PATHWAY FOR DEVELOPING COUNTRIES TO BE A GOOD EXPORTER WITHIN GLOBAL VALUE CHAIN: EVIDENCE FROM ELECTRONICS SECTOR

Ni Wayan Christy Adnyana[1] and Kiho Kwak[2,*]

[1]Business Department
PT. SungDam
Dusun Manduro Manggung Gajah RT.015/RW.003 Ngoro, Mojokerto, Jawa Timur 61385, Indonesia
christy@sungdam.com

[2]Graduate School of Management of Technology
Pukyong National University
365, Sinseon-ro, Nam-gu, Busan 48547, Korea
*Corresponding author: cloudnine@pknu.ac.kr

Abstract. *Participation in global value chain (GVC) is crucial for developing countries to achieve export performance. However, our understanding of how developing countries can be a good exporter is limited. To fill the gap, we first suggest major necessary conditions relevant to the export performance via GVC participation. We then apply qualitative comparative analysis (QCA) investigating the difference in ASEAN countries' electronics sector. We find that inward foreign direct investment and advance in info-communication infrastructure are relevant conditions for export performance from an industrial policy perspective. We also observe that the industrialization of the national economy and geographical proximity to major market lead to the export performance (macro-economic perspective). Our findings provide theoretical grounds on developing countries' sectoral policy for export performance via GVC participation.*
Keywords: Developing countries, Export performance, Macro-economic factors, Industrial policy factors, Qualitative comparative analysis

1. **Introduction.** For developing countries, export is one of the most relevant drivers for economic growth and technological learning [1,2]. It is because the export plays an important role in enlarging product market and accumulating technological capability and thus, makes countries benefit from economies of scale, scope, and learning [3,4]. Accordingly, developing countries try to increase the export in various ways and specifically, consider the participation in the global value chain (GVC), which means the activities of value chain are geographically spread across several economies [3,5], allow them to make internationally competitive products, utilize external knowledge base, and source qualified intermediates from the world [5].

Thus, previous studies identified participation in GVC of developing countries from various perspectives: such as type of manufacturing system (OEM (Original Equipment Manufacturing), ODM (Original Design Manufacturing), and OBM (Original Brand Management) [6], position in GVC in terms of the origin of the value-added (backward and forward participation) [3], and modularization of product architecture [7]. However, scholars have provided a limited knowledge of necessary conditions of export performance via GVC participation. Considering much anecdotal evidence that export performance differs among developing countries in the same globalized sectors, e.g., textile and automotive

[1,8], it is worthwhile to investigate the pathways that explain the difference in inter-countries' export performance based on the comparative method.

However, this is not a simple investigation, because we first should address developing countries with similar factor endowments, similar position in highly globalized value chains, as well as similar industry structure within the same sector. Furthermore, those countries show different export performance each other for cross-country comparison. Lastly, the investigation should deal with industries representing significant trade volume and contribution to economic growth for the external validity of the study [9].

We solve these challenges by employing an interesting phenomenon observed in Southeast Asian electronics sector, specifically, Vietnam, Malaysia, and Indonesia. Those developing countries are located in the same economic block (ASEAN) (similar factor endowments) as leading countries in the sector [10]. Further, they commonly act as parts and components suppliers and OEM for multinational companies (MNCs) in the sector [11] and have similar composition of export commodities. However, they show different export performance: Vietnam – *sharply growing and forged ahead of other countries*, Malaysia – *initially prominent but fallen behind*, and Indonesia – *aborted growth*.

Using crisp-set qualitative comparative analysis (csQCA) [12], we show that the export performance is highly associated with four relevant factors – inward foreign direct investment (FDI), advance in info-communication technology (ICT) infrastructure (industrial policy factors), industrialization of national economy and geographical proximity to major market (macro-economic factors). It implies that the role of government in nurturing export performance is not confined to short-term stimulus but should be extended to the transformation of the national economic system. Consequently, we contribute to the elaboration of the theoretical insights on the government's sectoral policy for participation in GVC in developing countries.
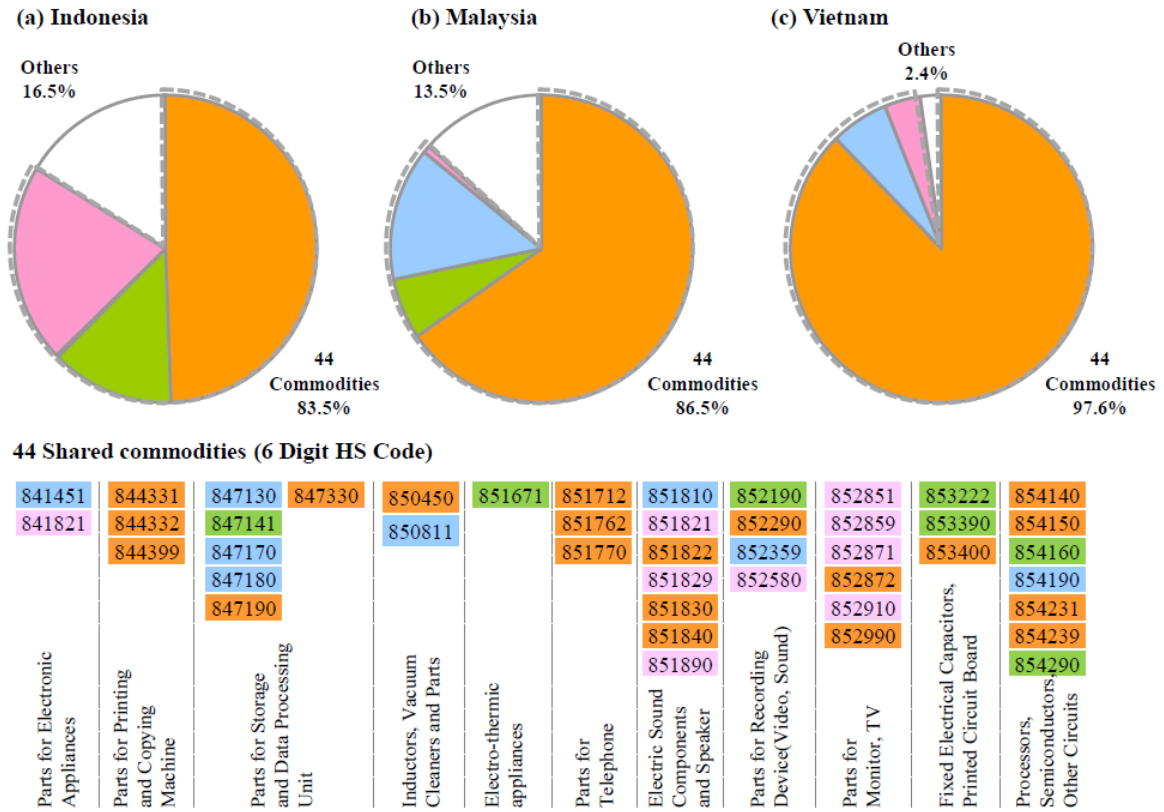
2. **Research Context: Electronics Sector in Three Southeast Asian Countries.** In many studies, the electronics sector has been known as the most globalized sector in value-added activities [13]. In the GVC of the sector, the participation of Southeast Asian region has been notable, as of 2013, which accounts for 18% of total trade volume in the world [14]. Specifically, Indonesia, Malaysia, and Vietnam, as parts and components suppliers, are regarded as leading electronics manufacturing countries in the region and compete for each other to achieve export performance in the GVC of the sector [10]. As shown in Figure 1, those three countries co-own 44 6-digit harmonized system (HS) codes as the major export commodities among 153 6-digit HS codes and significantly depend on export performance from those 44 commodities, 83.5% for Indonesia, 86.5% for Malaysia, and 97.6% for Vietnam, as of 2016. It implies that their electronics sectors have a similar structure in terms of the composition of export commodities.

Interestingly, despite the similar industry structure, these three developing countries have shown substantially different export performance as displayed in Figure 2. Specifically, Malaysia was initially prominent among these countries but then fell behind rapidly. In contrast, Vietnam experienced a rapid increase in export performance, caught up Indonesia in the late 2000s and finally, forged ahead of Malaysia in 2016. Meanwhile, Indonesia has shown aborted growth and has recorded marginal export share. This raises the question of what necessary conditions are associated with the difference in export performance across those countries. To answer the question, we review the literature on GVC to identify latent factors correlated with the export performance of developing countries and apply them to csQCA for comparing those three countries.

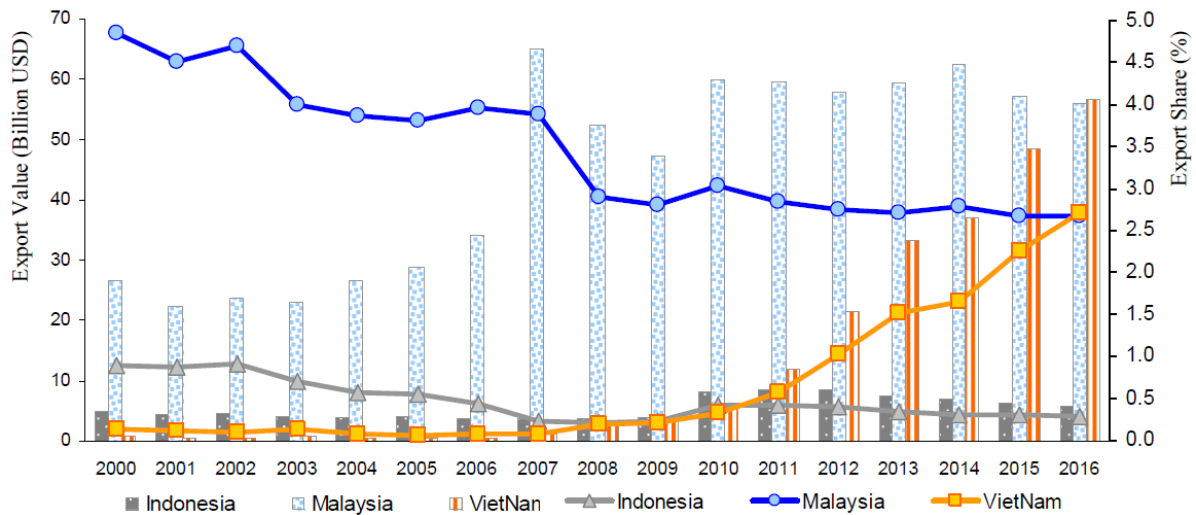3. **Necessary Conditions of Export Performance via GVC Participation.** We define GVC as the globalization of value chain, i.e., the mapping of the transformation of raw materials into final products and services through various processes undertaken

FIGURE 1. (color online) Composition of export commodities in electronics sectors among three countries (as of 2016)

FIGURE 2. Export performance of three countries in electronics sectors: export volume and share in the world

by distinct actors across different geographical location [5,15]. For developing countries, participation in GVC is critical to learn technology originated from the spill-over knowledge from developed countries [1,2,5]. Specifically, in doing so, developing countries can achieve growth, such as product upgrading (more value-added product), process upgrading (efficiency in production), and functional upgrading (transition to a more value-added position in GVC, i.e., forward participation) [1,2,15].

However, the benefit from participation in GVC is not guaranteed. Rather, based on an extensive review of previous studies proposing a wide range of factors for export performance via GVC participation, we derive ten relevant factors from industrial policy and macro-economic perspectives (See Table 1). The industrial policy perspective considers the conditions representing a government intervention for industry development. The

TABLE 1. Data and measurements for comparative analysis on the export performance of three developing countries in electronics sectors (Raw data table)

Category	Factor name	Operationalization (Unit) (*Data Source*)	Reference	Measurement			Thres-hold
				IDN	MYS	VNM	
Industrial Policy Factors	Trade policy	# of Free trade agreement (2016) Import Tariff (2016) (%) *Asia Regional Integration Center, World Bank*	[3,4,16]	9 6.5%	14 4.3%	10 5.4%	10 4.9%
	Openness to inward FDI	The share of FDI stock as % of GDP (2016) (%) *World Bank*	[4,17]	0.5	4.5	6.1	5.9
	Development of domestic logistics infrastructures	Quality of roads, railroads, port and air transport (2016) *The Global Competitive Index*	[7,18]	4.0	5.4	3.6	4.2
	Advance in ICT infrastructure	Internet bandwidth speed (2016) (Kb/s/User) *The Global Competitive Index*	[18,19]	24.9	42.6	49.2	46.1
	Innovation capability of public and industries	University-Industry Collaboration in R&D Index *The Global Competitive Index*	[6-8]	4.4	5.2	3.3	4.0
Macro-economic Factors	Domestic market size	Electronics product consumption (2015) (Mil. USD) *The Yearbook of World Electronics Data, Reed Electronics*	[1,3,8]	15,345	25,012	26,016	20,589
	Degree of industrialization	Manufacturing value added growth rate (2000-2016) (%) *World Bank*	[8,20]	4.3	4.4	11.9	5.2
	Increase in countries' purchasing power	GNI PPP per capita growth rate (2000-2016) (%) *World Bank*	[3,21]	6.19	5.24	6.64	6.03
	Population growth	# of Citizenship growth rate (2000-2016) (%) *World Bank*	[22,23]	1.48	1.30	1.90	1.24
	Geographical proximity to a major market (Trade Cost)	Distance to major market, China, EU, and USA (between capital cities) (km) *DistanceFromTo.net*	[3,7]	9,926	9,332	8,391	8,918

macro-economic perspective reflects the structural characteristics of countries representing the overall economic development.

3.1. **Industrial policy factors for export performance.** First, *Trade policy* can have a significant impact on developing countries' export performance in GVC, because policy regarding *regional trade agreement (RTA) and import duties on intermediates* can facilitate the export of goods by backward participation in GVC [3,4,16]. Second, *openness to inward FDI* can also have a positive relationship with the export performance from the perspective that it entices multinational companies (MNC) to establish subsidiaries for OEM and ODM [4,17]. Third, we consider the *development of domestic logistics infrastructures*, such as roads, railroads, ports, and airports, which supports the border-related procedures of goods in GVC more efficiently [8,18]. Fourth, we also address *advance in ICT infrastructure*, which can significantly reduce the search and transaction cost of long-distance trade [18,19]. The last factor is the *innovation capability of public and industries* that represents a policy to improve the R&D based learning and high skilled manpower in the industries [6-8].

3.2. **Macro-economic factors for export performance.** The first macro-economic factor is the domestic market size. The larger local market can lure MNCs to develop a local supply chain for final goods production. Through the technological learning process, the local supply chain can grow as intermediate goods suppliers with economies of scale [1,3,8]. Thus, it has a positive relationship with the backward linkage of developing countries in GVC [3]. The second one is the degree of industrialization that reflects the quality of the local supply chain regarding capital goods [8,20]. Therefore, it has a positive relationship with the forward linkage of developing countries in a GVC [20]. The third factor is an increase in countries' living standard per capita that reflects the purchasing power of the economy [3,21]. We address that the higher purchasing power stimulates the competitiveness of local suppliers that lead to forward and backward engagement in a GVC. Fourth, we propose countries' population growth facilitates the expansion of export in GVCs due to abundant supply of low-cost labor [22,23]. The last one is geographical accessibility to a major market. If developing countries have a big foreign market nearby them, they have a competitive advantage in export in terms of transportation cost [3,7].

4. **Methodology and Data Analysis.** To investigate factors that explain the difference in three countries' export performance, we use csQCA that allows a systematic comparative analysis to determine the pathway of an outcome [12]. Specifically, csQCA considers each case as a unique combination of independent variables and outcomes based on their dichotomous measurements. Following the stepwise approaches for csQCA suggested by [12], we first develop a "raw data table" that consists of independent variables (necessary condition). Table 1 shows the operationalization of each independent variable, data source of the operationalization, the measurement of three countries, and a threshold value. Second, we construct a "truth table" that is a synthesis of the "raw data table" simply a given combination of conditions related to a given outcome. In the "truth table", the measurements of independent variables have value '1' when they exceed the threshold, or '0' otherwise [12]. The operationalization and threshold of each variable depending on the relevant data source is explicitly justified by the average of ASEAN, respectively.
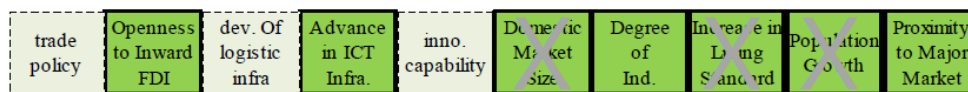
Lastly, the truth table has one '1' outcome (Vietnam) and two '0' outcome (Indonesia and Malaysia). Each outcome has a distinct combination of necessary conditions (See Table 2).

The final step is Boolean minimization for '1' outcome (Vietnam) and '0' outcome (Malaysia, Indonesia), which eliminate condition(s) that does not affect the outcome. First, we can select the combinations of necessary conditions that Vietnam only has '1'.
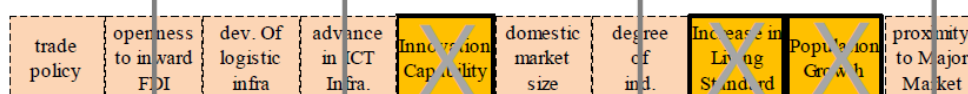
TABLE 2. Truth table of the Boolean configurations for three developing countries

Country (Outcome)	Industrial policy factors					Macro-economic factors				
	Trade Policy	Open to In-FDI	Dev. of Logistic Infra.	Adv. in ICT Infra.	Inno. Capability	Dom Market Size	Degree of Ind.	Increase Living Std.	Pop. Growth	Prox. to Major Market
Indonesia (0)	0	0	0	0	1	0	0	1	1	0
Malaysia (0)	1	0	1	0	1	1	0	0	1	0
Vietnam (1)	0	1	0	1	0	1	1	1	1	1

FIGURE 3. Boolean minimization for three developing countries
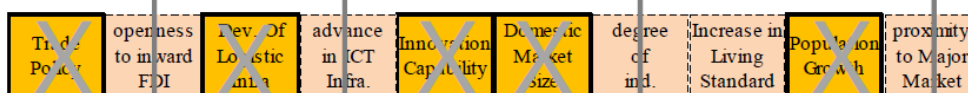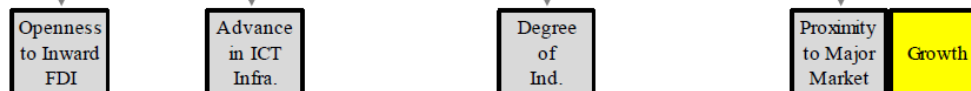
As a result, we simplify the combinations of conditions as follows: Degree of Industrialization * Geographical Proximity to Major Market (2 macro-economic factors) * Openness to Inward FDI * Advance in Information and Communication Infrastructure (2 policy factors). Likewise, we minimize the configuration for '0' outcome and consequently, we derive that the absence of Degree of Industrialization * Geographical Accessibility to Major Market (2 macro-economic factors) * Openness to Inward FDI * Advance in Information and Communication Infrastructure (2 policy factors) lead to *initially prominent but fallen behind* (Malaysia) and *aborted growth* (Indonesia). We describe the stepwise approaches from the truth table (Table 2) and Boolean minimization for '1' and '0' outcome in Figure 3.

5. **Discussion.** Regarding the Boolean minimization for export performance of Vietnam, we can understand that 'Openness to Inward FDI' stimulates GVC participation from the perspective that it builds business networks and promotes foreign market entry and thus, facilitates export. Second, we recognize 'Advance in ICT Infra.' can allow local firms to significantly reduce a transaction cost of commodities in a value creation process and finally, contribute to the competitiveness in the cost and delivery of developing countries in a GVC. Third, we can understand the 'Degree of Industrialization' represents the ability to supply qualified intermediate goods for demand sectors (electronics sector). In this respect, Vietnam's recent fast growth of manufacturing base positively affects the competitiveness and export growth of the local electronics sector. Lastly, considering that Vietnam is the lowest transportation cost countries for reaching China, one of the

biggest electronics markets in the world, 'Geographical Proximity to Major Market' can have a significant advantage in export in terms of logistics efficiency.

6. **Conclusion.** Using the csQCA, we investigate the difference in export performance among countries within the same regional economies and GVC of the electronics sector. We find that inward FDI and advance in ICT infrastructure are relevant conditions for Vietnam's notable export performance from the industrial policy perspective. Furthermore, from the macro-economic perspective, we present that industrialization of the national economy and geographical proximity to major market lead to the significant growth of Vietnam's export. Meanwhile, Indonesia and Malaysia experienced *aborted growth* and *initially prominent but fallen behind*, respectively, because of the immature industrial policy and macro-economic conditions favorable for export growth.

Our findings extend the theoretical avenue to developing countries' sectoral GVC participation and export performance. Despite the possession of similar factor endowments among countries, the difference in export performance means that the role of government can be significant. Specifically, we suggest that developing countries' sectoral policy intervention encompasses not only direct stimulus for attracting FDI, but also infrastructure investment, such as ICT. Moreover, the governments need to develop favorable macro-economic conditions for export competitiveness, even if it requires long-lasting efforts and patience in achieving the economic goal [20].

Like other research, our study has several limitations, which offers interesting grounds for future research. First, although we examined the difference in export performance among the same GVC participants, we considered only a single industry (though it includes many heterogeneous commodities). Future research is, therefore, necessary to investigate the heterogeneous export performance in globalized sectors. Second, we call for a more fine-grained analysis on how Malaysian electronics sector fell behind since the early 2000s. We suggest future studies examine the falling behind process from the developing countries' "middle-income trap" perspective [9]. Last but not least, we hope that future research should try to specify the significance of each condition in Vietnam's growth by applying statistical methods. This is the starting point for a unified theory of causality.

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