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“Flying Geese” Paradigm: Review, Analytical Tool, and Application

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“Flying Geese” Paradigm: Review, Analytical Tool, and Application

Abstract

The paradigm of the "Flying Geese" (FG) industrialization pattern is often referred to in the process of industrialization in the Southeast Asia region. This paper consists of three main sections: literature study, empirical analytical tool, and application with the Southeast Asia case study. *Firstly*, the paper discusses the paradigm of FG industrialization starting from Akamatsu's early concept to the modern concept of "multi-sequentialist". *Secondly*, this paper proposes an empirical analysis tool ("Product Mapping") which is a combination of the main variables in the FG paradigm, dynamic comparative advantage and net-export or net-import. Two indicators of Revealed Symmetric Comparative Advantage (RSCA) and Trade Balance Index (TBI) are used. *Thirdly*, the empirical analysis tool is then applied to analyze the FG paradigm in the ASEAN region. We find that the flying geese paradigm have occurred in the ASEAN with the slow “catching up” process.

Keywords: Flying geese, Comparative advantage.

JEL Classification: F10, F14, F17.

1. Introduction

The conventional theory in international economics (for an example Heckscher-Ohlin model¹) carries out very strict assumptions that production of each commodity follows constant return to scale (CRS) and the markets for commodities and factors are perfect competitive ones. However, those assumptions are hard to fulfill in the real world. Some new theories relaxing several assumptions have emerged for instances the imitation lag hypothesis (Posner, 1961), the flying geese paradigm (Akamatsu, 1961), the product cycle theory (Vernon, 1966), the Linder theory (1961), the gravity model (Tinbergen, 1962) the Krugman model (Krugman, 1979), and the reciprocal dumping model (Brander, 1981; Brander and Krugman, 1983), among others. The presence of prevalent economies of scale may be obtainable from different sizes of factories or countries. International market distortions, which are represented by tariff and non-tariff barriers, still exist widely. Starting from the 1960-s, the dialogs about economies of scale and imperfect competition in the theory of international trade have taken much consideration. Verdoorn (1960), Balassa (1963, 1966) and Grubel (1967), among others, examined intensively the effects of tariff reductions on the pattern of specialization.

¹ Heckscher-Ohlin model assumes two countries-two homogenous goods-two homogenous factors of production (2x2x2 model), identical technology, constant return to scale (CRS), different factor intensities, identical tastes and preferences (utility functions), perfect competition markets, perfect mobility of factors of production within country and perfect immobility between two countries, zero transportation costs, and no trade barriers or any policy restrictions.

The “flying geese” (FG) paradigm is one of the eminent models to be strongly considered in explaining economic development in the South East Asian region. Akamatsu firstly introduced the model in the 1930s, as similar sequential development or catching-up development of manufacturing industries in developing countries (Kojima, 2000; Ozawa, 2001; Kwan, 2002; Kasahara, 2004). The FG paradigm attempts to describe the phenomenon of industrial development in the catching-up economies. After Akamatsu’s publication in English during 1960s together with the popularity of product life cycle (PLC) by Raymond Vernon (1966), the FG paradigm has become prevalent one. Subsequently, the FG paradigm has been greatly developed and modified by some Japanese scholars including Kojima and Ozawa who were Akamatsu’s students (Kasahara, 2004). It is sometime referred as the modern “multi-sequentialist” FG model.

Japan – as the region’s most advanced country in term of technology and becoming the main trading partner as well the source of foreign investment for the other East Asian countries - has played important roles in East Asian economic and industrial development. The expansion of economic dynamism from Japan to the Asian New Industrialized Economies (NIEs) and further to the ASEAN countries as well as China has been frequently related with the FG paradigm. Notwithstanding the popularity and plausibility of the FG paradigm, there are very few extensive empirical researches conducted to test the validity of the paradigm in explaining the region’s economic development. Rana (1990), Fukasaku (1992) and Dowling and Cheang (2000) are the empirical studies which have been conducted. The first two tested a traded-based version of the model. The later examined whether the evolving trade and Foreign Direct Investment (FDI) patterns of the Asian economies support the flying geese pattern by applying a “revealed” comparative advantage (RCA) index and Spearman’s rank correlation coefficient.

This paper is addressed to review the concepts of the FG theorem, to derive an empirical analytical tool, which is suitable to analyze the FG pattern, and to apply the tool in case study of the Southeast Asian region. It is argued that there two crucial variables in the FG paradigm i.e. comparative advantage and catch-up level. By using two corresponding indicators i.e. Revealed Symmetric Comparative Advantage (RSCA) (Laursen, 1998) and Trade Balance Index (TBI) (Laffay, 1992), this paper creates an analytical tool namely “products mapping”. The analytical tool is then applied to analyze the FG pattern in the Southeast Asian region. The rest of this paper is organized as follows. Part 2 describes literature review consisting of the Akamatsu’s original model of FG, and the modern multi-sequentialist of FG. Part 3 exhibits the methodology consisting of the proposed analytical tool for the FG paradigm and the data used in this study. Part 4 shows the results and discussion. Finally, some conclusions and policy implications are presented in Part 5.

2. Literature Review

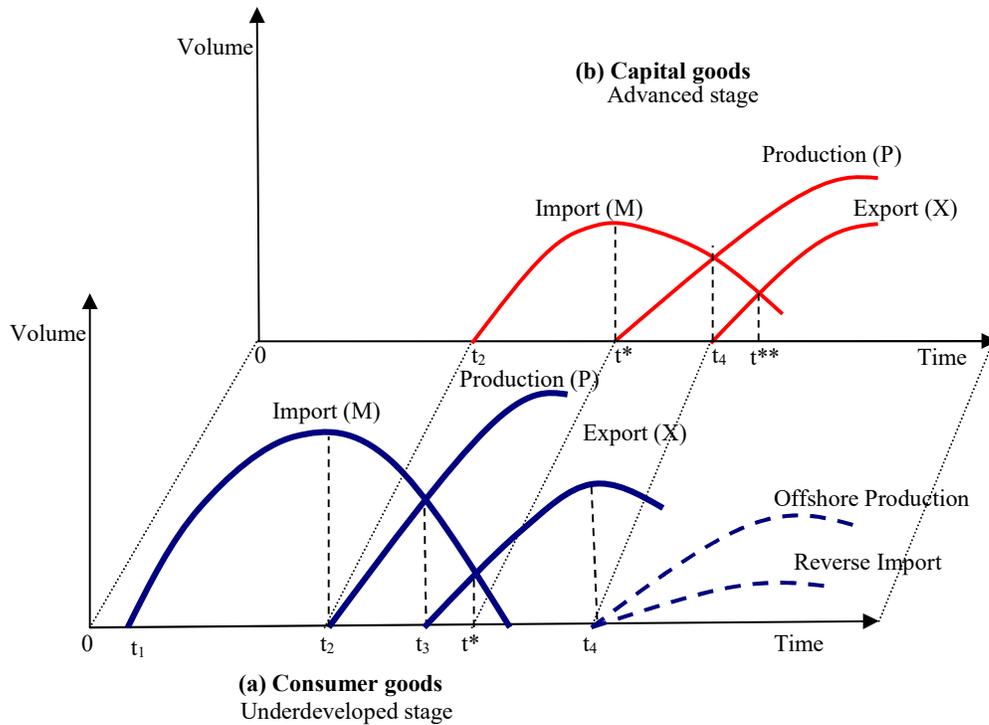
Akamatsu (1962) argued that the economic growth of developing countries must consider mutual interactions between developing countries and advanced countries. He mentioned seven historical stages of the economic growth in developing countries i.e. (a) the development of native (handicraft) industry, (b) the flow of manufactured goods from

advanced countries, (c) the infiltration of capital and techniques for large-scale production of *primary* products, (d) the establishment modern industries including the industries processing raw materials, (e) the increased participation of native capital to run the industries processing native raw materials, (f) the native industries handling manufactured goods in general, and (g) the industrialization of the developing countries becoming advanced. The essence of the FG model then might be given by directly citing the original Akamatsu's argument:

“The wild-geese-flying pattern of industrial development denotes the development after the less-advanced country's economy enters into an international economic relationship with the advanced countries. This theory leaves out of consideration the period during which less-advanced countries are in the stage of a closed self-sufficient economy or during which there is no international trade of any significance with a neighboring country, since their economic structure are homogenous with each other. A sort of formula for the industrial development of less-advanced countries after they have opened trade ports and entered into large-scale trade relations with the advanced Western European countries is the hereby termed wild-geese-flying pattern of industrial development. (Akamatsu, 1962: p.11).”

The basic configuration of industrial development is illustrated as the wild-geese-flying in orderly rank, like “inverse V”. Figure 1 shows the Akamatsu's FG concept. Akamatsu stated four phases of the essential FG pattern that was developed in the historical context of the Euro-American as frontrunner and Asian as follower (Kasahara, 2004; Kojima, 2000). *First phases*: the industries might be categorized into several categories. Manufactured consumer goods are imported from advanced countries (started from period t_1 in Panel a). Several products (*primary* products for example) are exported by less-advanced countries. In this phase, imported manufactured product may have a negative concern on the native handicraft industry of the less-advanced countries due to the substitution effect.

“When an underdeveloped nation first enters the international economy, the primary products, which are her specialties, are exported and industrial products for consumption are imported from advanced nations. [Because the later's more advanced factory products are superior in quality and cheaper in price.] (Akamatsu, 1961, pp. 206)”



Source: Authors' modification from Kojima (2000).

Figure 1. The Akamatsu's Original FG Paradigm

Second phase: the production of the imported manufactured goods (import-substitution strategy) occurs (started from time t_2 in Panel a). The import of consumer goods rises from time t_1 to t_2 . The domestic demand becomes huge enough to grasp the economies of scale. It is therefore likely for the domestic production to start (at t_2 in Panel a). Simultaneously, the country must also import capital goods (started from t_2 in Panel b). In the case of Japan, not only capital goods such as machinery but also raw materials must be imported (Akamatsu, 1962). In this stage, there will be rivalry between imported consumer goods and domestic production. By using infant industry arguments, the government sometimes must safeguard the domestic industry through subsidy, import tariff, etc.

“In the process of recovering the domestic market, there will arise a struggle of economic nationalism in less-advance countries. This presupposes the accumulation of capital and the technological adaptability of the people in those countries. Further, it calls for the government’s protective policy to encourage and promote the consumer good industries. (Akamatsu 1962 pp.13).”

Third phase: the domestic consumer goods industry grows into the export industry (started from t_3 in Panel a). At period t^* , trade in consumer goods is in the steadiness or trade balance (Export=Import) and domestic production equals domestic demand (since domestic demand = domestic production – export + import). This phase implies a fruitful implementation of the catching-up process of the industry concerned along the sequential path import-production-export (M-P-E) which is the basic pattern of

the FG model (Kojima, 2000)². In addition, the industry metamorphoses from import-substitution industry toward export-led growth industry. The consumer goods industry is already homogenized with that of advanced countries. Therefore, the country has not been less-advanced country in these goods.

Fourth phase: the advanced status in consumer goods industry is further raised. It is shown by the decrease of export in consumer goods (started from t_4 in Panel a) meanwhile capital goods are started to be exported (started from t_4 in Panel b). The decrease export in consumer goods happens due to the fact that consumer goods production is put in other less-developed countries (Offshore production depicted by broken line in panel a). In addition, it is possible that the reverse import exists.

“.....due to the high wages make the import of consumer goods from less-advanced countries more profitable. Thereupon, what had been imported from advanced countries in the early development stages of less-advanced countries are now, conversely, exported to advanced countries from the less advanced countries. ...The wild-geese-flying pattern sees its completion in the fourth stage, with respect to capital goods such as machinery, by going through the importation beginning from the second stage, the initiation of domestic production in third stage, and switch over to export in the fourth stage. Here, domestic industrialization is also achieved for the capital goods industry. (Akamatsu, 1962, pp.16)”

The FG paradigm does not only occur in the capital goods industry following the consumer goods industry but also in the advancement from crude and simple goods to multifaceted and refined goods. According to Akamatsu (1962), the products (industries) variation is then classifiable into two patterns i.e. intra-industry and inter-industry cycles. The former is created by the rise of new product groups within each industrial sector, i.e. from cotton to woolen to synthetic textiles, or from crude and simple goods to multifaceted and refined goods. The later displays the development of new industry, for example from textiles to steel to shipbuilding to auto to computer, or from consumer goods to capital goods. The later also demonstrates the level of development of any national economy (Kasahara, 2004). Either intra-industry or inter-industry cycle recurrences the FG pattern (import-production-export) enhancing competitiveness and efficiency of an industry through the “rationalization” of production. For the meantime, a diversification of production through inter-industry cycle upgrades the structure of industries and exports. As result, the similar progress and interaction between rationalization and diversification of production could encourage national development (Kojima, 2000).

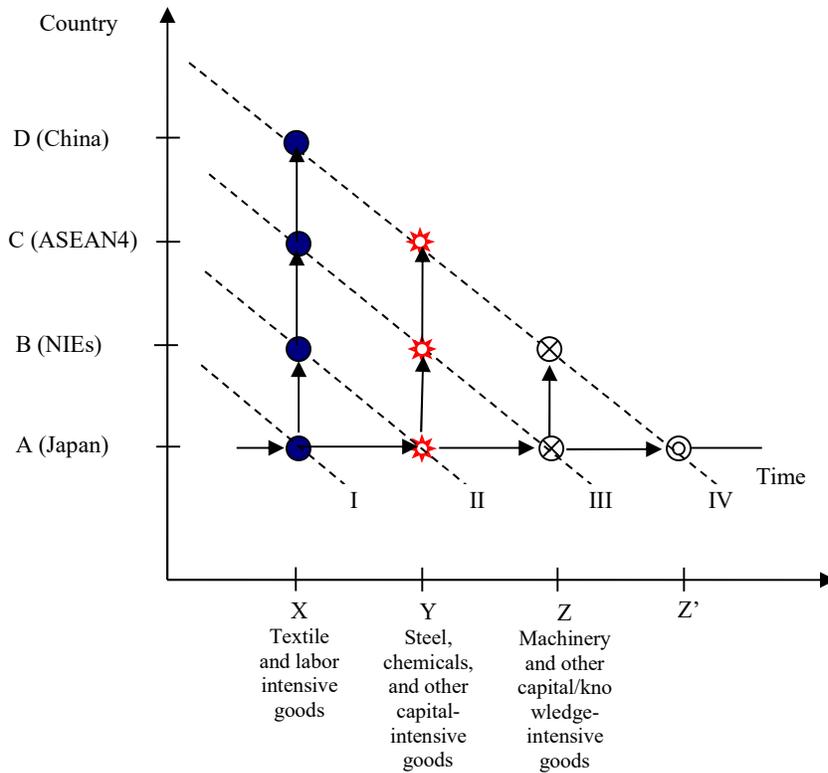
The modern FG paradigm deliberates the sequential change of economic activities from industrialized countries to less industrialized countries through the growing significant role of transnational corporations (TNCs: through sub-contracting, licensing agreement, joint venture, foreign direct investment activities, etc.) in parallel with the dynamic shifting in comparative advantage pattern. Ozawa (1991) stipulated three types of orderly sequencing of economic activities –“multi-sequentialist”- within and among a group of national economies (as summarized by Kasahara (2004)). Product-cycle

² This is why this research applies trade balance (net-importer or net-exporter) as one crucial variable in the analytical tool. By using trade balance, we can firmly assert the position of a specific country i.e. whether it lays in the period t_1t^* (net importer), t^*t_4 (net exporter) or beyond as a net importer (due to the reverse import).

sequencing of a particular product (or a product group) is the first type. The national economy pathways the trade framework of a product life cycle, encompassing four phases: (a) import, (b) import-substituting production, (c) export and (d) finally once again import (reverse import). In Figure 1, panel (a) depicts it. Consumer goods are firstly imported, and then domestically produced, exported and again imported (M-P-E-M). Industry-cycle sequencing of economic development is the second type. The continuing development of industries together with national economy's changing factor and technological endowments affects a country's comparative advantage. It also means that the country changes its production activities (and export), from the lower value-added, more labor-intensive and less capital-intensive industries, to the higher value-added, less labor-intensive and more capital-intensive industries. In Figure 1, it is shown by the shift from panel (a) consumer goods to panel (b) capital goods. The shift shows a signal of the structured and orderly process to generate self-sustaining and self-propelling forces along the dynamic path of comparative advantage. Inter-economy sequencing related to the orderly transfer of industrial activities among national economies along the regional hierarchy is the third type. These industrial transfers will be done in those following economies that have attained the resources and technological capacities most appropriate to the transfers.

For the lead goose country, the phase of post-catch-up situation exists (time t^* in Figure 1 panel a). Exports of consumer goods keep on rising up to a peak at t_4 and then decrease because such labor-intensive consumer goods are losing their comparative advantage due to wage increasing. Then, the production process of the labor-intensive consumer goods (including capital, superior technology, and managerial skill as a package) is transferred to another country, which has lower wage through foreign direct investment (FDI). As a result, the follower goose country can sell the products to domestic market or even export to other countries (including the lead goose country as reverse imports). Kojima (1995) called this FDI as "Pro-trade oriented type (PROT) of FDI". He found that Japan's FDI has been the Pro-Trade oriented investment. In this case, there is mutual relationship between the lead goose and follower geese as described by Kojima (2000):

"FDI thus augments comparative advantages in both countries, resulting in an expanded basis for trade and a reinforce productivity growth. As long as this type of FDI is promoted, an FG stimulus of industrialization is transmitted sequentially from a lead goose to follower geese, bring about enlarged trade and co-prosperous economic growth. This is nothing else but the "FDI-led growth" of regional economies, which is a prime motive for building regional integration (p. 383)"



Source: Kojima (2000)

Figure 2. The Modern “Multi-sequentialist” FG Paradigm

The modern “multi-sequentialist” FG paradigm is clearly presented in Figure 2. Kojima (2000) made two assumptions: (a) an economy’s industrial structure is diversified and upgraded in a sequence from industry X (textiles and other labor-intensive goods) to Y (steel, chemicals, and other capital-intensive goods), and further to Z (machinery and other capital/knowledge-intensive goods), this industrial shift happens horizontally over time, (b) the flying-geese pattern of industrialization is transmitted through Pro-trade type of FDI from economy, the lead goose (or Japan), to the follower geese B (or NIEs), C (or ASEAN 4) and D (or China) according to the order of industrialization stage or per capita income level. This geographical spread takes place vertically over time. The passages of time are indicated by broken lines I, II, III, and IV.

At period I, Japan has already achieved the catching-up process in X-industry, and there is no outward FDI yet. At period II, Japan has comparative advantage in Y-industry and invests in country B’s X-industry. At period III, Japan upgrades its comparative advantage to industry Z, and invests in country B’s Y-industry and country C’s X-industry³. At period IV, the future progress of Japan’s industrialization is yet

³ Dynamic comparative advantage becomes a crucial variable in the FG paradigm. This is why this research uses comparative advantage as one crucial variable in the analytical tool. By using a comparative advantage measurement, we can firmly assert the position of the country’s comparative advantage in the international market for a specific product.

unclear, but her investment has spread widely toward country B's Z industry, country C's Y-industry and country D's X-industry.

3. Methodology

3.1. Data

This study uses data of ASEAN member countries such as Indonesia, Malaysia, Singapore, Thailand, the Philippines, Brunei Darussalam, Cambodia, Laos, Myanmar, and Vietnam. The data of internationally trade products are categorized according to the 3-digit Standard International Trade Classification (SITC) Revision 2. The data is taken from the UN-Comtrade (United Nations Commodity Trade Statistics Database) and published by the World Bank. Products are classified to several international classification standards such as Standard International Trade Classification (SITC). In the SITC classification, products are grouped according to: (a) the materials used in production, (b) the processing stage, (c) market practice and product use, (d) the importance of the commodities in terms of the world trade, and (e) technological changes. The classification structures are level 1 (one digit code) for section, level 2 (2-digit codes) for Divisions, level 3 (3-digit codes) for Groups, level 4 (4 digit codes) for subgroups and level, 5 (code 5 digits) for items (UN, 2004).

Based on the United Nations Conference on Trade and Development (UNCTAD) and the World Trade Organization (WTO) and the 3-digit SITC classification, a Dutch research organization Empirical Trade Statistics (ETA) grouped the 3-digit SITC into 6 product groups: (1) Product group A: primary product (83 products), (2) Product group B: intensive products using natural resources (21 products), (3) Product group C: Intensive product using unskilled labor (26 products), (4) Product group D: technology-intensive products (62 products), (5) Product group E: intensive products using human capital (43 products), and (6) Product Group F: Sectors not classified according to intensity (5 products)

3.2. “Product Mapping “

This subpart explained the “products mapping” which is developed to examine the FG pattern. As mentioned in the FG concept, there are two crucial variables engaged in the FG pattern i.e. comparative advantage and export-import (trade balance)⁴. Therefore, the analytical tool is constructed by combining the two variables. Accordingly, two indicators are chosen i.e. Revealed Symmetric Comparative Advantage (RSCA) as the indicator of comparative advantage and Trade Balance Index (TBI) as the indicator of export-import activities. The RSCA index is formulated as (Laursen, 1998):

$$RSCA_{ij} = \frac{(RCA_{ij} - 1)}{(RCA_{ij} + 1)} \quad (1)$$

⁴ It is argued that production is represented well by both export and import. In the early stage of import substitution, domestic production is low, there is no export and import is still high. When economies scale is reached, domestic production becomes efficient and product has comparative advantage in international market, export will increase and import will decrease. Beyond time t* (after the catching-up process) at Figure 1 (panel a) for example, domestic production and export increase meanwhile import decreases. See Balance *et al.* (1987) for a good discussion.

RCA is the “Revealed” Comparative Advantage (Balassa) Index by Balassa (1965), which is formulated as $RCA_{ij} = (x_{ij} / x_{in}) / (x_{rj} / x_{rn})$. Where x_{ij} symbolizes total exports of country i in group of products (SITC) j . Subscript r denotes all countries without country i , and subscript n refers all groups of products (SITC) except group of product j . By excluding the country and group of products under consideration, double counting is avoided and the nature of trade, which is always a bilateral exchange of goods between two countries, is nicely represented (Wörz, 2005; Vollrath, 1991). The $RSCA_{ij}$ index ranges from minus one to one (or $-1 \leq RSCA_{ij} \leq 1$). The $RSCA_{ij}$ greater than zero implies that country i has comparative advantage in group of products j . In contrast, the $RSCA_{ij}$ less than zero imply that country i has comparative disadvantage in group of products j .

Trade Balance Index (TBI) (Lafay, 1992) is applied to analyze whether a country has specialization in export (as net-exporter) or import (as net-importer) for a specific group of products (SITC). TBI is simply formulated as follows:

$$TBI_{ij} = (x_{ij} - m_{ij}) / (x_{ij} + m_{ij}) \quad (2)$$

where TBI_{ij} denotes trade balance index of country i for group of products (SITC) j ; x_{ij} and m_{ij} represents exports and imports of group of products j by country i , respectively. This index ranges from minus one to one. Extremely, the TBI equals to minus one if a country only imports, in contrast, the TBI equals to one if a country only exports. Indeed, the index is not defined when a country neither exports nor imports. In this case, this paper put zero since it shows either potentially to be exported or imported. Any values within minus one and one implies that the country exports and imports good j simultaneously, “net-importer” (if the TBI negative) or “net-exporter” (if the TBI positive). By using the RSCA and TBI indexes, the “products mapping” is constructed. Products (SITC) can be categorized into four groups A, B, C and D as depicted in Figure 3. Group A consists of products which have both comparative advantage and export-specialization; Group B consists of products which have comparative advantage but no export-specialization; Group C consists of products which have export-specialization but no comparative advantage; and Group D consists of products which have neither comparative advantages nor export-specialization.

Revealed Symmetric Comparative Advantage Index (RSCA)	RSCA > 0	Group B: Have Comparative Advantage No Export-Specialization (net-importer) (RSCA > 0 and TBI < 0)	Group A: Have Comparative Advantage Have Export-Specialization (net-exporter) (RSCA > 0 and TBI > 0)
	RSCA < 0	Group D: No Comparative Advantage No Export-Specialization (net-importer) (RSCA < 0 and TBI < 0)	Group C: No Comparative Advantage Have Export-Specialization (net-exporter) (RSCA < 0 and TBI > 0)
		TBI < 0	TBI > 0
		Trade Balance Index (TBI)	

Figure 3 Product Mapping

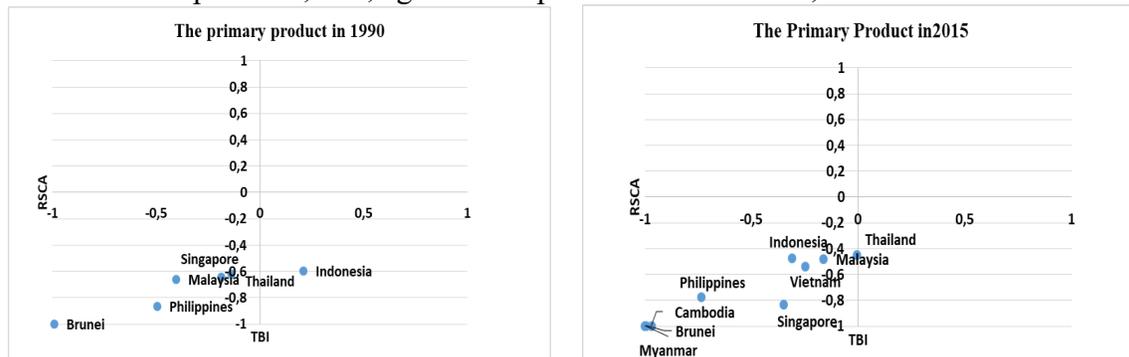
The analytical tool, “products mapping” is used to examine the flying geese pattern. In this research, geese flying might be products (SITC), then the analytical tool is

called “products mapping”. We can examine what products are the leading products based on their comparative advantage and the position of the country as a net-exporter or net-importer. The geese might be industries, then the analytical tool is called “industries mapping”. We can scrutinize what industries are the leading industries based on their comparative advantage and the position of the country as net-exporter or net-importer. Additionally, the geese might also be countries, then the analytical tool is called “countries mapping”.

4. Results and Discussion

From the calculation results can be described "Product Mapping" for the industry. The image are through several stages: (1) calculate the RSCA and TBI index, (2) calculate the medias of RSCA and TBI for each classification, and (3) each industry classification, median⁵ RSCA and TBI plotted into "product mapping" for two observation periods.

Figure 4 shows the ASEAN Flying Geese pattern for the primary product industry. In 1990 Indonesia was a country with comparative advantage for industries producing primary products, followed by Thailand and Singapore. Indonesia products that have high comparative advantages such as natural gas and its preparations (SITC 341), latex and rubber (SITC 232). By 2015 the condition change as this year, Thailand can replace Indonesia as the strongest producer of primary products in ASEAN. This year Malaysia can also surpass Indonesia as a lending country in the primary product industry. Malaysia managed to occupy second place after Thailand. Thai products for primary products include rubber products, rice, agricultural products such as fruit, fish and so on.

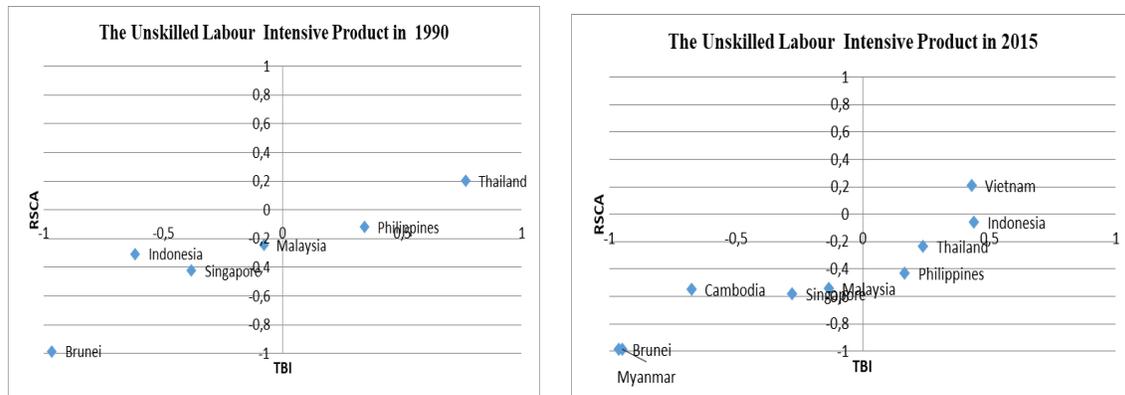


Source : UN-COMTRADE Authors' calculation

Figure 4. The Pattern of Flying Gees : Primary Product

Figure 5 shows that the ASEAN Flying Geese pattern for the intensive product industry using unskilled labor industry. In 1990 Thailand was a country with comparative advantage for industries that products using unskilled labor, followed by the Philippines and Malaysia. Thai products that has high comparative advantages such as apparel and textiles. In 2015 Indonesia succeeded Thailand as a producer of intensive products using the strongest unskilled labor force in ASEAN. Thailand was ranked second followed by the Philippines.

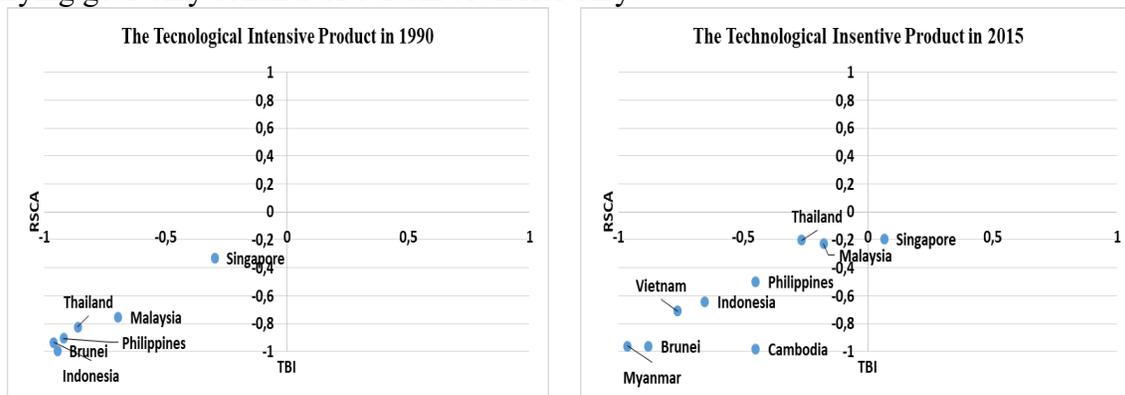
⁵ Since the distributions of RSCA and TBI are skewed distribution, the median is better measurement than the mean.



Source : UN-COMTRADE Authors' calculation

Figure 5. The Pattern of Flying Gees : Unskilled Labour Intensive Product

Figure 6 describes the ASEAN Flying Gees pattern for technology-intensive product industry. In 1990 Singapore took the lead in the excellence of producing technology-intensive products. Malaysia ranks second after Singapore. Some Singaporean products have high comparative advantages such as data processing machines and medical equipment. By 2015, the conditions remain unchanged as this year Singapore and Malaysia remain in the same position. Followed by Thailand as the third rank in producing technology-intensive products. Other ASEAN countries such as Brunei, Cambodia, Vietnam, and Myanmar are relatively far behind compared to the five ASEAN countries. Thus, it can be said that the process of “catch up” in ASEAN member countries is not running as expected because the country that leads in the composition of flying gees only consists of certain countries only.



Source : UN-COMTRADE Authors' calculation

Figure 6. The Pattern of Flying Geese : Technological Intensive Product

5. Conclusions and Policy Implication

This paper examines the FG pattern in the East Asia region. *First*, the evolution of FG concept starting from the original Akamatsu's one to the modern one is briefly described. There are two crucial variables in the FG model i.e. comparative advantage and trade balance (export-import). Industries will be transmitted from the lead-geese country to the follower-geese countries based on their comparative advantage. The

successful catching process for a specific industry in specific country is reflected by the country's trade balance. *Second*, from the FG concept, this research develops an analytical tool namely the "products mapping" which is constructed by combining the two crucial variables. This paper uses the Revealed Symmetric Comparative Advantage (RSCA) index as the indicator of comparative advantage and the Trade Balance Index (TBI) as the indicator of export-import (implicitly domestic production) activities. Then, the analytical tool is applied to examine empirically. In conclusion, the flying geese paradigm has occurred in the ASEAN with the slow process of "catching up". The leading countries in the flying geese formation only consist of certain countries only, namely Singapore, Malaysia, Indonesia, Thailand, and the Philippines.

Some policies implications might rise. *First*, as far as the FG paradigm is concerned, the products (SITC) which Japan have no comparative advantage anymore are potentially transmitted to the follower geese in the future. *Second*, the follower-geese must be well prepared in accepting new industries transferred from the more advanced countries. The follower-geese must be also well prepared to be left by industries, which might be reallocated to the next follower geese. The key success in attracting new industries and keeping established industries operating in the domestic economy is by creating more comparative advantage than the other countries. It relates with how countries prepare the domestic infrastructure, taxation, industrial cluster, low cost in doing business, competitive factor prices, and better quality of factors (including human resources).

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