



VIETNAM'S ELECTRONICS INDUSTRY: THE RISE AND PROBLEMS OF FURTHER DEVELOPMENT

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Abstract

Purpose: To evaluate the Vietnamese electronics industry (EI) by analyzing its successes and shortcomings in recent years in comparison with other Southeast Asian countries, as well as the problems faced by the young industries in Vietnam in the course of its development and identify their abilities to participate in the global value chain.

Methodology: Systems approach was used to analyze the status of Vietnam's EI. The advantages and the results achieved by EI are assessed and described with the help of objective data from statistical and officially published sources.

Main Findings: The position of Vietnam's EI in the context of growing industry 4.0 was recognized. Its dependence on imports and other reasons that affect its efficiency and competitiveness were identified in the study. The Government should provide adequate support for the development of priority area including EI within the framework of national policies and encourage import substitution program of the industrial enterprises.

Applications: Research results could be used for providing recommendations for making Vietnam's electronic industry development policy and import substitution program in the future.

Novelty/ Originality: Study considered the effects of inconsistent structure, import dependence of production, lack of unified government control, quality of labor, etc. in gross output and export revenue.

Keywords: *Electronic Industry, Value Added, Supporting Industries, Import Dependence, Import Substitution, Competitiveness.*

INTRODUCTION

The electronics industry is a marvel of industrial production and leverage of economic development of the ASEAN countries. In Vietnam, the electronics industry has impressively developed since 2010, which has been proved by its successful achievements in manufacturing. However, despite the high rates of gross output and export revenue, there are still a number of problems, such as low value added, inconsistent structure, import dependence for production, lack of unified government control, quality of labor, etc., which require specific analysis and relevant solutions. Using a specific framework, the authors evaluate the Vietnamese electronics industry by analyzing its successes and shortcomings in recent years in comparison with other Southeast Asian countries, as well as the problems that the young industries of the Vietnamese economy face in the course of its development, and identify their abilities to participate in the global value chain. Proposals, concluded as research results, could be used as recommendations for framing Vietnam's electronic industry development policies and import substitution programs in future.

LITERATURE REVIEW

The electronics industry (EI) is a sector of the economy that produces electronic components and products. It is one of the most important sectors for any state, as it provides the electronic component base (ECB) for almost all other sectors of the economy (Borisov, 2006). EI especially refers to consumer electronics, and consists of organizations involved in the production, design and development, assembly and maintenance of electronic equipment and components. EI differs from other industries in high levels of concentration, specialization and integration of production. In addition, the EI products themselves are characterized by a high level of international integration in production, high technology and a short life cycle, and therefore high Value added (VA). A vital EI can boost a country's economic growth, provide jobs for a large number of workers, and accelerate development in other fields (Dahlman et al., 1993).

Moreover, in the modern world, the state of EI determines technological independence, the pace of modernization in the country, and contributes to national security. The role of EI as a decisive factor amidst the scientific and technological revolution that is taking place at the present stage of development was also emphasized. When studying the periodic

cycles of alternating ups and downs of the world economy described by the Soviet economist Nikolai Kondratieff (1892 - 1938) in the 1920s, the Russian economists have noted that according to Kondratieff theory, the scientific and technical revolution has been developed in waves with long cycles of about 50 years. Up until now, the humankind has seen five technological structures (waves) since 1785, and the 5th wave (1985–2035) is oriented towards achievements in the field of microelectronics, computer science, biotechnology, genetic engineering, new types of energy and materials, space exploration and satellite communications, etc. Glazyev S. Yu et al. considered that the kernel of the 5th technological wave is the electronics industry, computer technology, software, aviation industry, telecommunications, optical fibers, robotics information services, and its key factor is microelectronic components (Fatkhutnikov, 2015; Mendes & Silva, 2018; Zare, 2015).

In Vietnam, the EI began to take shape during the late 80s, and its breakthrough development started since 2010, when foreign direct investment (FDI) in Vietnam's EI was revived impressively. As a key industrial sector, EI plays an important role in the Vietnamese economy and society as it: (i) has an impact on the development of other industries, accelerates the process of industrialization in the country; (ii) stimulates the expansion of the service sector; and (iii) provides more jobs for the working population and improves the quality of daily life.

In 2007, the Government approved a list of priority industries for the period 2007-2010, with a vision of 2020, and a number of incentive policies for these industries by Decision No. 55/2007/QĐ-TTg of April 23, 2007 were introduced. According to this Decision, electronics, information and telecommunication technologies were identified as the key sectors among the top 10 priority sectors. The Government has established a series of measures to support their development. Accordingly, the "Vietnam's Industrial Development Strategy to 2025 with a vision by 2035" was approved by Decision No. 879/QĐ-TTg of June 9, 2014, in which EI and telecommunications were emphasized as key industries. Thus, EI received the attention of the state and gained rapid development.

Table 1: Number of enterprises and labor force in Vietnam's EI in 2010-2017 period

Year	Number of EI enterprises, unit	Labor force number employed
2010	613	167.562
2011	629	238.661
2012	739	289.757
2013	839	327.659
2014	1.021	410.994
2015	1.145	497.037
2016	1.399	612.306

Source: GSO [General Statistics Office] (2018) (compiled by the authors)

In terms of production scale, according to the official data of the General Statistics Office of Vietnam (GSO), by the end of 2016, the number of EI enterprises increased by more than 2 times and the total number of people employed in the manufacturing sector by 3.65 times in comparison with the number in 2010 (Table 1). After many years, a rapid growth has been noticed and its fast pace of development was testified by the industrial production index of this sector during the period 2013- 2017.

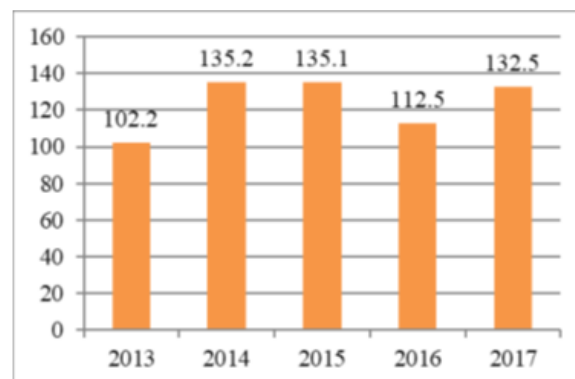


Figure 1. The industrial production index of the EI in the period 2013 – 2017(in %).

Source: GSO (compiled by the authors).

The achievements in the production by Vietnam's EI make a significant contribution to the socio-economic development of the country. According to the International Labor Organization (ILO), back in 2014, the share of EI in GDP and total exports are in succession of 23.4 percent and 25.4 percent (Table 2).

Table 2: ASEAN Electrical and Electronics (E&E) sector overview

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam
Key production	ICs, semiconductor PCBs	Semiconductor microchips, conductors, valves, household appliances, radio equipment, solar cells, PCBs	IC, semiconductor s, electronic data processing (PCBs, printers, hard disk)	Semiconductor s, silicon wafers, hard-disk components	Hard-disk drives, ICs, microchips, air conditioning units, refrigerators	ICs, semiconductors printed circuit boards, computers, smartphones
Contribution to GDP (%)	2.1 (2014)	9.8 (2014)	13.8 (2013)	5.3 (2013)	15 (2015)	23.4 (2014)
Contribution to total exports (%) (2014)	7.0	36.5	52.2	41.2	24.1	25.4
Major players	Toshiba, LG, Sony, Panasonic, Samsung	Bosch, Fairchild, Hewlett Packard, Hitachi, Silterra, Intel	Texas Instruments, Fairchild, Amkor, Toshiba, Epson, Fujitsu	Avago, Fairchild, Micron, Seagate, Hitachi, Flextronics, Sanmina, Lite-On, Wistron	Fujitsu, LG Electronics, Samsung, Seagate, Sony, Western Digital Bosch, Daikin, Electrolux, LG, Panasonic, Samsung, Siemens, Toshiba	Intel, Microsoft, LG, Panasonic, Samsung, Hitachi, Active-Semi, Hanel, Fuji, Xerox

Source: (OIE [The Office of Industrial Economics, Thailand] 2015); * in Thailand and Malaysia electrical appliances and electronics (E&E) are calculated.

METHODS AND MATERIALS

The methods of quantitative analysis, systems approach was used to analyze the status of Vietnam's EI. The assessment of advantages in production and the results achieved by EI are described with the help of objective data from statistical and officially published sources. The research problems are presented by the authors as the causes affecting the efficiency and competitiveness of the sector. Inductive approach is applied to find the advantages and the shortcomings in the development of EI and show the main reasons that drive production as an answer to the question of low value added of this sector (Rynhart et al., 2016; Bakhshandeh et al., 2015).

Data from GSO of Vietnam, international statistics and other officially published sources were used in the study. In order to compare EI development with other developing countries, the experiences of Thailand and Malaysia - the countries that have similar geographical conditions and development level to Vietnam were considered.

DISCUSSION

Advantages for development

Electronic products are export-oriented. The export value of electronic products in 2015 accounted for \$45.80 billion, overtaking Thailand (\$32 billion) this year. In 2017, according to the GSO, the total value of electronics exports, excepting the value of optoelectronic devices exports (photo and video cameras, components and accessories), reached \$71.215 billion, up to 20.76 percent compared with 2016, contributing 33.27 percent to the total volume of Vietnam's export (\$214.019 billion in 2017, Figure 2).

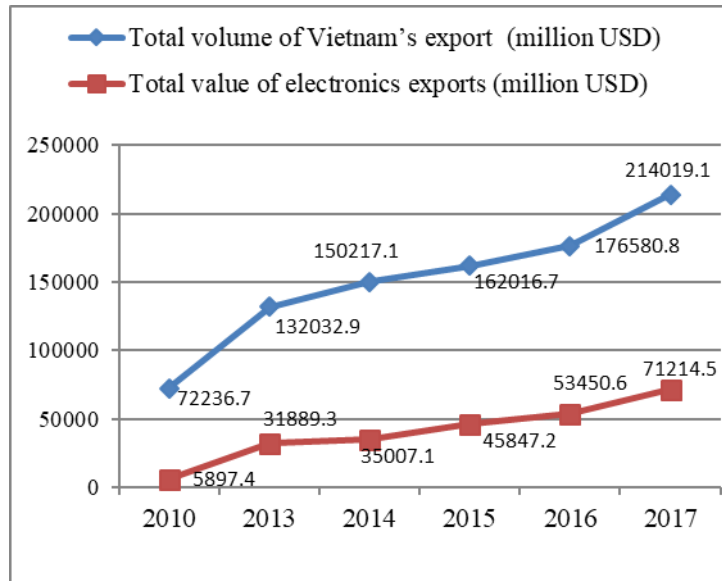


Figure 2. Total volume of exports and total volume of electronics exports in 2010-2017

The dominance of foreign invested enterprises (FIEs) in the production and export of electronic products can be observed from the data presented in Table. 2. Although the number of FIEs is only one-third of the total, in recent years their export share accounts for over 90 percent of total exports and covers 80 percent of the domestic market demands (Phan Trang, 2017).

Table 3: The volume of electronic products exports of Vietnam in 2013-2016

Year	Total exports * (billion \$)	Export turnover of enterprises (billion \$)		Export share of enterprises (%)	
		FIEs	Domestic enterprises	FIEs	Domestic enterprises
2013	33,467	33,131	0,336	99,0	1,0
2014	37,253	36,985	0,268	99,3	0,7
2015	48,799	48,412	0,378	99,2	0,8
2016	56,231	55,655	0,58	99,0	1,0
2017	75,015	73,910	1,105	98,5	1,5

Source: (GDOC [General Department of Vietnam Customs], 2018) (*) including the export value of computers, smartphones, and optoelectronics devices, components and accessories for them (compiled by the authors).

The ILO study shows that in Vietnam, 99 out of the 100 biggest electronics enterprises are related to FDI (ILO, 2016).

Certain favorable conditions exist in Vietnam for the development of EI and to make it as one of the world's leading electronics manufacturing centers.

1. The trend towards international economic integration accelerates convergence that brings Vietnam closer to other countries and external financial sources; participation in the global integration of electronics manufacturing creates a real opportunity for Vietnam to enter the world market and to deeply engage in global value chains. Accession to the WTO, the Southeast Asian Economic Community and participation in many free trade agreements with countries in Asia, the European Union, and the Eurasian Union promote agricultural and light industrial products' export to the regional and world markets.
2. The movement of global capital flows can turn Vietnam into the second center of world production of electronic products after China. According to experts' forecasts, published by the American Journal of Commerce, referring to the data of Bank Barclay, currently a number of large transnational corporations – main electronics and telecommunication manufacturers of the USA, Japan, and South Korea are gradually transferring their production from China to Southeast Asia (Knowler, 2014). By the end of 2016, the accumulated amount of FDI in the Vietnam's electronics sector reached \$20 billion, including from Samsung - 14.8 billion, Intel - 1 billion, LG - 1.5 billion, Microsoft - 302 million (ThuyTrang, 2016), Nidec - the Japanese manufacturer of optical meters and micromotors - 1 billion, Foxconn Group (Taiwan) for the production of electronic components – 1billion (Nguyen et al, 2013).

3. One of the privileges of attracting FDI is the attractiveness of the investment environment. According to Law No. 32/2013/QH13 of June 19, 2013 on amending and supplementing some articles of the Law on Enterprise Income Tax and other Vietnamese legal acts, any organization or enterprise can use privileges and support from the State established, namely:
 - Exemption from payment for the lease of land, water surface for 11 years if the investment project in the districts that is not on the List of geographical areas eligible for investment incentives, or 15 years if the investment is implemented in localities facing extreme socio-economic difficulties in accordance with the Law on investment; the tax rate of 10 percent for 15 years is applicable to: (a) incomes of enterprises from the execution of new projects of investment in localities facing extreme socio-economic difficulties, economic zones, and hi-tech zones; (b) incomes of enterprises from the execution of new projects of investment, including: scientific research and technology development; application of high technologies in the list of prioritized high technologies according to the Law № 29/2013/QH13 on High Technologies; cultivation of high technologies, cultivation of hi-tech enterprises; high-risk investment in the development of high technologies in the list of prioritized high technologies according to the Law on High Technologies; and (c) incomes of hi-tech enterprises and agricultural enterprises that apply high technologies according to the Law on High Technologies;
 - From January 01, 2016, incomes of the enterprises defined in Clause of The Law No. 32/2013/QH13 are eligible for the tax rate of 17 percent (National Assembly, 2013);
 - Exemption from import duty on goods imported to create fixed assets; and materials, supplies and components to implement investment in Vietnam (Law № 67/2014/QH13 on Investment, Article 15).
 - These incentive measures are considered more attractive than those in Thailand, where state benefits include exemption from corporate income tax for 8 years and a 50 percent reduction for the next 5 years. Additionally, in the region, corporate income tax rate in Thailand is 20 percent, Singapore -17 percent, and Malaysia and Indonesia -25 percent (Suchinai, Hirunya, 2013).
4. A large young labor force and profitability of doing business are considered an advantage of Vietnam’s market. According to studies, conducted by demographic experts in corporation with United Nations Fund for Population Activities (UNFPA), Vietnam is in the period of the “golden population”, which occurs in the period from 2010 to 2040 with an accuracy of 90 percent, that is, it began in 2009–2011 and will end in 2038-2042.

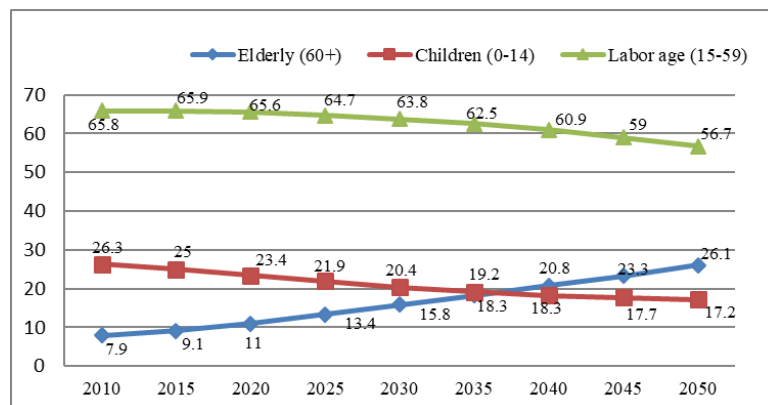


Figure. 3. Forecast of the age structure of the Vietnamese population for 2010-2050, in millions

Source: [Giang and Bui, 2009](#).

Upon analyzing the data presented in Figure 3, it can be observed that during those years, decrease in the groups of children and working age, and an increase in the group of the elderly, that is, the process of population aging begins right at the moment when the “golden population” appears could be observed. This problem must be taken into account when making long-term policies for the country's socio-economic development.

The average monthly base salary of workers at an industry/ enterprise in 2017 in Vietnam was about \$216, much lower than Thailand (378), Indonesia (314), Malaysia (356), China (470), Singapore (1.630) and South Korea (1.879) (JETRO, 2016). Moreover, the cost of living in Vietnam is more acceptable. According to Mercer Human Resource Consulting (MHRC) in 2017, Hanoi (Vietnam) appears to be a city with a fairly low cost of living, ranking 100th among 209 qualified cities in the world, while Jakarta (Indonesia) ranks 88th, Bangkok (Thailand) - 67th, Beijing (China) - 11th,

Singapore - 5th and Tokyo (Japan) - 3rd. These figures once again confirm the profitability of doing business in Vietnam ([MHRC, 2017](#)).

FINDINGS

The created "boom" in EI production, in fact, did not please Vietnamese economists. Despite successes and large-scale development, Vietnam's EI faces challenges that directly affect its efficiency and competitiveness.

Low production efficiency and underdevelopment of supporting industries

In recent years, the manufacturing unit of Vietnam's EI has been growing at a rapid rate (on average 37 percent per year) and reaches a large export volume (Figures 1 and 2). However, the earned VA is disproportionate. Depending on foreign suppliers, the Textile and Garment, Footwear and Electronics industries in Vietnam can now participate only at a certain stage of production in the form of industrial outsourcing for foreign brands or final assembly of the final products. Looking at all, the manufacturing profitability of those sectors range from about 5 to 10 percent ([Hong Hanh, 2017](#)). It turns out that VA and production efficiency is low and we need to find an answer to this question.

In economics, VA refers to a difference between the total sales revenue of an industry and the total cost of components, materials, and services purchased from other firms within a reporting period. Efficiency mentions the use of all inputs in producing any given output, and is a measurable concept, quantitatively determined by the ratio of useful output to total input. We note that VA and efficiency are directly depended on total cost or input cost; the increase of costs reduces relative efficiency and VA. Regarding Vietnam's EI, the tendency towards assembly and dependence on the imports of raw materials and technology increases the input costs and reduces the production efficiency or productivity as well as VA. And so, based on analysis, we can conclude that import dependence is one of the main reasons for the low efficiency and scarce VA. Import dependence in Vietnam's EI production is mainly due to the underdevelopment of supporting industries.

Supporting industries are understood as a group of industries or enterprises producing and supplying intermediate goods (raw materials, semi-finished products or final products in the form of components, individual devices and units, etc.) to other areas of production ([Mori & Junichi, 2005](#)). The development of these industries is considered as a determinant of efficiency increase and competitiveness of industrial production where the country's economic growth depends on foreign investors. Without strong supporting industries, assemblers must import a large number of parts and components that will add international transportation costs and a long production time, reducing competitiveness compared with competing companies with quick access to suppliers in the same country ([Ohno, 2008](#)).

Actually, Vietnam's supporting industries at present do not have enough technological capabilities to provide intermediate goods for EI. According to an ILO study, the percentage of Vietnamese enterprises accounts for only 10 percent of the total number of suppliers. In general, domestic suppliers mainly provide services with low VA, such as packaging and printing works. Statistics from the Ministry of Trade and Industry of Vietnam also show that domestic suppliers can actually meet only 30-35 percent of the intermediate inputs needs for appliance manufacturing and 5 percent for high-tech electronics production (MIC, 2016). And so, the problem could be explained by the fact that E&E production largely depends on imports and foreign investors which is proven by the calculations of statistical data presented in Table 3.

Import dependence leaves serious consequences for Vietnam's economy. Foreign investors (most often transnational corporations), using this logic, try to apply a system of "transfer pricing" in order to avoid paying taxes and obtain high profits by increasing the prices of imported equipment, technologies, and raw materials produced by their subsidiary companies. Transfer pricing leads to an increase in conditional production costs in favor of foreign investors who receive double benefits: to get corporation income tax exemption in line with the Vietnamese laws, and profits from the subsidiaries who provide raw materials for their assemblers in Vietnam. The data of the inspection carried out by the General Department of Taxation show that in recent years about 50 percent of FIEs in the country have reported production losses for many years in a row. And there is a paradoxical phenomenon: declaring losses in business, but many FIEs continue to invest in manufacturing expansion.

The Coca-Cola's suspicious transfer pricing in Vietnam can be considered as a typical case. For more than 20 years of operation in Vietnam, the Coca-Cola Vietnam has constantly reported losses and only until September 30, 2011 the company's stated accumulated losses reached 3,768 billion VND, equivalent to approximately \$210 million, which exceeded the initial investment capital (2,950 billion VND). Due to the claimed loss, Coca-Cola Vietnam during this period was exempted from corporation income tax. But in fact, its income, according to the results of financial

inspection, continued to grow at a rate of 20-30 percent per year. And at the same, the company planned to invest \$300 million in new projects in Vietnam (Nguyen, 2015).

Such import dependence cannot be solved in one day. We firmly believe that foreign investors who own modern technologies, production facilities, material resources and product brands control over the Vietnam's EI production and products sale. The given situation can be changed by solving the issue of import dependence. [Panchamukhi \(1969\)](#) in his article "Import Dependence and Production Efficiency" (1969) have concluded that the firms which had large efficiency are not necessarily those which received large import content. The firms which received large import content do not necessarily have better efficiency in the following period ([Panchamukhi, 1969](#)). The latter conclusion implies that firms do not have any comparative advantage in the purchase of inputs through import. [Kotlyarov \(2016\)](#), when studying this problem, stated that import dependence and import substitution are serious factors, affecting domestic economic development ([Kotlyarov, 2016](#); [Machado et al., 2019](#)).

Lack of EI clusters

Vietnamese enterprises operating in the electronics sector are characterized by their specific products and have weak cooperation among themselves due to their ownership. Foreign investors often place production in the location that is convenient for them, and their assemblers. Satellite suppliers, depending on the regulations of the parent company, do not have relations with firms of other investors which could cause inefficient use of capabilities, human resources, infrastructure, and advantages of each other, etc.

Industrial clusters have been practiced in the world for a long time to avoid the above mentioned issues. Essentially, clusters are a group of suppliers of intermediate products and specialized services, infrastructure, research institutes, even educational institutions and other interrelated organizations (firms, banks and others) concentrated in a certain area. The geographical proximity of the enterprises and organizations in the cluster location ensures cheap and timely delivery of the goods or services needed for the business, and to a certain extent, allows for generating a qualified labor market and contributes to the dissemination of knowledge and work experience. Close links and cooperation among the parties are mutually complementary and enhance competitive advantages of individual companies and the cluster as a whole.

In Southeast Asia countries, E&E clusters have been created. For example, during 2005-2010, Thailand created three large-scale clusters of the E&E industry. Enterprises placed on the territory of these clusters receive preferential treatment for development from the state. The electronics industry in Malaysia is a combination of three micro regional clusters: Penang, Klang Valley and Johor ([MUM, 2016](#)). In Vietnam, such EI clusters are only in the initial stages of formation based on groups in the outlying districts of Ho Chi Minh City, Hanoi and in provinces such as Bac Ninh, Thai Nguyen and Haiphong.

Dependence on foreign investor's technologies and trade mark and lack of own trademarks

EI production in Vietnam is mainly limited to the assembly of products with famous brands and the manufacture of individual parts and accessories. This tendency can be considered as a type of expression depicting import dependence. There are no domestic brands in the list of manufactured electronic goods. In 2015 – 2016, Vietnamese smart phones such as Mobicell Prime X-Max (Mobicell Company) or Bphone (Bkav Technology Group) appeared in Vietnam's market. However, they underwent "early death" a few months after their appearance. Before that, in 2009-2010, mobile phones like Q-Mobile (ABTel), F-Mobile (FPT), Mobicell (P&T), and other kids of famous Vietnamese operators like Avio (VinaPhone) and Zik 3G (Viettel), disappeared only after several years of existence. The reasons of failure, in our opinion, were determined as follows: (i) pressure from well-known manufacturers in the market like Nokia, Samsung, LG, Apple, etc.; (ii) weak conjuncture and lack of knowledge about consumer's demands from Vietnamese producer's side; (iii) and finally, most importantly, their products were completely dependent on the import of components, equipment, and even software.

Currently, the smartphone "Bphone" developed by Bkav Technology Group, including design, software and production, has gained reputation and has been sold well in the Vietnam market.

Lack of unified control for a long time

Since its inception during the 1980s, Vietnam's EI has existed in an almost spontaneous manner without any unified development plan and attention from the competent authorities for 20 years. Only in 2007, for the first time, the "Vietnam's EI Development Plan for the period up to 2010, with a vision by 2020" was approved by the Government's Decision No. 75/2007/QĐ-TTg of May 28, 2007. According to this Plan, the state administration of the Vietnam's EI is

entrusted to the Ministry of Information and Communication (MIC). In short, the MIC is responsible for the development of this industry. But factually, a number of problems have already risen: control over the issues relating to investment, production and sales, financial support and specialists training, vests with the Ministry of Planning and Investment, Ministry of Industry and Trade (MOIT), Ministry of Finance and Ministry of Education and Training, etc. The MIC itself is either unable to control the EI, or cannot coordinate the common efforts and necessary interactions between the ministries and departments in solving the risen problems that will lead to overlapping functions, delaying response and slowing down the problem solving, and finally, the development of the sector.

For comparison, we take the practices of state regulations in Thailand and Malaysia, where E&E industries have acquired a systematic development since the 90s last century. The Ministry of Industry (in Thailand) and the Ministry of Foreign Trade and Industry (in Malaysia) are directly responsible for the industries, including the E&E industries. In addition, in Thailand, the Board of Investments under the Cabinet of Ministers was established in order to coordinate the activities and efforts of government bodies and entrepreneurs aimed at developing industry and attracting investment flows (BOI, 2016). The Malaysian Government established the Electrical and Electronics Strategic Council (EESC) under the Ministry of Foreign Trade and Industry (Fam et al., 2018) to implement the state settlement of E&E industries and assist enterprises to participate deeply in the global supply chain.

The issue of quality of labor resources

Vocational training is important as highly skilled workforce help to increase the production productivity and to improve national competitiveness in general.

Vietnamese engineers working in the EI have a fairly high qualification compared to their colleagues in the region. According to Samsung Vietnam, 10 percent of Samsung's software on a global scale is developed by Vietnamese Information Technology engineers. As of 2016, 1,600 Vietnamese high skilled workers were working at the largest Samsung R&D Center in Southeast Asia located in Hanoi (Nguyen, 2017). In November 2017, the second Samsung R&D Center was launched at Saigon Hi-Tech Park in Ho Chi Minh City (Nguyen, 2017).

However, in general, there are problems in junior staff training and the quality of graduates of educational organizations. The analysis of data from a quarterly study conducted by the Ministry of Labor, Disabled and Social Affairs and the GSO of the 2nd quarter of 2018 has shown that the population aged 15 years and older amounted to 72.51 million people and the number of working population (aged between 15 and 60 years, not counting the disabled and people abroad) accounted for 55.12 million people. But only 12.04 million of them (about 22 percent) have been trained at different levels and had vocational education with certificates; the ratio of vocational training structure of higher/secondary/junior based on the presented data in Fig. 4 respectively was 1/0.92/0.36 while the world's ratio of 1/4/10 was considered as normal (Do & Thuy Nga, 2017).

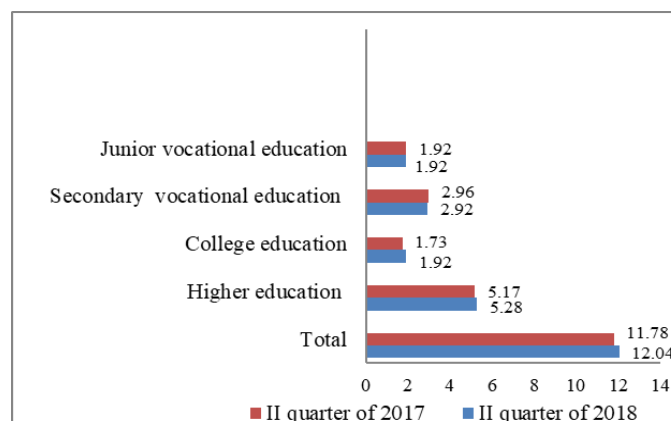


Figure 4. Number of trained workers who have certificates of different degrees for the 2nd quarter of 2017 and the 2nd quarter of 2018 (million people); source: (MOLISA & GSO, 2018).

This ratio provides a warning regarding the imbalance structure of labor force training, which is just the opposite of the demand for a large number of qualified specialists and junior workers in light industries.

The quality of the training was also noted in the Skills toward Employment and Productivity (STEP) Employer Survey, conducted in late 2011 and early 2012 in Vietnam by the World Bank as part of the STEP project. Most of the opinions of employers were as follows:

- Two-thirds of all international firms claim that both the general and vocational education systems do not meet the skill needs of their workplace.
- Nearly 40 percent of international firms see the general education of workers as an obstacle, and 46 percent see vocational education as an obstacle.
- Employers from international firms estimate that approximately 14 percent of their employees are not fully qualified to do their jobs, which suggests that despite the expanding educational attainment, the education system does not respond to the labor market needs and that improving the quality of education will remove an important barrier to productivity and growth of Vietnamese firms.
- Vietnamese employers are highly critical of the quality of the education system. Almost half of the employers who participated in the survey complained that graduates do not have the level of skills needed in their workplace. International firms complain about the quality of education more often than local businesses ([Bodewig et al., 2014](#)).

As a suggestion for solving the problem, we recommend from our experiences from Thailand, where over 2,300 E&E companies operate in the industry and employ nearly 750,000 workers, as of September 2016 ([Errighi & Bodwell, 2017](#)). More than 60 public and private engineering institutes across the country, including The National Science and Technology Development Agency, the Thailand Microelectronics Center and the Western HDD Technology Training Institute were accredited and offered to train technical workforce for E&E industries ([Thai's Embassy in Mexico, 2016](#)). The cooperation between public and private educational organizations, research centers and institutes and private companies was established in the form of a Public - Private Partnership (PPP). In order to ensure qualified workforce for the industry, Thailand has developed a complex network of research centers and institutes that offer resources for technical training. The forms of cooperation and training programs have proven to be effective. Firstly, they are aimed at addressing the problem of shortage of skilled labor in the long term by training and improving worker's professional qualifications for the needs of the industry through practical activities, and deepen the relationship and provide mutually beneficial cooperation among the industry, research and educational organizations; secondly, this form of training serves as the primary starting point for transferring the skilled workforce to a more advanced production unit in future ([Murzinova et al., 2018](#); [Metsämuuronen, 2018](#); [Luo et al., 2018](#)).

RECOMMENDATION

After studying the state of Vietnam's EI, the authors conclude that underdevelopment of the supporting industries, and the dependence on foreign investors are the barriers that prevent EI to bring the expected VA and to participate deeply in the global value chain. In order to solve the problems associated with the production of electronics, it is necessary to take comprehensive measures aimed at its development as stated below.

1. To strengthen the control of the state over the electronic sector is an important task to manage the development of this sector in the context of Master Industrial Development Plan and industrialization of the country. Additionally, attention should be paid towards:
 - transferring the state control over EI from MIC to MOIT; whereas, the functions of Government management of industrial production and commercial management belong to MOIT;
 - developing measures to control the phenomenon of transfer pricing of transnational corporations and their enterprises located in Vietnam and improve the business environment indicators that determine national competitiveness.
2. The Vietnamese government, recognizing the importance of supporting industries and industrial clusters to EI, has developed overall measures to attract investment in supporting industries as those mentioned in the National Supporting Industries Development Program for the period 2016-2025. Moreover, it is necessary to focus on:
 - developing a policy for solving the problems of import dependence and import substitution as specific measures to reduce dependence on foreign investors;
 - creating EI clusters based on industrial parks in the Ho Chi Minh City, Hanoi and in the provinces of Haiphong, Bac Ninh, Thai Nguyen and Binh Duong, where the assembly enterprises and companies of supporting industries are concentrated; providing benefits and financial assistance for any legal entities and individuals who wish to conduct the business and services in the territory of cluster, giving attention and support to small and medium-sized enterprises (SMEs) in line with Law No. 04/2017 /QH14, dated June 12, 2017 on support for SMEs.

3. The quality of workforce, as presented above, does not meet the needs of advanced production. Hence, the Government should make appropriate measures to attract the public and private educational organizations, research centers and institutes, and enterprises to take part in workforce training from all the sectors of the economy, expanding the form of cooperation in "public-private partnership". During the restructuring of the educational system, The Ministry of Education and Training should optimize the ratio between higher, secondary and junior vocational education in order to meet the growing demands of the labor market.

The ironic paradox that exists in Vietnam today is that though graduates are available in excess, business owners often complain about the lack of skilled workers. According to the Vietnam Labor Market Information Bulletin of 2nd quarter 2018, the number of unemployed higher education graduates accounted for 126.9 thousand. Therefore, it is necessary to create a close mutually beneficial relationship and cooperation between the educational organizations and employers in order to study their demands for specialists of different degrees and implement a principle for combining training and "training by addressers".

CONCLUSION

Electronics is becoming extremely important today. Electronic products and their applications are finding their way in every fields of human activity. Global integration of economic space is the inevitable trend which leads to industrial outsourcing. As a result, the import substitution policy has a fundamental position in the national economic development. Countries that combine import substitution and export orientation will achieve high ranks in economic development and deeply participate in the global value chain.

As the main sector of industrial production and a key to the processes of industrialization and modernization of the country, the role of Vietnam's EI in the context of growing industry 4.0 is recognized. Its import dependence and other reasons that affect its efficiency and competitiveness were also observed in the study. The Government should provide adequate support for the development of priority area including EI within the framework of national policies and encourage import substitution program for the industrial enterprises.

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