

# Operation situation of the national innovation system in Vietnam period 2012 - 2022

Pham Minh Hai

*Faculty of Economics and Business Administration,  
Hanoi University of Mining and Geology, Hanoi, Vietnam*

-----  
Date of Submission: 28-03-2023

Date of Acceptance: 07-04-2023  
-----

**ABSTRACT:** In recent years, most countries have recognized and appreciated the importance of National Innovation Systems (NIS). NIS plays an important role in long-term sustainable economic growth and development of countries. This article illustrates the current situation of NIS in Vietnam so that appropriate policies can be devised and implemented. Furthermore, this paper provides an analysis of the institutions, policies, and linkages that characterize Vietnam's national innovation system. It focuses on the strengths and weaknesses of the national innovation system that Vietnam has implemented to promote technological innovation for economic growth and development. First, this article summarizes Vietnam's 10 years of economic reform (from 2012 to 2022) as the context of doi moi. Second, it provides a more in-depth look at Vietnam's NIS, starting with the legal and institutional framework, including science and technology legislation, government legislatures, and regulatory agencies. other support. Current funding for research and development (R&D) activities in general and other areas is provided through government efforts to encourage investment or to provide financial support for R&D. In addition, the main factors affecting Vietnam's NIS are also identified and analyzed. Finally, the article makes comments to build a national innovation system to help Vietnam achieve middle-income economy status by international standards.

**Key word:** National Innovation System, NIS, R&D

## I. INTRODUCTION

According to the Socio-Economic Development Strategy approved by the Government of Vietnam, from 2020 to 2025, Vietnam will become an industrialized country with a middle income level and the development of science and technology will be promoted. identified

as the key driving force of the country's program of industrialization and modernization. Vietnam needs to make the transition from low value-added sectors to industrialized sectors with higher technology and productivity. Achieving these ambitious goals necessarily involves a more effective application of the science, technology and innovation (STI) sector in the economy to promote productivity growth and diversify production. The NIS plays an important role in countries' efforts to keep pace with technological advances, which are vital to countries' long-term sustainable economic growth and development. Currently, Vietnam has in place many of the elements necessary for an effective and efficient STI system. However, like many other developing countries, the role of STIs in Vietnam's development has so far been limited. National innovation systems in developing countries such as Vietnam are not well coordinated and they are fragmented, thus forming a major obstacle to building the required technological capacity. country to promote sustainable economic development. The Government of Vietnam recognizes the role of knowledge and innovation in transforming the economy, reducing poverty, and increasing the country's competitiveness in international and regional trade. This recognition is reflected in many national programs of the Government, such as the National Technology Innovation Program to 2030, the National Product Development Program to 2030, and the National Program on Industrial Development high technology to 2030 and the Action Plan for the implementation of the Socio-Economic Development Strategy from 2021 to 2025. However, these policies need to be supported by concrete actions for the sake of the innovation system. Vietnam's national innovation is relatively underdeveloped compared to the system of middle-income developing countries. There is still much

more that the Government of Vietnam needs to do to develop and stimulate the growth of the national innovation system.

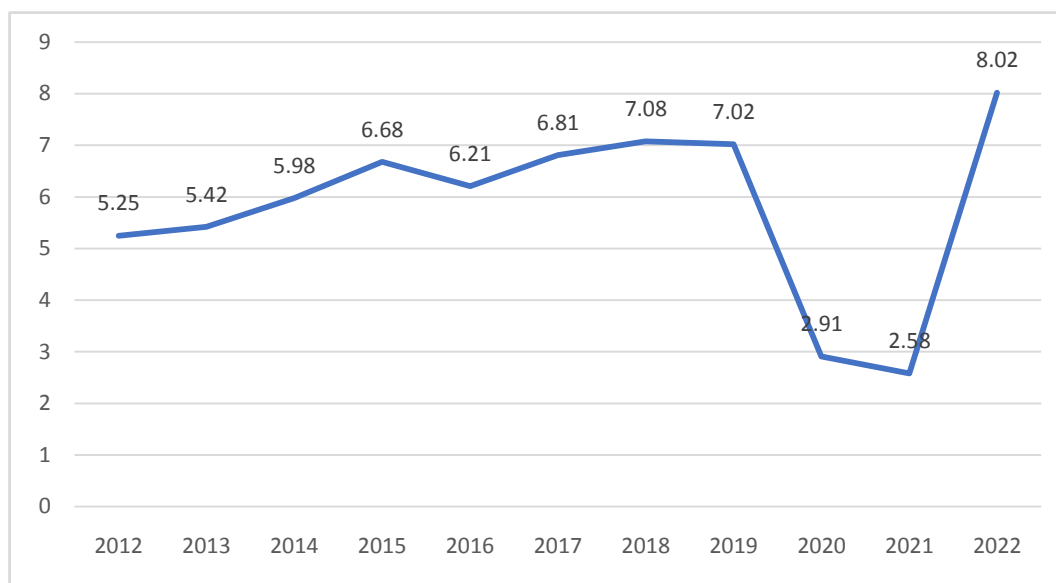
## II. VIETNAM'S ECONOMIC SITUATION IN THE PERIOD 2012 - 2022

After the reform, Vietnam established the fundamentals of a market economy and opened its economy to international capital flows and trade in goods and services. The emergence of a market-based economy with market-oriented institutions, a stable macroeconomic environment and government support for business development has allowed Vietnam to achieve a number of following achievements:

- Unleash the potential of the agricultural industry, turning Vietnam from a country lacking food to the world second largest rice exporter by 2021;
- To encourage the development of the domestic private sector;

- Attracting significant FDI capital;
- Promote their competitive advantages and gain more benefits from international trade.

Figure 1 shows Vietnam's GDP growth rate from 2012 to 2022. Overall, GDP growth over this 10-year period has returned to growth after the negative effects of the crisis. Global finance started in 2008. Since the reform in 1989, Vietnam has achieved outstanding achievements in terms of GDP growth, macroeconomic stability, export expansion, and poverty reduction. Vietnam is now recognized as one of the most successful developing countries in terms of economic growth and poverty reduction. During the period 2012 - 2019, Vietnam's annual GDP growth rate ranged from 5.25% to 7.08%, however, this index dropped sharply to less than 3% in 2020 and the lowest in 2020-2021 with 2.58% due to the heavy impact of the Covid 19 pandemic with its complex variations. However, we have seen a strong rebound in GDP growth in 2022 at 8.02%.



Data source: General Statistics Office of Vietnam

**Figure 1: Vietnam's GDP growth rate from 2012 to 2022**

According to the General Statistics Office, Vietnam's GDP growth in 2022 will reach an impressive rate of 8.02%, far exceeding the target set by the National Assembly of 6.0-6.5%. This is the third year that Vietnam's economy has grown over 7% and the highest growth rate in the past 10 years. In the context of the global economic recession, widespread inflation, complicated Russian-Ukrainian war, the growth rate of 8.02% shows the effectiveness of state management and efforts. strong government of Vietnam.

Despite rapid growth, Vietnam's manufactured exports are still small when compared to other countries and only mark the beginning of the transition to a higher value economy. According to data from Uncomtrade, Vietnam's export market share accounts for only a small proportion of the world market, accounting for only 1.5% of world trade in manufactured goods in 2019. Technology content In Vietnam's exports, an essential indicator of industrial capacity and competitiveness shows significant

improvement. Table 1 shows the technological structure of manufactured exports of Vietnam and comparable countries in 2015 and 2018. It is clear that Vietnam is a country with a low share of high-tech products in large manufactured exports best. From 2015 to 2018, the export of low-tech goods accounted for a large proportion of the total export turnover of manufactured goods (over 40%). Medium and resource-based technology exports

also decreased slightly while high-tech exports saw the most significant change, from 20% in 2015 to 38% in 2018. This is a good sign in the shifting trend structure in Vietnam: high-tech exports are gradually increasing while low-tech and resource-based exports are decreasing significantly. The export value of low-tech goods in 2018 decreased from 55% to 43% compared to 2015.

**Table 1: Technology export rate in the period 2015 – 2018 in Vietnam (%)**

Technology Export Group	2015	2018
Low-tech export group	55%	43%
Medium technology export group	12%	11%
High-tech export group	20%	38%
Resource-based export grouping	13%	8%

Source : UNCOMTRADE

### III. VIETNAM'S NATIONAL INNOVATION SYSTEM

#### 3.1. Legal and institutional framework

After more than 30 years of economic reform, the transition from a centrally planned economy to a market economy, Vietnam has enjoyed remarkable economic growth and has become a low-middle-income country in the past decade 2020. The country's growth pattern has changed as income levels have changed. To avoid falling into the low-income group, it is necessary to restructure the economy and become an industrial country. For industrialization to take place, education policy and science and technology (S&T) policy must play an important role. For this purpose, the Vietnamese government seems to have provided a fairly comprehensive legal framework for the development of S&T activities. The Science and Technology Law enacted in 2000 is considered the backbone of the country's innovation. In addition, a series of other regulations have been introduced, including: Law on Intellectual Property (2005) and the Law amending and supplementing a number of articles of the Intellectual Property Law (2009), the Law on Standardization and Regulation technical standards (2006), technology transfer law (2006), product quality law (2007), high technology law (2008), nuclear energy law (2008). These laws and regulations laid the essential foundation for the NIS. In addition, the science and technology strategy for the period 2011-2020 was approved in 2010, which sets out specific goals for the development of NIS Vietnam. Under current law, the National Assembly and Government of Vietnam are responsible for approving national strategies and legislation (i.e. those listed above)

for S&T development and innovation. The Science, Technology and Environment Committee (under the National Assembly) and the Department of Education, Science, Technology and Environment (under the Government) support these two organizations in making important decisions on issues innovation in Vietnam. In the field of S&T activities, the Ministry of Science and Technology is said to be the key agency responsible for supervising S&T activities, formulating S&T promotion policies and programs to submit to the Government for approval, and monitoring implementation of the S&T strategic plan. Other ministries such as the Ministry of Education and Training, the Ministry of Planning and Investment and the Ministry of Finance also play an important role in the national innovation system. The Ministry of Planning and Investment and the Ministry of Finance are responsible for developing policies and incentives to promote innovation in Vietnam. The National Science and Technology Policy Council plays an advisory role. At the local level, there are provincial science and technology departments that oversee local and regional S&T and innovation activities. Besides these administrative agencies, there are a number of other agencies that support innovation and R&D activities. However, these agencies are mainly public funded agencies such as national S&T development fund, national program on S&T development, state agency for technological innovation (SATI), science development fund National Agency of Science and Technology (NAFOSTED) provides funding for basic research, the national agency for science and technology information (NASATI), and national programs for

laboratory development. These agencies are often attached to government agencies or ministries.

### 3.2. Funding budget for R&D activities in Vietnam

For industrial policy to be successful and for the industrial base to develop to a self-sustaining level, Vietnam needs good domestic

capacity to develop its industrial base. However, the country's investment in R&D, innovation and higher education does not appear to have adequately complemented industrial policies and has not supported the development of the industrial base. Table 2 illustrates the share of R&D spending in Vietnam and some developed countries in the world from 2012 to 2018.

**Table 2: R&D expenditure by some countries (% of GDP)**

Year	2012	2014	2016	2018
Vietnam	0.19	0.37	0.44	0.53
Japan	3.48	3.54	3.5	3.43
China	1.78	1.99	2.06	2.12
America	2.67	2.71	2.72	2.82

Source: World Bank

Specifically, investment in R&D only reached nearly 0.19% in 2012. This number has gradually increased over the years and reached a peak of 0.53 in 2018. Although the amount of money Vietnam spends on R&D increases every year, it is still very small compared to developed countries in the world. To compare these numbers, Japan invested 3.43% of GDP, China 2.12% and the US 2.82% in 2018. Also, this small amount of S&T investment is scatteredly distributed between central and local government agencies. This will make S&T and innovation policies less effective. To increase investment in S&T activities, the Government is targeting the private sector with the hope that the ratio of public and private investment in R&D will be 1:2 by 2020. However, due to the public nature and risks related to S&T and investment policies, it will be difficult to achieve this goal. In recent years, Vietnam has made efforts to strengthen financial incentives to invest in science, technology and innovation. The government extends tax incentives to businesses engaged in R&D and investing in technologically advanced machinery and equipment. These measures include: VAT exemption for machinery that must be imported from abroad, tax deduction for science and technology expenses, and corporate income tax exemption for income from related contracts. to science and technology and to dividends from joint stock companies. In addition to general incentives open to all businesses,

specific programs target key technology application areas including information technology, biotechnology, building materials and automation technology. A state fund has been approved to give companies investing in technology easier access to credit, but this has yet to be fully implemented. The National Fund for Technology Transfer was approved by law in 2006, but has not yet been put into operation. This fund aims to provide financial support to promote the process of technology transfer and support small and medium enterprises to innovate and improve technology; promote technology transfer to mountainous, deep-lying and remote areas; supporting technology business start-ups and incubators; strengthening human resources in technology transfer and technical improvement.

### 3.3. Criteria for evaluating innovation ability

There are a number of indicators that we can use to measure the innovation capacity and performance of countries. The Global Competitiveness Index developed by the World Economic Forum is an index that can be used directly to gauge the potential performance of a given country's NIS. According to the new release of the global competitiveness index in 2019 (Table3), Singapore ranks first among 141 countries surveyed. In contrast, Vietnam stands at 67th position, up 10 places compared to the previous year.

**Table 3: Global Competitiveness Index 2019 of ASEAN countries**

Nation	Rating	Index	Compared to 2018	
			Rating	Index
Singapore	1	84 , 8	+1	+1 , 3
Malaysia	27	74.6	-2	+0.2

Thailand	40	68.1	-2	+0.6
Indonesia	50	64.6	-5	-0.3
Philippines	64	61.9	-8	-0.3
Vietnam	67	61.5	+10	+3.5
Cambodia	106	52.1	+4	+1.9
Laos	113	50.1	-1	+0.8

Source: World Economic Forum

Besides, there are 2 indicators as The knowledge index (KI) and the knowledge economy index (KEI), developed worldwide to measure a country's ability to create, receive, and disseminate knowledge as well as whether the environment is

favorable for knowledge to be used effectively for economic development. Table 4 compares these indicators of Vietnam with these of selected ASEAN countries and ranks them.

**Table 4: Metric Indicators of ASEAN Countries**

Rating	Nation	KEI	KIND	Economic incentives	Innovation index	Education	ICT
23	Singapore	8.26	7.79	9.66	9.49	5.09	8.78
48	Malaysia	6.1	6.25	5.67	6.91	5.22	6.61
66	Thailand	5.21	5.25	5.12	5.95	4.23	5.55
92	Philippines	3.94	3.94	4.32	3.77	4.64	3.03
104	Vietnam	3.4	3.4	2.8	2.75	2.99	5.05
108	Indonesia	3.11	3.11	3.47	3.24	3.2	2.52

Source: KEI and KI index (KAM 2018), World Bank

Singapore always leads in two main indexes, KI and KEI, and most of the sub-indices. Besides, in terms of KEI, Singapore ranks 23rd out of 145 countries in the world with 8.26. On the other hand, Malaysia's ranking is 18 places higher than Thailand. Moreover, the gap between the rest of the countries and Thailand is quite large. For example, Vietnam has a lower ranking than Thailand, namely 38 places. In addition, in terms of sub-indices, especially innovation and education, Vietnam has the lowest score. However, Vietnam's Information and Communication Technology (ICT) index, based on the number of computers and Internet users (per 1,000 inhabitants), is as encouraging as Thailand. This index is especially high because Vietnam has the highest Internet user growth rate in the world.

### 3.4. Key factors in Vietnam's national innovation system

- Companies, businesses

R&D performers include businesses and research institutions, who are the core innovation actors in Vietnam. The main function of the organizations in this group is related to research and knowledge creation. This group includes universities, colleges, R&D institutes and industrial research organizations (i.e. those that are affiliated with enterprises/companies). They can be public, semi-public or private establishments. The emergence of the private sector since the reform is an important development in the framework of Vietnam's national innovation system. Economic reforms in the past decades have directly stimulated the growth of the private sector in Vietnam, which is largely composed of small and medium-sized enterprises (SMEs). As can be seen in Table 5a and Table 5b, SMEs accounted for 97% of the total number of enterprises in 2019, down from 98.1% in 2017. The average growth rate of SMEs is 45.1% and the average growth rate of SMEs is 45.1%. The average growth rate of SMEs is 45.1%. large enterprises is 131.7%.

**Table 5a: Distribution of SMEs in 2017-2019 (by business size)**

Year	Total number of businesses	SMEs (%)	Large enterprises (%)
2017	517,900	98.1%	1.9%
2019	760,000	97%	3%

**Table 5b: Growth rate of enterprises in 2017-2019**

Year	Total number of businesses	SMEs (%)	Large enterprises (%)
2017	517,900	-	-
2019	760,000	45.1%	131.7 %

Source: General Statistics Office of Vietnam

Table 6 provides information on innovation activities of SMEs in Vietnam (mostly domestic companies). SMEs are unlikely to invest in new products, rather, they are investing in new processes with improved technology and product modifications. At the current stage of development, this may prove the right strategy. However, for future growth, investment in new product innovation is essential. Thanks to the gradual liberalization of regulations on FDI, the FDI sector has now become an important part of the national economy. Although Vietnam has been successful in

attracting FDI in recent years, the real benefits from FDI are still controversial. Previous studies have found little evidence of technical spillover from FDI-related firms to local counterparts. Recently, Intel invested 1 billion USD in a chip manufacturing, assembly and testing factory and Samsung's success with the opening of a high-tech complex in Thai Nguyen province with a total investment of 2 billion USD. This will obviously improve the R&D investment of enterprises in Vietnam.

**Table 6: Innovation activities of small and medium enterprises**

Types	2017			2019		
	New product (%)	New production process (%)	Product modification (%)	New product (%)	New production process (%)	Product modification (%)
Exporting businesses	11.69	33.12	69.48	2.52	12.58	38.9
Businesses that do not export	4.84	14.31	42	8.39	35.48	67.74
FDI enterprises	12.5	36.25	62.5	6.15	35.38	61.54
Enterprises without FDI	5.01	14.76	43.01	2.69	12.81	39.5

Source: survey data of small and medium enterprises in 2017, 2019

- Higher education system

The education sector in Vietnam has expanded rapidly, with the fastest growth occurring at the higher education levels. Table 7 shows that

in a very short time, the number of students enrolled in universities and colleges has increased significantly.

**Table 7: Situation of higher education in Vietnam from 2012 to 2018**

Number of students enrolled

	2012	2013	2014	2015	2016	2017	2018
Higher Education	893,754	1,020,667	1,319,754	1,541,201	1,719,499	1,935,739	2,162,106
College	173,912	215,544	273,463	367,054	476,721	576,878	726,219

University	719,842	805.123	1,046,291	1.174.147	1.242.778	1,358,861	1.435,887
------------	---------	---------	-----------	-----------	-----------	-----------	-----------

**Higher education institutions in Vietnam**

	2012	2013	2014	2015	2016	2017	2018
University	93	104	139	140	146	149	163
Public	71	79	109	100	101	103	113
Non-public	22	25	30	40	45	46	50
College	137	151	183	206	223	227	223
Public	130	142	166	182	194	197	193
Non-public	7	9	17	24	29	30	30
<b>Total</b>	<b>230</b>	<b>255</b>	<b>322</b>	<b>346</b>	<b>369</b>	<b>376</b>	<b>386</b>

**Staff in higher education schools in Vietnam**

	2012	2013	2014	2015	2016	2017	2018
College Lecturer	13,677	14,285	15.381	17,903	20,183	24.597	23,622
University lecturer	33,969	34,294	38.137	38.217	41.007	45,961	50,951
<b>Total</b>	<b>47,646</b>	<b>48,579</b>	<b>53.518</b>	<b>56.120</b>	<b>61,190</b>	<b>70.558</b>	<b>74.573</b>

**Qualifications of lecturers at colleges (%)**

	2012	2013	2014	2015	2016	2017	2018
Doctor	1.8	2.1	1.4	1.4	1.7	2.7	2.5
Master	22.5	24	23.9	27.1	28.7	27.9	31.8
Bachelor or engineer	73	71.4	71.5	69.6	67.8	66	63.2
Other qualifications	2.7	2.6	3.3	1.9	1.8	3.4	2.5

**Qualifications of lecturers at universities (%)**

	2012	2013	2014	2015	2016	2017	2018
Doctor	17.6	16.7	14.9	14.8	14.3	14	14.4
Master	33.7	35.7	38.3	40.4	41.6	43.2	44.9
Bachelor or engineer	46.0	45.9	45.3	43.6	42.9	41.5	39.4
Other qualifications	2.7	1.7	1.6	1.3	1.2	1.2	1.4

Source: Ministry of Education and Training in 2018

Higher education in Vietnam has more than doubled between 2012 and 2018, from 893,754 students to 2,162,106 students. Along with the growing demand for higher education, the Vietnamese education sector has witnessed a rapid expansion of the capacity of existing educational institutions (including upgrading colleges to universities) and the establish new universities and colleges (both public and non-public). In 2012, there were only 230 universities and colleges in the country, but by 2018, this number has increased to 386. Non-public higher education institutions have become an increasingly important part of the total. In 2018, Vietnam had 80 non-public higher education institutions, of which 50 were universities. The number of lecturers in the higher education sector (both colleges and universities) has increased more than 1.5 times in the period 2012 - 2018, from 47,646 staff to 74,573 staff. However, it seems likely that access has expanded

at the expense of reduced quality of education delivery, with the proportion of faculty holding a doctorate decreasing during this period and with some large number of students for each faculty member in charge (approximately 28-29 students per faculty member). There are different types of educational institutions in Vietnam's higher education system, public and non-public. The government supports public educational institutions to ensure that they play a key role in the national education system.

- Public research institutions

To date, the public sector has played a key role in the innovation system in Vietnam. These institutions are managed by line ministries and are specialized in fields such as natural sciences, socio-cultural studies, agriculture and engineering. Unfortunately, these research institutions have no or limited links to higher education institutions and

are isolated from other innovation actors including the private sector. Recently, there has been a significant change in the involvement of non-state actors in the establishment of research institutions. Research and development institutes run by the private sector and NGOs. A current challenge is that a large number of public R&D institutes lack adequate funding.

#### IV. CONCLUSION

Vietnam's national innovation system is in the process of formation and development. With its long-standing commitment to science and technology activities, the Vietnamese government seems to have established the basic foundations of a comprehensive national innovation system. However, Vietnam's national information system is still at an early stage of development and has many weaknesses. Among other issues, the most important are: isolating research institutions including universities from the productive sectors of the economy; in the manufacturing sectors of the economy, the link between the more advanced sector (FDI) and the slower sector (domestic SMEs) is weak; there is still a bias towards the state sector; higher education has not functioned properly as a source of creativity and knowledge transfer; the degree of coordination between policies is not appropriate, especially policies to encourage R&D for the business community; and lack of coordination among science and technology policies at national, regional and community levels.

#### REFERENCES

- [1]. Nguyen, Anh Ngoc, Thang Nguyen, Le Dang Trung, Ngoc Quang Pham, Nguyen Chuc Dinh, Nhat Duc Nguyen (2008), Foreign Direct Investment in Vietnam: Is There Any Evidence Of Technological Spillover Effects, Working Papers 18, Development and Policies Research Center (DEPOCEN), Vietnam.
- [2]. Jensen, HT, and F. Tarp (2006), A Viet Nam Social Accounting Matrix SAM for the Year 2003, Discussion paper PRG1.06.02, Central Institute of Economic Management (CIEM), Hanoi, Viet Nam.
- [3]. Nguyen, Viet Cuong (2009), Can Viet Nam Achieve Millennium Development Goal on Poverty Reduction in High Inflation and Economic Stagnation? Working Papers 01, Development and Policies Research Center (DEPOCEN), Vietnam.
- [4]. Policy Consultant Group and Research Team of Department of Public Expenditure (Ministry of Finance (2012)), Financial Autonomy and Financial Reform Orientation to Public Universities in the Period of 2012-2020, Review of Finance, pp. 44-49.
- [5]. SRV (Socialist Republic of Vietnam) (2003), The Comprehensive Poverty Reduction and Growth Strategy, Government Office, November, 2023, Hanoi.