levels of such costs are not participants of GPNs and usually only export primary and traditional goods, as implied in **Figure 10** below. Although the R squared¹¹ does not seem quite high, visually, the absence of observations in the southeast quadrant does suggest that economies with a poor Logistics Performance Index would not be able to participate in GPNs. This clearly implies the role of adequate transportation and infrastructure facilitation as prerequisites for participation in GPNs.

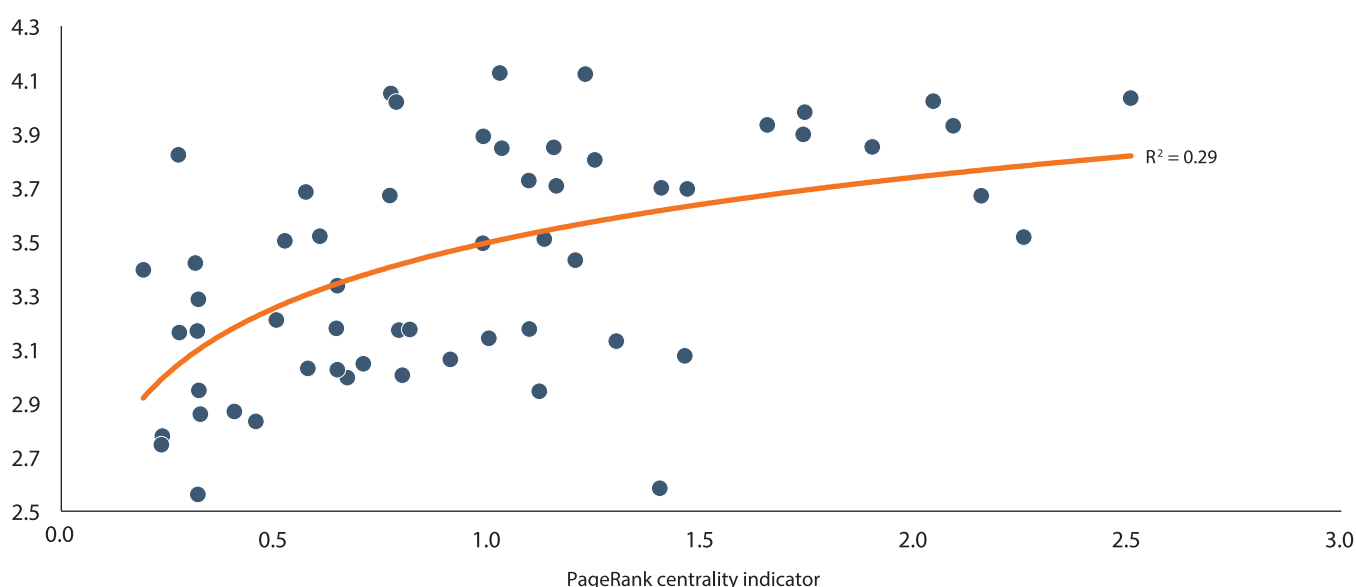
Regarding trading costs, equally important as transportation and logistics costs are not those intangible costs like regulation and licensing procedures, but also include the institutional quality of GPN participating countries. The goods produced through GPNs are often *contract-intensive* goods as they involve the goods and services being exchanged between different firms from different countries which thus increases the risk of other parties not abiding by the contract.¹² A country that does not have the reputation of not having an effective

mechanism to enforce contracts will thus be unlikely to participate in GPNs.

Furthermore, Miranda and Wagner (2015) have also shown that aside from a country's own institutional quality, those of their neighbors matter as well.¹³ Even though it is called GPNs, most value chains are still regionally clustered and thus the effects of having 'bad neighbors' could determine what kind and how much trading a country does. If one is surrounded by neighbors with poor institutional quality, then it would be less likely for a country to trade in contract-intensive intermediate goods with those neighbors and thus are more likely to specialize in relatively simpler goods.

This is important for ASEAN member states (AMS) to note. If AMS's would like to increase their participation in GPNs, particularly in GPNs producing complex products that require multiple reimport and exports and multiple contracts among firms - e.g. photographic equipment, aircraft engines, or compressors - then one needs to ensure that neighboring countries that may have the technological potential to be partners should have adequate institutional quality. This thus calls for 'deeper' international trade agreements that go beyond reducing tariffs (although that is not unimportant), but trade agreements that specify legal and administrative commitments such as improving customs administrations, strengthening equitably enforced property rights, and providing accountable legal recourse as well.

Figure 10. Correlation Between Logistics Performance Index and GPN Participation



Source: World Bank (2017)

Summary and Conclusion

The decline of transportation, production, and coordination costs have enabled the fragmentation of the production process of various goods which are then distributed to different countries with the lowest marginal costs, giving rise to global production networks. The proliferation of GPNs have necessitated the concept of value added trade which better capture the real value that specific sectors, industries, and countries export and import with the rest of the world. A closer look at value added trade statistics highlight the growing importance of the services sector in value-added trade and that the liberalization of trade should not merely focus on the goods markets alone.

Estimates of the smile curve as well as mapping out the 'atlas of economic complexity' have shown that industrial strategy must also change as well. The smile curve shows that developing countries that would like to upgrade to more profitable tasks must develop the capacity to be producers in tasks located on the sides of the smile curve which require higher levels of human capital. The concept of the product space illustrates that the potential of an economy to upgrade economically depends on their capability to produce more complex goods which often means that they will have to diversify the range of products that they produce, rather than specializing in certain goods that are dead-ends in connective capabilities (e.g. the capabilities for planting palm oil has little connection to the capabilities of producing complex machinery).

Participating and upgrading in GPNs also require developing countries, including those in ASEAN, to reduce their trading costs, which means that they must have an adequate infrastructure network as well as reduced intangible costs. Reducing these intangible costs include strengthening the governments administrative capacity to optimize licensing processes, cut superfluous bureaucracy, and strengthen the government's capability to enforce contracts. The apparent importance of the institutional capacity of neighboring countries also highlights the need for regional governance and trade agreements that does not only cut tariffs but also ones that emphasizes legal commitments as well.



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About The Habibie Center

The Habibie Center was founded by Bacharuddin Jusuf Habibie and family in 1999 as an independent, non-governmental, non-profit organisation. The vision of The Habibie Center is to create a structurally democratic society founded on the morality and integrity of cultural and religious values. The mission of The Habibie Center are first, to establish a structurally and culturally democratic society that recognizes, respects, and promotes human rights by undertaking study and advocacy of issues related to democratization and human rights, and second, to increase the effectiveness of the management of human resources and the spread of technology.

About ASEAN Studies Program

The ASEAN Studies Program was established on February 24, 2010, to become a center of excellence on ASEAN related issues, which can assist in the development of the ASEAN Community by 2015. The Habibie Center through its ASEAN Studies Program, alongside other institutions working towards the same goal, hopes to contribute to the realization of a more people-oriented ASEAN that puts a high value on democracy and human rights. The objective of the ASEAN Studies Program is not merely only to conduct research and discussion within academic and government circles, but also to strengthen public awareness by forming a strong network of civil society in the region that will be able to help spread the ASEAN message. With the establishment of ASEAN Studies Program, The Habibie Center aims to play its part within our capabilities to the ASEAN regional development.

About Talking ASEAN

Talking ASEAN is a monthly public dialogue held at The Habibie Center in Jakarta. Covering a wide array of issues related to ASEAN, Talking ASEAN addresses topics of: Economic Integration, Socio-cultural, & Democracy, human rights and regional peace, among others. Featuring local and visiting experts, Talking ASEAN is one of a series of twelve dialogues regularly held each month and open to a target audience consisting of ASEAN officials, foreign ambassadors & diplomats, academics, university students, businesses, and the media.

Cover Image: Wikimedia Commons

Robert Bowker welds the initials of Susan Ford Bales into the keel of the aircraft carrier Gerald R. Ford (CVN 78) during a keel laying and authentication ceremony at Northrop Grumman Shipbuilding in Newport News.

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