

Communication

Drivers Enabling Developing Countries to Enter High-Tech Production Networks through Global Production Sharing: Evidence from Malaysia, Taiwan, and Vietnam

Shan Jayasinghe ¹, Lester W. Johnson ^{2,*}, Nilan Udayanga ³, Lakshitha Kumarapperuma ⁴
and Sanath Ranjitha ⁵

¹ Department of Industrial Management, Faculty of Science, University of Kelaniya, Kelaniya 11300, Sri Lanka

² Department of Management and Marketing, Swinburne University of Technology, Hawthorn, VIC 3122, Australia

³ College of Engineering and Computing, Florida International University Miami, FL 33199, USA

⁴ Victoria Section, IEEE Asia Pacific Region, 1, Fusionopolis Walk #04-07, South Tower, Solaris, Singapore 138628, Singapore

⁵ Divisional Secretariat—Hakmana, Ministry of Home Affairs, Matara 81000, Sri Lanka

* Correspondence: lwjohnson@swin.edu.au

Abstract: Since the 1960s, the world has witnessed the rise of several East Asian nations as economic powerhouses. One of the main contributing factors of their success is their decision to create policies that allowed them to enter high-tech global production networks. Today, other countries are attempting to do the same by replicating the success of these East Asian nations, but they have had considerably less success. Thus, a study that investigates the drivers of developing countries entering global production networks would be of great use to policymakers in other countries. Hence, with the support of evidence from Vietnam, Malaysia, and Taiwan, this study proposes policy options (government support, science parks, tax, and other incentives, high- and semi-skilled labor, infrastructure development roadmaps, and free trade agreements) that are necessary to initiate and drive the entrance of a developing country into high-tech global production networks. Government support was identified as the main driver that determines the outcome of an effort to enter. Infrastructure development roadmap and free trade agreements were identified as optional. However, it is recommended that governments consider the two optional factors during policy formation, as they could complement the other factors.

Keywords: global production sharing; high-tech global production networks; economic development; East Asia; developing countries



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1. Introduction

Several East Asian nations such as Taiwan, South Korea, Malaysia, and Singapore have experienced exponential economic growth compared to other countries in the region during the final four decades of the twentieth century [1]. With the dawn of the twenty-first century, two other East Asian countries, Vietnam and the Philippines, began to experience a similar spectacular increase in growth. Some economists consider this growth to be miraculous, considering the abysmal state of the economies of these nations in the 1960s [2].

One of the major contributing factors that led to this unprecedented economic growth was the establishment of US-backed electronic manufacturing operations on the shores of the East Asian nations [3,4]. Governments in the East Asian countries played a decisive role in convincing US high-tech electronic multinational companies to establish operations in the region [2,5]. By doing so, they were able to transform their countries into export-oriented industrial economies that focus mainly on the production of high value-added exports [6].

Global production sharing is a concept that could be used to explain this transformation. Global production sharing is the process of separation of production processes into

stages, with each country specialized in a specific stage of the manufacturing process [7]. Multi-national companies (MNCs) slice their production process and place slices in various geographical locations around the world to achieve cost advantages [8,9]. For example, the Dreamliner, produced by Boeing Corporation, has 43 parts and component suppliers spread over 135 production sites around the world [9]. Developing countries could form policy frameworks that would enable them to engage with such production networks owned by high-tech MNCs [7]. That is exactly what the East Asian nations that successfully transformed their countries did.

India is a country that has taken considerable effort to replicate the success of East Asian nations and connect with global production networks through MNCs. Athukorala [10] discusses India's prospects of attracting MNCs engaged in high-tech global production networks. According to him, India has failed to enter high-tech global production sharing despite various efforts. Thus, there is a need to understand what exactly a developing country should be doing to enter global production sharing by attracting MNCs to initiate and drive a transition (Here, a transition is referred to the process of transforming a country that focuses mainly on traditional labor-intensive industries to a country that focuses on high-tech capital-intensive industries). The purpose of this study is to fulfil this requirement by broadening the understanding of the process of global production sharing and exploring policy options that enable developing countries to initiate and drive transitions as part of national development strategies by investigating how a selected set of East Asian nations have initiated and driven their transitions.

Based on this background, this study proposes a set of policy options that could initiate and drive a transition of a developing country. The remaining sections of this paper are organized as follows. Section 2 presents the methodology adopted to derive policy options and a detailed discussion of each policy option with empirical evidence. Section 3 presents implications and recommendations based on the findings of the study as well as the limitations of the study and suggestions for future research. Concluding remarks are presented in Section 4.

2. Methodology and the Policy Options That Could Initiate and Drive a Transition

First, this study conducted a systematic literature review to understand whether the existing literature in global production sharing discusses anything specific on policy options that enable developing countries to initiate and drive transitions. The process that was followed to select articles for the systematic review is as follows.

1. First, the review question was finalized as what are the policy options that enable developing countries to initiate and drive transitions?
2. As per the recommendation of [11], this study decided the article selection criteria mentioned in Table 1 below.

Table 1. Criteria for inclusion.

Characteristic	Inclusion Criteria
Publication medium	Peer-reviewed journal, conference, and book chapters indexed in Scopus
Languages	English and Sinhalese
Period	From 2008 to 2022 (inclusive)
Research design	Conceptual and empirical
Content	Studies that discuss matters related to global production sharing
Source	Scopus database

The study limited its search to articles written in English and Sinhalese, as the authors were not fluent in any other language. This method has been used in previous review articles (e.g., [11]). Only peer-reviewed journal articles, book chapters, and conference papers were included. This decision was made as it was also an inclusion criterion in other review articles published in reputed journals (e.g., [11,12]). Furthermore, only the Scopus

database was considered to search articles as there are articles published in reputable journals that have done the same (e.g., [13]). Additionally, the study only considered articles on global production sharing that were published between 2008 and 2022.

- Third, the search process was conducted in the three steps mentioned below in Figure 1, since those three steps have been used to search articles in past studies (e.g., [14]).

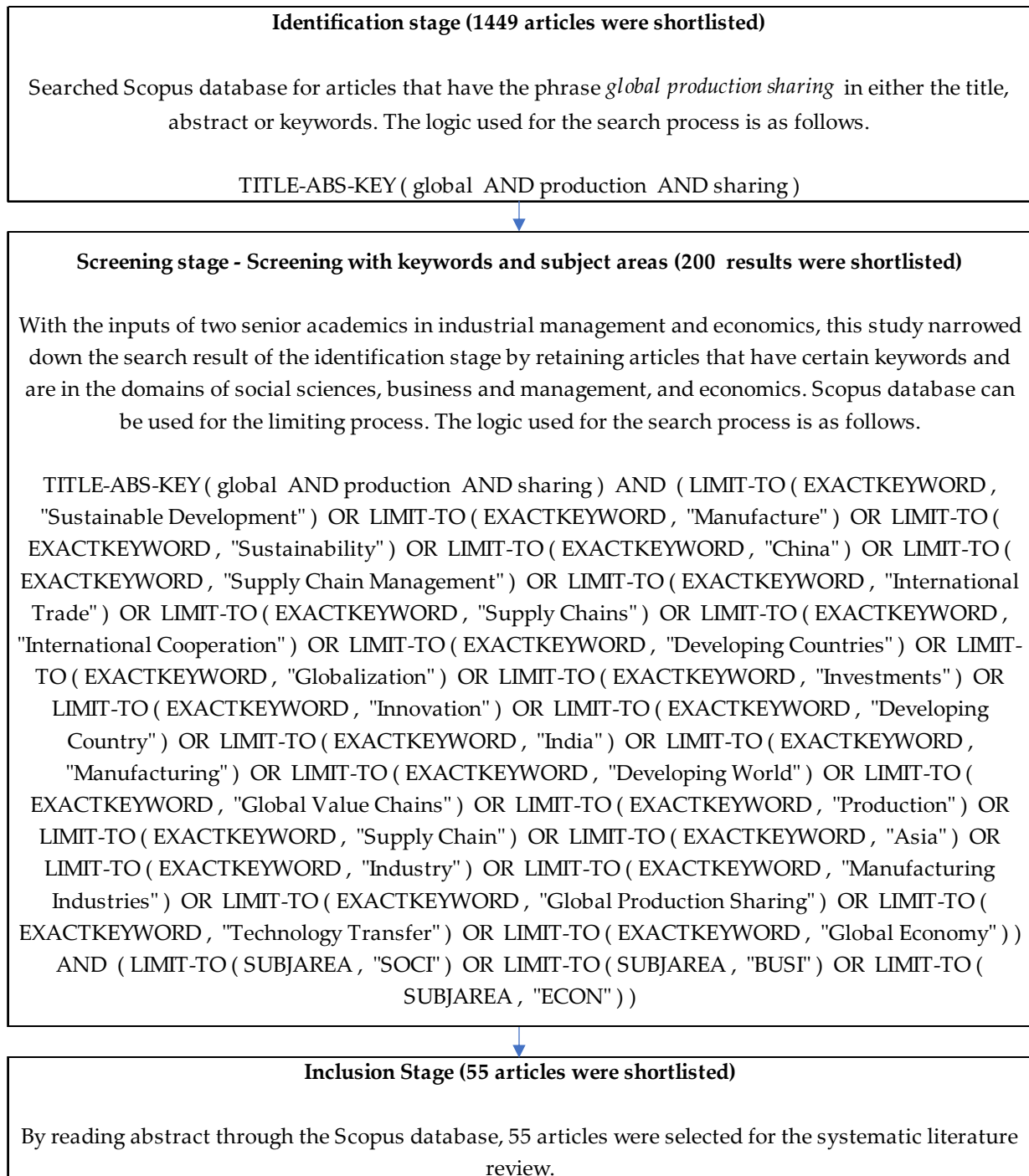


Figure 1. Summary of the article search process.

Authors were able to shortlist 55 articles for the systematic literature review. They understood that a majority of the articles discuss the phenomenon that happened due

to the participation of a country in global production sharing (e.g., [15]). Furthermore, studies have focused on aspects such as challenges faced by developing countries due to the non-participation in global production sharing (e.g., [16]), role of global organizations in promoting the participation of developing countries in global production sharing (e.g., [17]), etc. Thus, through the systematic literature review, it was further identified that studies in the domain of global production sharing have hardly focused on conducting studies that investigate policy options that enable developing countries to initiate and drive transitions to participate in global production sharing.

Since nothing concrete that is capable of answering the review question was found, this study moved into the second phase of the methodology. Based on the GDP per capita of various countries in the region in 2020, nine East Asian nations that have successfully initiated and driven the transition were classified into three categories by following the approach of [18].

- Lower-middle income countries: Indonesia, Philippines, and Vietnam
- Upper-middle income countries: China, Malaysia, and Thailand
- High-income countries: Singapore, South Korea, and Taiwan

By the time the second phase of the methodology was implemented, at least one author has visited Vietnam, Malaysia, and Taiwan. During those visits, authors had the opportunity to observe what has happened in those countries during the initial transition, do industry visits, and discuss with the experts to understand the policy options that were implemented during the initial transition.

Furthermore, literature on Vietnam, Malaysia, and Taiwan were more easily sourced than other countries. Thus, using the Google Scholar database, authors sourced literature that discusses policy options that initiated and drove transitions of Vietnam, Malaysia, and Taiwan. Once the literature was sourced, the authors reviewed them to find and understand the policy options. The authors reviewed journal articles, book chapters, and reports prepared by governments and independent organizations to identify policy options.

Once the authors realized that the factors related to a particular country reached a saturation point during the article search process, the search process was terminated. For example, the authors found several articles on Taiwan's transition. However, the authors realized that nothing novel could be found in the reviewed articles that were reviewed after [6,19,20]. As a result, the authors terminated the search process related to Taiwan's transition at that point. A summary of the source articles and the findings of the review are listed in Table 2.

Table 2. Policy options that initiated and drove the transitions of Vietnam, Malaysia, and Taiwan.

Country	Source	Policy Options
Vietnam	[21,22]	<ul style="list-style-type: none"> • Active intervention and support of the government to promote high-tech industries and investment • Formation of free trade agreements with regions to facilitate free trade between Vietnam and various strategic regions • Formation of high-tech investor and industry-friendly tax policies and benefits packages • Development of semi-skilled human capital
Malaysia	[23,24]	<ul style="list-style-type: none"> • Active intervention and support of the government to promote high-tech industries and investment • Development of clear infrastructure development roadmap • Formation of high-tech investor and industry-friendly tax policies and benefits packages • Development of semi-skilled human capital
Taiwan	[6,19,20]	<ul style="list-style-type: none"> • Active intervention and support of the government to promote high-tech industries and investment • Formation of high-tech investor and industry-friendly tax policies and benefits packages • Development of high-skilled and semi-skilled human capital • Formation of dedicated science parks to house high-tech firms

The review process uncovered the following six key policy options that are vital to initiate and drive the transition of an economy.

1. Government support
2. Tax incentives and benefits packages to attract investments
3. Clear infrastructure development roadmap
4. Formation of industrial parks
5. Development of semi-skilled and high-skilled labor
6. Formation of bilateral and regional free trade agreements

These policy options present the aspects that policymakers of a country planning a transition should selectively adopt and fulfil. The following subsections present a detailed discussion of each policy option.

2.1. Government Support

According to the information collected on Vietnam, Malaysia, and Taiwan, government support was found to be the most critical factor that contributes to the success of a transition. One reason for this is that the success of the other five policy options greatly depends on government support. However, this is not the only reason. The remainder of this section discusses the significance of government support in the transformations of Vietnam, Malaysia, and Taiwan.

In Vietnam, the government introduced their revolutionary Doi Moi reforms in 1986 to revitalize the country's economy by opening up the country and steering the economy towards a market economy [25]. Since then, the Vietnamese economy has grown steadily. As a result, the World Trade Organization (WTO) invited Vietnam to become a member, and Vietnam joined the WTO in January 2007. In addition, education reforms instituted by the government continued to strengthen the country's education system. As a result, Vietnam was able to build a vibrant and skilled workforce by the early 2000s. Once Vietnam developed the necessary capabilities to promote high-tech high value-added industries, the Vietnamese government hosted the 2006 Asia-Pacific Economic Cooperation Summit, which was held in the city of Hanoi. The purpose of the summit was to showcase the capabilities of Vietnam to the world and attract investment in high-tech industries. This summit was able to attract the attention of Intel Corporation, an American technology company. Later the same year, Intel announced that they would invest US\$300 million to establish their largest assembly and testing facility in Ho Chi Minh City. The Vietnamese government directly monitored and supported Intel throughout the construction phase of the project [26]. This project helped to establish confidence in Vietnam as an attractive investment destination for other high-tech companies [27]. The Vietnamese government actively utilized the investment of Intel and their diplomatic corps to convince other high-tech multinational companies such as Samsung, Nokia, Hitachi, Cisco, Canon, and Fujitsu to establish operations on the shores of Vietnam.

Government support and involvement also feature prominently in Malaysia's transformation. In the early 1970s, even though Malaysia was already an attractive investment destination due to its low labor costs as compared to Singapore, the state of the nation's infrastructure at that time was a concern. To overcome this issue, the Malaysian government prepared a roadmap to develop the infrastructure required by high-tech high value-added manufacturing operations [28]. The Malaysian government then went on to initiate discussions at the diplomatic level to obtain the assistance of the United States in making the transition. As a result, in 1972, despite a lack of required infrastructure at the time, Intel offered to bring the first investment in integrated circuit manufacturing to Malaysia [24]. These investments were directed at Penang province, and this area remains a hub for integrated circuit manufacturing and other high-tech high value-added industries. Furthermore, the Malaysian government made reforms to ensure political stability as well as education reforms to ensure that their workforce would be fluent in the English language; the government also established efficient government machinery with a sound communication system and created a number of special incentives for investors. These

reforms were designed to enable the nation to reach a level where they could compete with other East Asian countries [24]. As a result of these efforts, several world-renowned high-tech multinational companies (such as Dell, Canon, Sanyo, SONY, and Samsung) made investments in Malaysia in the 1980s and 1990s.

Similar to the governments of Vietnam and Malaysia, the Taiwanese government actively intervened to support the country's transition. To initiate and drive the transition, the Taiwanese government established two institutions in the 1970s: the Industrial Technology Research Institute (ITRI) and the Electronic Research and Service Organization (ERSO). Those two organizations were responsible for supporting high-tech research and development activities and producing highly skilled workers for high-tech high value-added industries [20,29]. The Taiwanese government also actively promoted selected high-tech, high value-added industries and was dedicated to developing an attractive environment where high-tech companies could become established and grow. Furthermore, the Taiwanese government directly communicated with established high-tech multinationals during the transition by, for example, requesting Philips to invest in the Taiwan Semiconductor Manufacturing Company (TSMC) [20]. Unlike Vietnam and Malaysia, by 2000, Taiwan had already built a high-tech high value-added ecosystem consisting of local companies such as TSMC, Foxconn, Acer, and ASUS. The support and involvement of the Taiwanese government in managing this ecosystem played a large role in Taiwan's transformation.

Thus, commitment to promoting high-tech high value-added investments, continuous policy-level involvement (such as the establishment of ITRI and ESRO by the Taiwanese government), timely reforms (such as reforming the education sector to produce workers with the appropriate skills), and reaching out to high-tech multinational corporations and research institutions through diplomatic channels are highlights of the government support provided for the transformation in Vietnam, Malaysia, and Taiwan. Unlike free markets such as those in the USA and Europe—where industries grow, compete, and survive with little or no government support—the governments of countries such as Vietnam, Malaysia, and Taiwan actively engage in shaping industries through continuous policy changes, since they are both promoting and are dependent on selected high-tech high value-added industries [20]. Hence, at the present time, government support is seen as a mandatory factor for initiating, driving, and sustaining a transition.

2.2. Tax Incentives and Benefits Packages to Attract Investment

Tax incentives and benefits packages are a common benefit that most governments of East Asian nations have offered to attract investment [30]. There is inconclusive evidence to determine the extent of the contribution of tax incentives and benefits packages in transforming a country into an exporter of high-tech high value-added products [31]. However, when considering the cases of Vietnam, Malaysia, and Taiwan, it is evident that tax incentives and benefits packages are a strategy that policymakers must consider offering to potential high-tech MNCs.

In the case of Vietnam, since 1986, the government has continuously revamped Vietnam's tax policies to drive economic transformation. Prior to 2010, the tax policy focused more on driving foreign and local investments towards incentive sectors, special incentive sectors, difficult socio-economic regions, and especially difficult socio-economic regions [27]. However, policymakers came to realize the significance of attracting high-tech investors to the shores of Vietnam to drive the transformation and, in July 2010, the government introduced a special list of technologies and high-tech products that would receive tax incentives and other benefits such as corporate income tax exemptions, land rental exemptions, and import duty exemptions [32]. There is no conclusive evidence suggesting that tax and other benefits had a significant impact on Vietnam's success in connecting with high-tech global production networks [31]. However, the actions of the Vietnamese government suggest that they believe tax and other benefits are factors in attracting MNCs, as the government has continued to revise the list of technologies and high-tech products that will receive tax incentives and other benefits [32].

Malaysia has provided many tax incentives and other benefits through national industrialization policies to attract high-tech high value-added investors during their transformation in the 1970s [24]. Over the decade, the government provided import duty exemptions for companies that produce high-tech high value-added products to import goods in order to create fixed assets in free trade zones. Another attractive benefit was the option of acquiring full ownership of the venture. In other words, MNCs had the freedom to choose whether or not to partner with a Malaysian venture. Moreover, high-tech high value-added investors received corporate income tax exemptions for up to ten years. Another notable benefit offered to these investors was a change in labor law that allowed firms to operate factories around the clock. Despite these tax and other benefits, there is no conclusive evidence to suggest that they had a considerable impact on the success of Malaysia's transformation [31]. However, since the 1970s, the Malaysian government has continuously updated their tax policies and benefits packages related to high-tech high value-added investments.

During the transformation in Taiwan, the government offered somewhat different tax incentives and other benefits than Vietnam and Malaysia to attract high-tech high value-added investment. Until the mid-1970s, Taiwan focused mainly on cheap, low-skill, and labor-intensive industries such as food processing, textiles, and electrical machinery [33]. In the mid-1970s, due to rising domestic labor costs and changes in the world economy, the Taiwanese government decided to promote skill- and knowledge-intensive products and industries [34]. To do this, they developed a set of tax incentives, preferential financial packages, and technological support to promote a list of strategic industries that had the capability to assist the island nation to bridge the technological gap that separated them from advanced industrialized countries and to build greater technological self-reliance [34]. By 1984, the Taiwanese government made certain that most tax incentives and other benefits were received by local and foreign high-tech firms and investors that were conducting research and development in Taiwan. This decision made Taiwan's transformation more focused on research and development. By 1984, nearly all US firms in the electronic industry that were research and development focused had established a venture in Taiwan.

Vietnam, Malaysia, and Taiwan have regularly modified their policies related to tax incentives and other benefits to stimulate their transitions, even though there is no conclusive evidence to suggest that these incentives have a significant impact on the success or failure of a nation's transition. However, the available evidence suggests that governments can use such policies to establish priorities of a transition. Vietnam and Malaysia implemented policies related to tax and other benefits to promote labor-intensive components of high-tech high value-added industries. In contrast, Taiwan implemented policies that promoted skilled- and knowledge-intensive components.

2.3. Clear Infrastructure Development Roadmap

Infrastructure, which includes roads, railway networks, telecommunication networks, housing facilities, universities, and other educational institutions, plays a significant role in attracting high-tech MNCs [35,36]. Some studies claim that quality infrastructure is one of the top five factors that contributes towards attracting high profile investors (e.g., [36]). Vietnam is a classic example demonstrating the importance of quality infrastructure in attracting high-tech investment. Even though Vietnam provided generous tax and other incentives during its transition for investing in regions with inadequate infrastructure, the country failed to attract MNCs to those regions. In contrast, Vietnam was able to attract investors to regions with high-quality infrastructure close to ports, highways, and major cities with a skilled workforce, such as the areas surrounding Hanoi and Ho Chi Minh City [31].

When Malaysia initiated its transformation in the early 1970s, its infrastructure was not the highest in quality [28]. However, in 1972, Malaysia was able to attract eight high-tech MNCs by promoting factors such as a relatively large labor force with proficiency in English, political stability, good basic infrastructure as compared to most other countries in the

region, and the availability of an excellent communication system [24]. Despite attracting eight high-tech investors, the chief minister of the state government of Penang, Dr. Lim Chong Eu, and his team realized the importance of developing high-quality infrastructure to prolong the attractiveness of Penang as an investment destination [28]. They made a solid commitment to infrastructure reforms by developing an infrastructure development roadmap that was intended to integrate Penang's economy with the global economy [7]. This commitment by the state government of Penang indirectly assisted the development of Penang as a high-tech manufacturing hub in East Asia.

Thus, developing countries that are willing to initiate a transition but do not possess high-quality infrastructure have the option of adopting Malaysia's approach of presenting a roadmap and demonstrating the commitment to infrastructure reforms when conducting investment promotion activities. However, since there is no empirical evidence to suggest that Vietnam and Taiwan promoted infrastructure development roadmaps to attract investors, this could be considered as an optional policy option. Even though it is an optional aspect, Malaysia's experience indicates that a clear infrastructure development roadmap could complement other policy options.

2.4. Formation of Industrial Parks

Historical data suggest that East Asian nations have promoted dedicated industrial zones to encourage foreign and local high-tech investment. While a majority of these zones have failed to achieve the objectives of their formation, a limited number such as the provincial industrial zone in Penang, the Hsinchu Science Park, and industrial zones in Hanoi and Ho Chi Minh City have been a huge success. Thus, it is evident that the formation of science parks or industrial parks alone, without taking other measures, will not be sufficient to attract MNCs.

In the case of Vietnam, government offered location-based tax incentives to investors for investing in industrial parks [27]. However, despite generous tax incentives, the investors did not select industrial zones in areas with under-developed infrastructure but preferred to invest in industrial parks in Hanoi and Ho Chi Minh City, since these parks had quality infrastructure and were close to critical locations such as ports and airports [31]. In addition, Hanoi and Ho Chi Minh City offered easy access to semi- and high-skilled labor [31].

Malaysia did not build industrial zones as aggressively as Vietnam at the start of the transition. Instead, Malaysia adopted a more focused approach by developing a cluster of industrial zones in Penang and creating a welcoming and conducive environment for high-tech investors [35,37]. The state government of Penang made sure that the industrial zones were constructed adjacent to the critical infrastructure such as the Penang airport [37]. Apart from that, Malaysia allowed high-tech MNCs to operate in a union-free environment with labor market flexibility if they decided to set up factories in industrial zones. Furthermore, if investors established factories in industrial zones, they were allowed to have full ownership of the plants.

Similar to Malaysia, Taiwan also adopted a focused approach. Beginning in 1980, they developed Hsinchu Science Park as an industrial zone and focused on attracting local and international high-tech MNCs. The Taiwanese government offered generous tax incentives to encourage investment in Hsinchu Science Park [33,34]. Since Taiwan had an approach that focused on research and development during their transition, they offered better tax incentives to those who invested in research and development activities along with manufacturing activities. In addition to offering tax incentives, the government developed high-quality basic infrastructure around the Hsinchu Science Park. Moreover, the Taiwanese government offered high-quality accommodations and access to university research facilities (at National Chiaotung University and National Chinghua University) to high-caliber researchers from firms that had invested in Hsinchu Science Park [33,34].

Based on the evidence from Vietnam, it is clear that only providing tax incentives for investing will not guarantee success in attracting high-tech investment in industrial

zones. Empirical evidence from Malaysia and Taiwan suggests that several other important measures—such as easy access to high-quality infrastructure, airports, and ports, proximity to higher education institutions, allowing union-free operations, allowing full ownership of operations—and other measures must be offered when promoting industrial zones. Moreover, it is good to use an approach during transformation that will focus on setting up a limited number of industrial zones complemented by the above-mentioned measures and expanding the number of zones at a later stage, rather than setting up multiple industrial zones simultaneously and trying to make all of them operationally successful.

2.5. Development of Semi-skilled and High-skilled Labor

During a transformation, one of the main factors affecting investment decisions by high-tech high MNCs is the availability of low-wage skilled labor [36]. When examining the transition of Vietnam, Malaysia, and Taiwan, it is evident that they have executed various measures to demonstrate their capability to provide sufficient human resources to meet the requirements of potential high-tech investors.

During its transformation, Vietnam was able to attract high-tech high value-added industries that focused on low-skill activities such as assembling and packaging integrated circuits, mobile phones, and other electronic products [35]. High-tech MNCs did not relocate their high-end manufacturing operations (such as integrated circuit fabrication) to Vietnam despite the availability of a large reserve of low-wage workers as compared to Singapore. Hence, during its transition, Vietnam focused on training and developing semi-skilled labor capable of working at assembly and packaging plants. In 2016, more than 75% of the admission to the tertiary education sector was enrolled for elementary and training programs that took less than three months to complete [38]. It should be noted that Vietnam did not ignore the development of highly skilled labor; however, they mainly focused on matching the labor supply with the demands of industry.

Malaysia also focused on supplying semi-skilled labor at the beginning of its transition. Like Vietnam, Malaysia was interested in attracting high-tech investment in assembly and packaging operations [24]. From 2005, the Malaysian government initiated training and development of high-skilled labor capable of engaging with knowledge-intensive high-tech industries [35]. Until then, the government's main focus was on meeting the demand of high-tech investors interested in semi-skilled labor. Thus, from the early 1970s until the inauguration of the Penang Skills Development Centre in 1989 [28], Malaysia was popular among high-tech investors as a destination with "low wages, long working hours, short holidays, highly labor-intensive operations, poor working conditions, and a lax state policy" towards labor laws [24].

Unlike Vietnam and Malaysia, Taiwan simultaneously developed both semi- and high-skilled labor during its transition [34]. Policymakers in Taiwan realized that they must supply semi-skilled labor for manufacturing operations to more rapidly transfer foreign technologies to Taiwan [34]. While promoting manufacturing operations and providing semi-skilled workers, Taiwan continued to train and develop high-skilled labor at ERSO and several other research institutions. Taiwan did not want the high-skilled labor to do basic research. Instead, Taiwan encouraged them to innovate, adapt, and improve established technologies transferred by foreign high-tech companies [34]. For example, ERSO acquired a 7-micron metal-gate complementary metal-oxide semiconductor (CMOS) process from the Radio Corporation of America (RCA) and developed the technology (a four-inch wafer) that was initially used by United Microelectronics Corporation (UMC) [20]. This development was done by scientists and engineers at ERSO. ERSO also provided the high-skilled labor needed by UMC. National universities also trained high-skilled workers with funds received from the government [20]. This approach, in which efforts were made at the start of the transformation to train high-skilled labor, helped Taiwan to establish a knowledge-intensive economy by 2000 [20]. Today, Taiwan no longer depends on foreign MNCs for investment and technology. Instead, Taiwan has several global companies (TSMC, UMC, Foxconn) that develop technology used throughout the world.

Thus, if a nation wishes to ensure the long-term sustainability of a transition, the country must develop high-skilled workers capable of developing local technologies from the start. However, the discussion above suggests that due to the reliance on manufacturing operations of foreign MNCs during the early stages of a transition, policymakers must first prioritize the development of semi-skilled labor.

2.6. Formation of Bilateral and Regional Free Trade Agreements

When a country enters into bilateral and regional free trade agreements (FTAs), the exporters residing within that country have the opportunity to “enjoy cost savings from elimination or reduction of customs duties, mutual recognition agreements, trade facilitating customs procedures and removal of onerous regulations” [39]. In other words, FTAs provide exporters easy access to various markets worldwide with fewer barriers.

Compared to Malaysia and Taiwan, Vietnam has formed a higher number of FTAs with countries and critical regions that have consumers with greater purchasing power (e.g., the United States of America, the European Union, Japan, Australia, and New Zealand). Vietnam is continuing to seek FTAs because of the benefits that these agreements provide, and it is currently in discussions to create an FTA with the European Free Trade Association (EFTA) [40], as EFTA’s member countries have consumers with greater purchasing power. Duong et al. [41] investigated the impact of FTAs on foreign direct investment inflows into Vietnam and concluded that FTAs created a higher inflow of foreign direct investments in the manufacturing sector between 2005 and 2016, which corresponds to the period when Vietnam went through its transition. Most of those investments were directed to establishing manufacturing operations in various high-tech industries [42].

The Philippines, which also experienced a successful transition in the twenty-first century, formed a number of bilateral and regional FTAs [43]. While there is no clear evidence to suggest that FTAs assisted the transformation of the Philippines, it appears that policymakers there had advised the government to aggressively form FTAs with important countries and regions. Thus, unlike countries that went through transition in the twentieth century, both Vietnam and the Philippines have promoted the formation of FTAs during the transition. More research is required to conclude whether Vietnam and the Philippines gained any competitive advantage due to the FTAs. However, empirical evidence from Vietnam suggests that FTAs are associated with the increased inflow of foreign direct investments [41] and is a factor that influenced investor decisions to invest in Vietnam [36]. Thus, based on the empirical evidence from Vietnam, even though it is not clear whether FTAs provide a comparative advantage, at least to demonstrate the country’s commitment and willingness to make trading easier for investors, it is good to consider forming bilateral and regional FTAs during a transition.

3. Discussion

With the support of evidence from Vietnam, Malaysia, and Taiwan, this study proposed six policy options that policymakers could adopt when initiating and driving a transition of a developing country. This section discusses the implications of the proposed policy options, limitations of the study, and suggestions for future research.

One aspect to notice from the discussion on each policy option is that it is not necessary to adopt all six elements during a transition. Evidence from Malaysia and Taiwan suggests that it is not mandatory to have free trade agreements with various parts of the world to initiate a transformation. Developing a clear infrastructure development roadmap is another aspect that is not mandatory since there is no empirical evidence to suggest that Vietnam or Taiwan presented such roadmaps to potential high-tech investors. However, evidence suggests that any country that demonstrates an interest in forming free trade agreements to promote and facilitate free trade [44] and in developing high-quality infrastructure [36] will have a comparative advantage over its competitors when attracting high-tech high value-added investors. Hence, even though policymakers can ignore those two aspects and develop a set of policies by focusing on the other four aspects, considering those factors

during the policy formation has the potential to leverage investor confidence and chances of entering global production sharing.

The most critical factor for a successful transition is government support. As discussed earlier, government support is essential for ensuring the success of the other five policy options. Furthermore, the active involvement of the government is mandatory to ensure political stability, economic stability, and continuous improvement of a country's legal framework. At the present time, political stability and economic stability are the two most important factors that investors consider when deciding where to make an investment [36]. When observing countries that are willing to initiate transition, it is obvious that some have not been able to create political and economic stability within their borders. For example, India has been trying to encourage semiconductor manufacturing since 2005; however, to date, India has not been successful in attracting a major player in semiconductor fabrication or packaging. One of the main contributing factors for India's failure is the lack of political and economic stability, which is also the case for other South Asian countries such as Pakistan, Sri Lanka, and Bangladesh. Most of these countries are democracies with strong opposition parties. As traditional media and social media have become more influential, governments in these countries are finding it extremely difficult to establish political and economic stability due to protests, media campaigns, and other movements. Hence, governments need to find ways to work harmoniously with opposition parties, traditional media, social media activists, and international organizations to develop the political and economic stability that is mandatory for a successful transition.

In addition to ensuring stability, governments should be directly involved with investment promotion activities with the support of diplomatic services. For example, Vietnam is well-known for semiconductor packaging and testing. Ten years after establishing its first semiconductor packaging and testing plant in Ho Chi Minh City, the Vietnamese government set up policies and strategies to attract investors in semiconductor fabrication. In 2020, the prime minister of Vietnam had a face-to-face discussion with top officials of Samsung to discuss the possibility of setting up a \$1 billion semiconductor fabrication plant in Ho Chi Minh City. The discussions held by the Indian government with ASE Technologies, Powertech Technology, SPIL, and Amkor Technology are some other recent examples of government involvement in the promotion of high-tech investment. Such discussions demonstrate the government's interest in attracting semiconductor fabrication and packaging investments. However, they also help to establish trust in the government among potential high-tech MNCs, and they allow the government to identify and better understand the requirements of these investors.

Based on the findings on transitions in Vietnam, Malaysia, and Taiwan, it would be beneficial for policymakers to consider tax and other benefits when planning a transition. However, offering tax and other incentives is not sufficient for attracting high-tech investors. For example, in 2019, the island nation of Sri Lanka introduced investor-friendly tax breaks and other incentive schemes that were on par with those of most other Southeast Asian nations, but those schemes did not attract any notable high-tech MNCs. To enhance the comparative advantage of a country as a potential high-tech investment destination, tax breaks and other incentives can be used in conjunction with efforts to create political and economic stability, create high-quality infrastructure, and ensure access to a sufficient number of workers with the requisite skills. However, more research is required to understand the specific role that tax breaks and other incentives play in attracting high-tech investment. Nevertheless, since nearly all countries that successfully transformed their economies have provided generous tax incentives to high-tech investors, it is a factor that cannot be ignored.

Governments have used tax and other incentives to navigate transitions in various directions, as policymakers can use these incentives as a tool to channel investments into specific regions, industries, or sectors. Vietnam used tax and other incentives in an attempt to direct investment to the country's least developed regions, but this effort failed. Vietnam, Malaysia, and Taiwan were successful in using tax and other incentives to attract high-tech investment to industrial zones such as those in Hanoi and Ho Chi Minh City, the provincial

industrial zone in Penang, and Hsinchu Science Park. As discussed in Section 2.2, Taiwan successfully used tax and other incentives to attract research and development operations of investors to the shores of Taiwan.

The formation of industrial zones is another factor that the policymakers of nations desiring a transition must consider. As discussed earlier, the ideal strategy is to form industrial zones in areas where investors have access to quality infrastructure, ports, and airports, as well as workers with sufficient talent. Vietnam's experience suggests that investors will not set up operations in industrial zones without access to any of the above amenities, even with generous tax breaks and other incentives. Moreover, governments should take necessary steps to create conducive environments for high-tech investors within the industrial zones by formulating policies to support their operations. For example, during its transition, Malaysia promoted policies (such as flexible labor laws) to encourage labor-intensive packaging operations within the industrial zones in Penang. Since Taiwan was mainly promoting research and development, their policies for Hsinchu Science Park were more focused on attracting the best human resources. To accomplish this, the government provided high-quality housing and free access to high-quality lab facilities to scientists working for companies within the science park. However, even though it is considered to be a mandatory component, a strategy that involves creating industrial zones will not succeed in attracting high-tech investors unless those efforts are complemented by other policy options.

The development of semi- and high-skilled labor is another mandatory aspect that the policymakers must focus on when planning a transition. Vietnam and Malaysia focused on training semi-skilled workers that are required to run low-end manufacturing operations for high-tech industries. In addition to semi-skilled labor, Taiwan trained high-skilled workers from the start of its transition. This provided them with the ability to cater to the requirements of foreign high-tech investors in the initial part of the transformation, where labor-intensive operations dominated, and to develop at a later time the knowledge-intensive, local high-tech industry consisting of local companies such as TSMC, Acer, Asus, Foxconn, and others. Malaysia was late in initiating programs that focused on developing high-skilled labor. Hence, 50 years after receiving its first high-tech investment from Intel, Malaysia still relies predominantly on foreign direct investments for technology transfer and has failed to develop local knowledge-intensive industries as Taiwan and South Korea have done. Hence, empirical evidence from East Asian nations suggests that short- to medium-term success of a transition depends on semi-skilled labor capable of driving labor-intensive operations of foreign investors, while long-term success depends on a nation's capability to develop new knowledge on its own through high-skilled labor and gradually move the country from a labor-intensive economy that depends on foreign direct investments to a knowledge-intensive economy. Consequently, any nation planning to make a transformation must create and implement policies to develop both semi-skilled and high-skilled labor.

Of the six policy options identified in this study, four policy options—government support, tax and other incentives, semi-skilled and high-skilled labor, and establishing industrial parks—are mandatory for a transition. Hence, policymakers must formulate policies that can address these elements. Although FTAs and infrastructure development roadmaps are considered to be optional, it is recommended to create policies to implement them, as they can complement the other four policy options. Based on this information, it is evident that policymakers in a developing nation can adopt the proposed policy options when planning a transition to enter global production sharing.

Despite its contributions, this study has several limitations. The framework proposed in this study applies only to the least developed countries and developing countries that are eager to transform their economies by promoting and establishing high-tech high value-added industries. Vietnam and Malaysia are still in the process of development, and Taiwan was a developing country during its transformation in the late 1970s through the 1990s. Hence, more investigation is needed to understand if these policy options can be

adopted by more highly developed countries, such as Australia and New Zealand, that do not currently have high-tech high value-added industries. The second limitation is related to the methodology used in the study. This study considered sources related to Vietnam, Malaysia, and Taiwan to identify the policy options. However, several other East Asian nations such as China, the Philippines, Singapore, South Korea, and Thailand have also achieved economic success by entering global production sharing. Future research might be able to extend the list of policy options by considering empirical data from other East Asian nations that were not included in the present study. The third limitation is that this study did not go deep into each policy option and discuss specific details. For example, when it comes to tax incentives, it is worth researching the nature of double taxation agreements and protocols in Taiwan, Malaysia, Vietnam, and other East Asian nations and the impact it had on the tech transformation of a nation, types of tax deductions done by East Asian nations to attract high-tech investors and initiate the tech transformation, and more importantly whether those tax incentives truly played a part in attracting and initiating tech transformations. Thus, it is important that future researchers generate more insights by studying each policy option further.

4. Conclusion

This study extends the understanding of global production sharing by proposing six policy options that a developing country could adopt to initiate and drive a transition to enter global production sharing. Thus, the outcome of this study is capable of providing clarity to the policymakers of developing countries on what they should be doing to initiate and drive a transition. Let us consider an example. India has special economic zones (SEZs) that are being built to attract MNCs. However, they have failed to attract a sufficient amount of MNCs that could facilitate India's entrance to global production sharing. The findings of this study suggest that it is mandatory to complement SEZs with government support, the development of semi- and high-skilled workers, and tax and other benefits. Thus, the outcome of this study could be used by Indian policymakers to rethink their strategies to enter global production sharing. Similarly, policymakers of other developing countries that are willing to enter global production sharing could utilize the findings of this study when selecting their policy options.

Moreover, by entering global production sharing, countries such as Vietnam, Malaysia, and Taiwan have integrated themselves with global production networks that have higher wealth. When analyzing various global production networks, it is quite clear that high-tech production networks for some products will generate comparably higher wealth (e.g., those for automobiles, integrated circuits, and consumer electronics), which is the main reason that East Asian nations made efforts to capture portions of those value chains by entering global production sharing.

When considering the findings of this study, it is evident that Vietnam has formed free trade agreements much more aggressively than Taiwan and Malaysia from the initial stage of the transition. Malaysia and Taiwan initiated their transition to enter global production sharing in the 1970s while Vietnam initiated its transition in the first decade of the 21st century. There is hardly any extant literature that suggests that it is mandatory to form free trade agreements from the initial stage of a transition. However, by observing the Philippines, another country that initiated the transition in the 21st century and is forming free agreements aggressively, it is possible to conclude that it is advisable to consider forming free trade agreements with countries and regions that have higher purchasing power parity.

Another phenomenon that can be observed in East Asia is, while countries such as Malaysia, Thailand, Singapore, and Vietnam are continuing their efforts to capture value from various high-tech value chains dominated by global multinationals firms, other countries such as Taiwan and South Korea have gone a step further and are contributing to the expansion of various global value chains by creating value through their own companies such as TSMC, Aser, ASUS, Foxconn, Samsung, Hyundai, KIA, and others.

This study suggests that the selection of policy options at the start of the transition might have an impact on the events that happen after the transition. Taiwan is a high-income country. They initiated their transition in 1974 [20]. Malaysia also initiated their transition in the early 1970s. Malaysia implemented almost all the policy options that were implemented by Taiwan, except for one. Malaysia did not start developing high-skilled labor during the initial stage of the transition. Taiwan did. This made a massive difference in the economic development of the two countries later on. Malaysia is still a value-capturing economy that depends heavily on the investments of foreign MNCs while Taiwan is predominantly a value-creating economy. Even though it is early to comment on the transition of Vietnam since the country started the transition in 2010, evidence suggests that Vietnam is also focusing predominantly on attracting investments from high-tech foreign MNCs. Taiwan's experience suggests that if a country aspires to move into the high-income category, it is advisable to develop high-skilled labor from the initiation of the transition.

Thus, it is evident that any nation with proper government support could develop policies that will help them to enter production sharing and beyond. The proposed policy options could be used by the policymakers to plan and execute a transformation. However, evidence from Taiwan and South Korea suggests that economic success goes beyond the initial transition, in which a country attracts various MNCs to conduct manufacturing operations within its borders. During the initial transition, a country begins to capture value from various global production networks. However, real success is achieved when a country develops its capabilities to create value and contribute to the expansion of those global production networks.

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