CHAPTER 9

Innovation Policy in Viet Nam

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9.1 | Introduction

After more than 30 years of implementing the Doi Moi (renovation) policy, Viet Nam has gradually shifted from a centrally planned system towards a socialist-oriented market economy. Comprehensive reforms have been implemented in three main pillars: (i) improvement of institutions for the market economy, (ii) macroeconomic stabilisation, and (iii) proactive economic integration into the regional and global economies. Such reforms have strengthened Viet Nam's microeconomic foundations and led the country to periods of high economic growth. Viet Nam's economic growth rates of 7.6% per annum during 1991–2000 and 6.8% per annum during 2001–2010 were among the highest in the world.

Since 2011, however, Viet Nam's economy has been facing sluggish growth and modest improvement in the quality of growth and labour productivity. Economic growth decelerated to 5.8% per annum on average during 2011–2015. This slowdown could be attributed in part to the deterioration of labour productivity growth and suggests the need to seek a new driving force for Viet Nam's economic growth. This, in turn, will require Viet Nam to make additional efforts to promote innovation, at least to augment labour productivity.

Since the start of the Doi Moi policy in 1986, Viet Nam's policy orientations and regulatory framework for innovation have improved significantly to cover all innovation-related issues at both the micro and macro levels. Pro-innovation policies, such as human resources development and investment targeted to the information technology

and hi-tech industries, have been formulated and implemented. However, they have been insufficient for sustaining economic and labour productivity growth. Thus, Viet Nam must review its innovation policy to identify the necessary amendments.

The paper is structured as follows. Section 9.2 summarises the key definitions and milestones of innovation policy in Viet Nam. Section 9.3 discusses the major outputs and progress of innovation policy in the country. Section 9.4 elaborates on the major issues that Viet Nam faces in promoting innovation, and Section 9.5 concludes with some recommendations.

9.2 | Evolution of Innovation Policy in Viet Nam

9.2.1 Definition of innovation

Definitions of innovation are diverse. From a broad perspective, innovation is associated with structural reforms to promote efficiency and productivity in competition policy, corporate and public sector governance, and regulatory reform. Economies at different stages of development face different challenges in developing the right mix of structural reform policies to support innovation-based economic growth (Table 9.1).

Innovation is multifaceted and extends beyond research and development (R&D) to intangible organisational capacities. However, this paper focuses on innovation in the narrow sense. In the narrow sense, the understanding of innovation is heavily influenced by Schumpeter's theory of innovation, which emphasises the changes in and commercial application of new methods, new technology, new materials, and new sources of energy (Śledzik, 2013). Based on Schumpeter's view, the Organisation for Economic Co-operation and Development (OECD) defines innovation as 'the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organization or external relations' (OECD, 2005). In this sense, innovation is a step beyond invention and requires the implementation of invention to lead to positive changes or outcomes. As such, innovation may take various forms, including products, processes, designs, marketing, and organisational approaches. Government policies may influence the innovation level of each economy by affecting variables such as risks, market opportunities, and the availability of, and access to, funding. Thus, they must adequately identify appropriate policies to mitigate the impediments to innovation at both the firm and national levels.

Table 9.1: Common Aspects of Structural Reforms and Innovation at Different Levels of Economic Development

	Developing (learning – factor driven)	Middle (catching-up – efficiency driven)	Advanced (frontier – innovation driven)
Regulatory reform	Developing institutions to support robust regulatory policy development and implementation	Implementing frameworks to identify and manage the impacts of regulatory reform; working to ensure that regulation does not inhibit firm innovation	Implementing advanced tools to support transparency and robust regulatory policy; using regulation to promote innovation and the adoption of new technologies
Public sector governance	Implementing governance frameworks to support the rule of law and remove corruption and administrative abuse	Administrative simplification, improving coordination between government agencies	Sophisticated governance arrangements to incentivise efficient and effective public spending, taxation, and ownership (where applicable)
Competition policy	Establish competition authority to enforce competitive markets	Establish comprehensive competition policy framework	Sophisticated competition framework to encourage long-term dynamic efficiency
Corporate governance	Providing basic legal infrastructure to support the birth, life, and death of firms	Refining corporate governance systems to enable increased capital mobilisation and more complex corporate structures	Sophisticated and flexible legal infrastructure to support firm governance and risk-taking, incentivise growth, and enable the mobilisation of capital

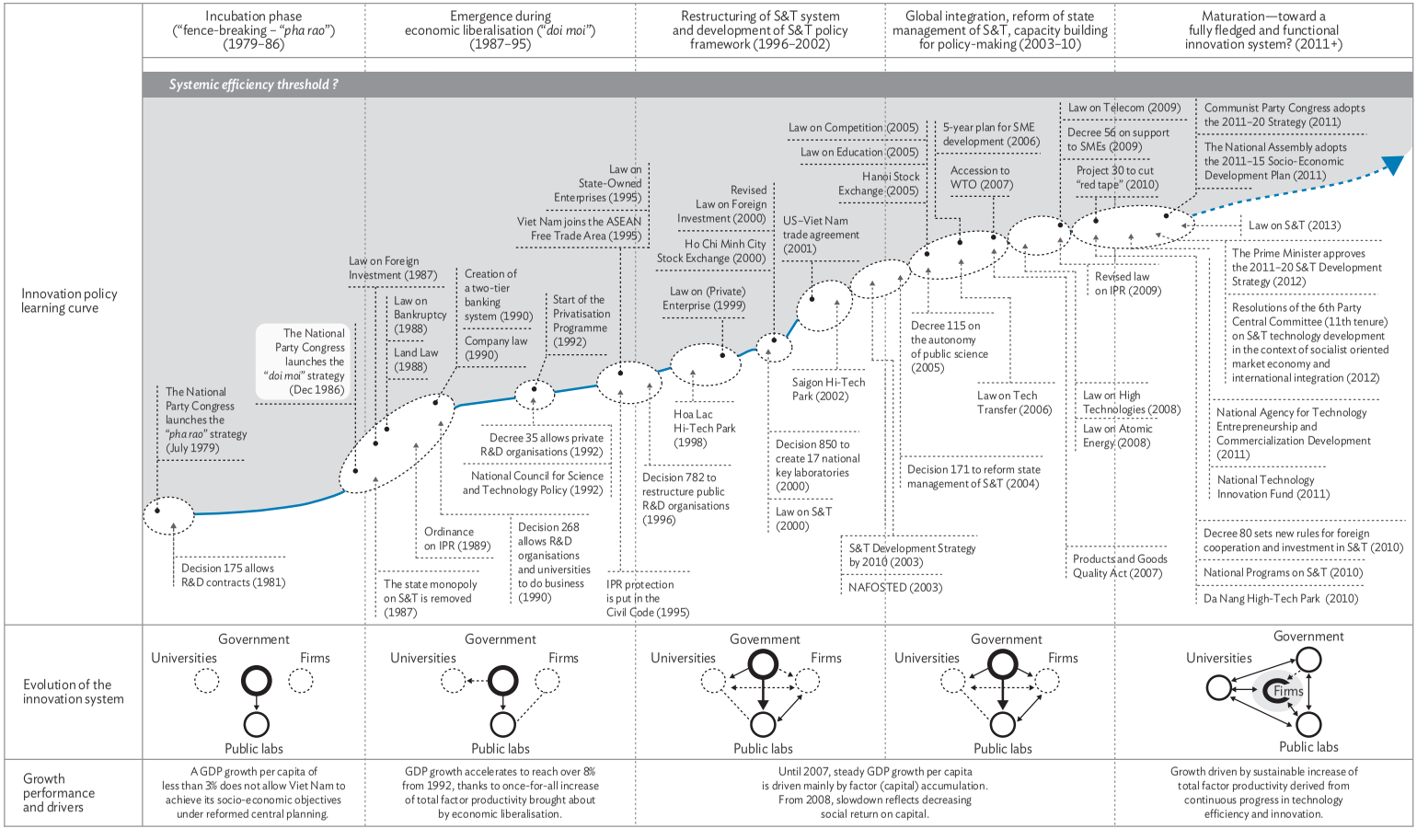
Source: Asia-Pacific Economic Cooperation (2015), *APEC Economic Policy Report 2015: Structural Reform and Innovation*. Singapore: Asia-Pacific Economic Cooperation Secretariat.

9.2.2 The evolution of innovation policy in Viet Nam

The pro-innovation policy framework in Viet Nam has evolved extensively since the implementation of the Doi Moi policy (Figure 9.1). During 1987–1995, Viet Nam witnessed the creation of a new legal framework for science and technology (S&T)-based development. The state monopoly on S&T activities was gradually removed, R&D organisations were allowed to enter into contractual relationships with individuals and non-state actors, and basic regulations on technology transfer were implemented.[1]

[1] Decision No. 268-CT dated 30 July 1990 by the President of the Council of Ministers on the registration and operations of economic organisations established by administrative agencies and organisations; Decree No. 35-HDBT dated 28 January 1992 by the Council of Ministers on the state management of S&T activities.

Figure 9.1: Viet Nam's Innovation Policy: Institutional Reform and Learning Curve



ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product, IPR = intellectual property rights, R&D = research and development, S&T = science and technology, SME = small and medium-sized enterprise, WTO = World Trade Organization.

Source: Organisation for Economic Co-operation and Development (2014, p. 23).

The legal basis for intellectual property rights (IPR) protection was introduced during this period with the issuance of Ordinance 13-LCT/HDNN8 on industrial IPR in 1989[2] and the incorporation of IPR regulations in the Civil Code in 1995. In 1993, the National Centre for Natural Sciences and Technology was given the broader mission of conducting both fundamental and applied research. However, public funding of S&T continued to go exclusively to government S&T organisations, and S&T priorities and evaluation mechanisms remained unchanged. Viet Nam's accession to the Association of Southeast Asian Nations (ASEAN) and the ASEAN Free Trade Agreement in 1995 also set out the country's commitments on S&T promotion, technology transfer, and human resources development, partly reflecting Viet Nam's first attempts to conform its S&T standards and activities to regional and international levels.

During 1996–2010, the S&T system was restructured and the state management of S&T was overhauled. Research centres were established under corporations, in accordance with Decision 782/QD-TTg in 1996,[3] to strengthen links between S&T and production. Relations between public research organisations and industries began to take shape in 2004 and 2005,[4] and new innovation infrastructure was initiated (e.g. the Hoa Lac Hi-tech Park and, later, the Saigon Hi-tech Park). The Law on Science and Technology (in 2003), the Law on Technology Transfer (in 2006), and the Law on High Technology (in 2008) helped strengthen the legal framework for the involvement of foreign investors and hi-tech activities ranging from manufacturing and production to education and training. In line with this direction, the Law on Standards and Technical Regulation was approved in 2007 with the aim of aligning national norms with international standards. The Intellectual Property Law was revised in 2005 and 2009, creating a sound basis for Viet Nam's integration into the international innovation system.

Viet Nam's engagement in the Viet Nam–United States Bilateral Trade Agreement, with its high-quality commitments on IPR, also reinforced the country's commitment to IPR – a critical concern for foreign investors in Viet Nam. The government's institutional capability was strengthened by the creation of the National Council for Science and Technology Policy (in 1997),[5] which directly advises the prime minister

2 Ordinance No. 13-LCT/HDNN8 of the State Council dated 28 January 1989.
3 Decision No. 782/QD-TTg dated 24 October 1996 of the prime minister on the organisation of R&D agencies in S&T.
4 Decision No. 171/2004/QD-TTg dated 28 September 2004; Decree No. 115/2005/ND-CP dated 5 September 2005 by the government on the autonomy of public science organisations.
5 Decision No. 1077/1997/QD-TTg dated 12 December 1997.

on national S&T development policy; the State Agency for Technology Innovation (in 2007); the Viet Nam Science and Technology Evaluation Centre (in 2006); and the National Agency for Technology Entrepreneurship and Commercialization (in 2011). In parallel, new legal frameworks and public support mechanisms were introduced, notably the National Foundation for Science and Technology Development, which began operation in 2008.

During 2011–2016, S&T development and innovation were specified as among the highest priorities under the Socio-economic Development Strategy, 2011–2020 and the Socio-economic Development Plan, 2016–2020. In 2015, the Minister of Science and Technology identified five key measures for S&T: (i) significantly and consistently upgrading the organisational structure, management mechanism, and operations of S&T activities; (ii) mobilising resources to implement S&T development orientations; (iii) continuously strengthening national S&T potential; (iv) developing the S&T market, S&T entrepreneurs, and S&T-related services; and (v) promoting international integration in S&T.

The amendment of the Law on Science and Technology in 2013 incorporated significant improvements, such as expanding the rights of S&T organisations to do business; promoting the development of the S&T market; reserving incentives for S&T enterprises in hi-tech fields;[6] stipulating expenditures to be counted as reasonable expenses; and introducing clear provisions on tax, credit, and funds for S&T activities.

In summary, Viet Nam's innovation policy has undergone drastic changes, including in the scope, facilitation of entry and operation in S&T, and types of support. These changes were driven by (i) the need to enhance competitiveness at the firm and product levels as Viet Nam has integrated more deeply into the world and regional economies; (ii) the narrowing of space to support business entities in Viet Nam due to economic integration, which has made S&T one of the few targets for legitimate support; and (iii) the internalisation of international rules and practices related to innovation management and promotion.

[6] Incentives included the exemption and reduction of corporate income tax for enterprises investing in hi-tech zones; preferential access to land and infrastructure in industrial zones, export-processing zones, economic zones, and hi-tech zones; interest rate support or lending guarantees; and financial support to invest in scientific and technological projects or to cover part of the technological transfer.

9.2.3 Intellectual property rights protection in Viet Nam

The Ordinance on IPR in 1989 marked the initial basis for the legal framework of IPR in Viet Nam. Subsequently, the Law on Intellectual Property was promulgated in 2005 and amended in 2009, and its guiding implementation legislation, such as decrees and circulars, were issued. Other laws relevant to IPR include the Competition Law, the Civil Code, the Criminal Code, and the Law on Customs.

In line with integration into the regional and international economy, IPR is an important chapter in the Viet Nam–United States Bilateral Trade Agreement, signed in 2000. As Viet Nam prepared for accession to the World Trade Organization in the early 2000s, the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) became the framework for its international commitments on IPR. The new-generation free trade agreements (FTAs) since 2015, such as the European Union (EU)–Viet Nam FTA and the Trans-Pacific Partnership (TPP), pushed for even deeper commitments on IPR. TPP commitments on IPR are evaluated as TRIPS+, which reflects a higher level of IPR protection in relation to TRIPS and other conventions on IPR. The TPP covers such IPR-related areas as issues of pharmaceutical exception (relating to public health), and trademark and industrial design protection. Meanwhile, the EU–Viet Nam FTA's commitments on IPR focus more on geographical indication, which is not mentioned in the TPP.

Viet Nam also joined other international agreements on intellectual property (IP), including the Berne Convention for the Protection of Literary and Artistic Works; the Madrid Agreement Concerning the International Registration of Marks; the Paris Convention for the Protection of Industrial Property; the International Convention for the Protection of New Varieties of Plants; the ASEAN Framework Agreement on Intellectual Property Cooperation; the Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of their Phonograms; and the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations. Consequently, the design of Viet Nam's legislation and its level of protection of IP follows the protection standards under TRIPS and other related conventions of which Viet Nam is a member.

Currently, the mandate for state management of IPR protection is assigned to three agencies: the National Office of Intellectual Property under the Ministry of Science and Technology (MOST); the Copyright Office of Vietnam under the Ministry of Culture, Sports and Tourism (MCST); and the New Plant Variety Protection Office

under the Ministry of Agriculture and Rural Development (MARD). Of the three, MOST, in coordination with the MCST and MARD, takes prime responsibility for the state management of IPR and industrial property rights. The MCST, within the ambit of its tasks and powers, performs the state management of copyright and related rights, while MARD performs the state management of rights to plant varieties.

9.3 | Innovation Performance in Viet Nam

9.3.1 Innovation competitiveness

The Global Competitiveness Report, 2016–2017 ranked Viet Nam 60th out of 138 countries on overall competitiveness, with a score of 4.3 out of 7. Notably, of three sub-indices, the sub-index of innovation and sophistication factors had the lowest score of 3.5 and a rank of 84th. The score has shown no significant improvement over the years (Table 9.2). Thus, although Viet Nam has adapted its laws and regulations in line with its World Trade Organization accession, these efforts have been insufficient to improve the country's relative innovation competitiveness.

Table 9.2: Viet Nam's Global Competitiveness Index

Item	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017
Rank	68/131	70/134	75/133	59/139	65/142	75/144	70/148	68/144	56/140	60/138
Score (1–7)	4.04	4.10	4.03	4.27	4.24	4.11	4.18	4.2	4.3	4.3
A. Basic requirements	77	79	92	74	76	91	86	79	72	73
B. Efficiency enhancers	71	73	61	57	66	71	74	74	70	65
C. Innovation and sophistication factors	76	71	55	53	75	90	85	98	88	84
11. Business sophistication	83	84	70	64	87	100	98	106	100	96
12. Innovation	64	57	44	49	66	81	76	87	73	73

Source: World Economic Forum, Global Competitiveness Index database, various years.

Examining the 12th pillar of innovation in more detail, Viet Nam ranked well on government procurement of advanced technological products (27/138) and company spending on R&D (49/138) (Table 9.3). Capacity for innovation achieved the highest score (4.0/7). The availability of scientists and engineers, and government procurement of advanced technological products have been relatively highly ranked, although their scores have trended downwards in recent years.

Table 9.3: Innovation Sub-index of Viet Nam in the Global Competitiveness Index, 2008–2017

Item	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017
Ranking out of	131	134	133	139	142	144	148	144	140	138
Twelfth pillar: innovation	64	57	44	49	66	81	76	87	73	73
Availability of scientists and engineers	55	51	62	66	66	70	88	87	75	84
Capacity for innovation	41	41	33	32	58	78	86	95	81	79
Company spending on R&D	57	42	27	33	52	75	59	63	57	49
Government procurement of advanced tech products	36	21	11	18	41	39	30	34	28	27
PCT patents, applications per million population						97	92	93	91	95
Quality of scientific research institutions	94	85	64	63	74	87	89	96	95	98
University–industry collaboration in R&D	78	70	59	62	82	97	87	92	92	79
Score (1–7), unless indicated otherwise										
Twelfth pillar: innovation	3.2	3.3	3.5	3.4	3.2	3.1	3.1	3.1	3.2	3.3
Availability of scientists and engineers	4.5	4.5	4.2	4.1	4.1	4.0	3.8	3.8	3.9	3.8
Capacity for innovation	3.7	3.5	3.7	3.6	3.2	3.0	3.4	3.5	3.8	4.0
Company spending on R&D	3.3	3.6	3.8	3.6	3.2	3.1	3.2	3.2	3.3	3.5
Government procurement of advanced tech products	4.0	4.2	4.5	4.4	4.0	3.9	4.0	3.9	3.9	3.8
PCT patents, applications per million population						0.1	0.1	0.2	0.2	0.2
Quality of scientific research institutions	3.4	3.6	3.7	3.8	3.5	3.4	3.4	3.3	3.3	3.4
University–industry collaboration in R&D	2.9	3.1	3.5	3.7	3.4	3.2	3.3	3.3	3.3	3.3

PCT = Patent Cooperation Treaty, R&D = research and development.

Source: World Economic Forum, Global Competitiveness Index database, various years.

9.3.2 Science and technology actors

In accordance with the 2013 Law on S&T, S&T organisations are classified into three groups: technological R&D institutes; universities, academies, and colleges; and S&T services organisations. A 2014 survey by MOST found that Viet Nam had 1,055 S&T organisations, of which R&D institutes accounted for the largest share (48%); universities, academies, and colleges made up 32%; and S&T services organisations accounted for 20%. Most S&T organisations were in the technical and technological science area (Table 9.4). Most R&D institutes are small with an average of only 55 people. The government has established international R&D institutes, such as the Viet Nam–Korea Science and Technology Institute (in 2017) and the Viet Nam Institute for Advanced Studies in Mathematics (in 2010), with the aim of achieving breakthrough results.

Table 9.4: Viet Nam's Science and Technology Organisations, 2014

	R&D Institutes		Universities, Academies, Colleges		S&T Services Organisations	
Type	No.	Share (%)	No.	Share (%)	No.	Share (%)
Natural science	60	11.9	26	7.7	26	12.3
Technical and technological science	178	35.2	105	31.0	136	64.2
Health-medicine science	27	5.4	32	9.4	3	1.4
Agricultural science	104	20.6	18	5.3	12	5.7
Social science	105	28.8	143	42.2	32	15.1
Human science	31	6.1	15	4.4	3	1.4
Total	**505**	**100.0**	**339**	**100.0**	**212**	**100.0**

No. = number, R&D = research and development, S&T = science and technology.

Source: Ministry of Science and Technology (2016), *Survey on S&T Capacity of S&T Organizations in Vietnam in 2014*.

By 2015, Viet Nam had 204 S&T enterprises, most of which were operating in priority fields in line with the S&T development strategy, 2011–2020, including information and communication technology, biotechnology, new materials, mechanics and automation, and the environment. Viet Nam had more than 400 hi-tech firms located in hi-tech parks and zones, 34 hi-tech firms located outside industrial zones, and more than 1,400 software enterprises (MOST, 2016).

9.3.3 Science and technology human resources

According to MOST (2016), in 2013, Viet Nam had 164,744 people working in R&D related-activities, of which 128,997 were direct R&D personnel (i.e. researchers and scientists, on a headcount basis). Almost half of the R&D personnel (49.2%) worked for universities, 23.1% for R&D institutes and centres, and 14.4% for enterprises. By educational level, most R&D personnel held bachelor or master's degrees (86.8%), while personnel with doctorates accounted for 9.5% of the total (Table 9.5).

Table 9.5: Viet Nam's Research and Development Human Resources by Organisational Status and Educational Level, 2013

	Number of Employees by Educational Level				
Organisational Status	Doctorate	Master's	University	College	Total
R&D institutes/centres	3,367	8,815	16,635	1,002	29,820
Universities	7,959	31,582	22,819	1,075	63,435
Administrative agencies	229	1,795	6,135	300	8,460
Public service agencies	252	1,616	5,268	359	7,495
Enterprises	185	1,154	15,175	2,038	18,553
Non-profit organisations	269	260	652	53	1,234
Total	**12,261**	**45,224**	**66,684**	**4,827**	**128,997**
	Share of Employees by Educational Level (%)				
R&D institutes/centres	11.29	29.56	55.78	3.36	100.00
Universities	12.55	49.79	35.97	1.69	100.00
Administrative agencies	2.71	21.22	72.52	3.55	100.00
Public service agencies	3.36	21.56	70.29	4.79	100.00
Enterprises	1.00	6.22	81.79	10.98	100.00
Non-profit organisations	21.80	21.07	52.84	4.29	100.00
Total	**9.50**	**35.06**	**51.69**	**3.74**	**100.00**

R&D = research and development.

Source: Ministry of Science and Technology (2016), compiled from the 2014 Survey on R&D and 2014 Enterprise Survey.

In 2013, Viet Nam had 14.3 R&D personnel per 10,000 population, equivalent to one-fifth that of Japan (70.2/10,000) and Singapore (74.8/10,000) and one-sixth that of the Republic of Korea (82.0/10,000). Using the full-time equivalent method,[7] the number of R&D personnel in Viet Nam was 61,663 (6.8/10,000) – higher than Indonesia and the Philippines but much lower than Malaysia and other advanced Asian countries (Table 9.6).

Table 9.6: Full-time Equivalent Research and Development Personnel of Viet Nam and Selected Economies

Economy	Full-time Equivalent R&D Personnel (number per 10,000 population)
Singapore (2013)	66.7
Republic of Korea (2013)	64.2
Japan (2013)	52.0
United States (2012)	40.3
EU28 (2013)	34.1
Russia (2013)	30.8
Malaysia (2012)	17.9
China (2012)	11.0
Viet Nam (2013)	**6.8**
Thailand (2011)	5.4
Indonesia (2009)	2.1
Philippines (2007)	0.7

EU = European Union, R&D = research and development.

Source: Ministry of Science and Technology (2016).

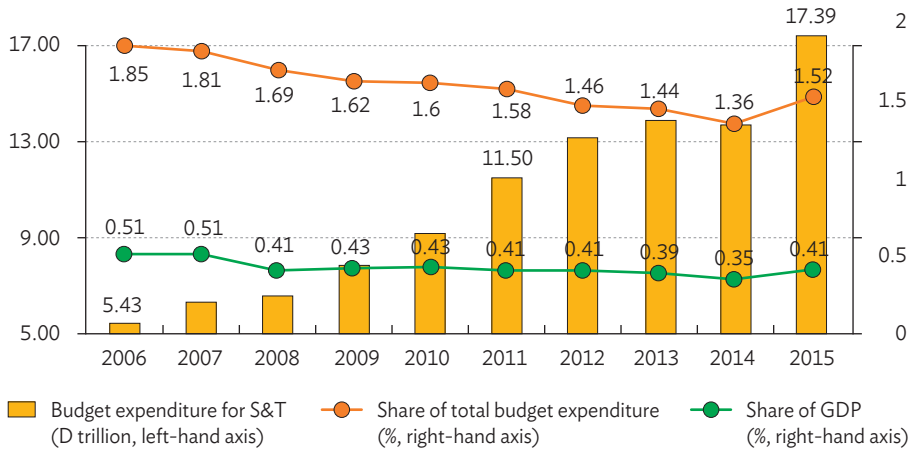
9.3.4 Science and technology finance

Most S&T activities are financed by the state budget. During 2006–2015, total expenditure on S&T ranged from 1.36% to 1.85% of the state budget expenditure (Figure 9.2). In 2015, S&T accounted for 1.52% of the total budget expenditure

[7] As defined by the OECD, full-time equivalent employment is the number of total hours worked divided by the average annual hours actually worked in full-time jobs. In international practices, full-time equivalent R&D personnel are personnel who work in R&D activities on a full-time basis within a year. On an annual basis, full-time equivalent is considered to be 2,080 hours, which is calculated as 8 hours per day x 5 working days per week x 52 weeks per year.

(equivalent to D17.39 trillion), which represented an average increase in absolute terms of 13.8% during 2011–2015 but a decrease compared with the 2006–2010 average in terms of share. The share of S&T investment in total gross domestic product (GDP) also decreased from 0.51% to 0.41% during 2006–2015.

Figure 9.2: Science and Technology State Budget Expenditure, 2006–2015



GDP = gross domestic product, S&T = science and technology.
Source: Ministry of Science and Technology (2016).

Viet Nam's gross expenditure on R&D (GERD)[8] was 0.37% in 2013 (Table 9.7). As such, the country was considerably less R&D-intensive than Malaysia and slightly less so than Thailand. By source, the state budget contributed the largest share of GERD (56.7%), followed by enterprises (41.8%) and foreign loans (1.5%).

9.3.5 Science and technology infrastructure

Viet Nam has made important progress in S&T infrastructure in recent years. In line with Decision 850/QD-TTg, it established 16 national key laboratories in 2000 to serve seven fields of basic science: biotechnology (5 laboratories), information technology (3), material technology (2), mechanics-automation (2), petro-chemistry (1), energy (1), and infrastructure (2). The laboratories are based in 13 research institutes and 3 universities under the management of 8 ministries

[8] GERD is the ratio of total R&D expenditure to GDP.

and line agencies. In addition, three national hi-tech parks were founded in three regions: Hoa Lac Hi-Tech Park in the north, Ho Chi Minh Hi-Tech Park in the south, and Da Nang Hi-Tech Park in the central region. A total of 140 projects have invested more than US$7.1 trillion in these hi-tech parks. There are 8 software parks concentrated in major cities (such as Ha Noi, Ho Chi Minh City, Da Nang, and Hai Phong), and 13 hi-tech agricultural zones (such as in Thai Nguyen, Son La, Hanoi, Lam Dong, and Hau Giang).

Table 9.7: Gross Expenditure on Research and Development in Viet Nam and Selected Economies (%)

Economy	GERD
Republic of Korea (2015)	4.23
Japan (2015)	3.28
United States (2015)	2.79
Singapore (2015)	2.20
China (2015)	2.07
EU28 (2015)	1.96
Malaysia (2015)	1.30
Russia (2015)	1.13
Thailand (2015)	0.63
Viet Nam (2013)	**0.37**
Philippines (2013)	0.14
Indonesia (2013)	0.08

EU = European Union, GERD = gross expenditure on research and development.
Sources: Ministry of Science and Technology (2016); World Bank, World Development Indicators (2017).

9.3.6 Science and technology products

Hi-tech products have accounted for a rising share of Viet Nam's trade value, especially since 2011 (Table 9.8). The share of hi-tech products rose to over 27% in 2013–2014 from less than 6% during 2000–2008. The growth rate of total imports of hi-tech products ranged from 9.7% to 13.7% during 2000–2010 and jumped to 24.2% in 2013 and 22.9% in 2014. Though the hi-tech share in total imports and exports remains modest in relation to that of low- and medium-tech products, the improvement partly reflects Viet Nam's efforts to promote S&T and innovation activities, which in turn have resulted in the positive change in the trade structure of the country.

Table 9.8: Share of Viet Nam's Exports and Imports by Technological Level, 2000–2014 (%)

Level	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Exports											
Hi-tech	5.6	5.5	5.7	5.4	6.6	8.4	10.6	14.5	22.0	27.7	27.2
Low-tech	24.6	31.7	31.4	33.6	33.4	36.2	38.0	34.1	30.1	30.3	31.7
Medium	4.3	5.6	6.4	8.1	7.9	7.2	8.0	8.3	9.0	8.6	9.0
Other	65.5	57.3	56.5	53.0	52.1	48.2	43.4	43.1	38.9	33.4	32.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Imports											
Hi-tech	12.0	9.7	9.8	12.0	10.9	13.7	13.0	14.4	20.8	24.2	22.9
Low-tech	18.3	19.7	18.4	18.7	17.5	18.6	19.6	18.3	17.8	18.0	18.4
Medium	31.6	28.1	26.0	27.9	27.7	29.0	27.1	24.8	23.1	22.6	23.5
Other	38.0	42.4	45.8	41.4	43.9	38.7	40.4	42.5	38.3	35.2	35.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: United Nations Comtrade Database, various years.

According to calculations by MOST, technological innovation growth[9] in Viet Nam reached 10.7% per annum during 2011–2015, achieving the 10%–15% target set in the S&T development plan for the period. The results also revealed that rapid technological innovation occurred in such industries as information and communication technology, petrol, aviation, and finance and banking. Nevertheless, most firms were using technologies two or three generations behind the world average. Less than 20% of manufacturing firms (one-third of enterprises in Viet Nam) applied advanced technology, and most of these received foreign investment.

[9] MOST's calculations of Viet Nam's technological innovation growth covered 13 groups of input and output indicators of technological innovation activities, including (i) budget expenditure for S&T (% of GDP); (ii) R&D human resources (head count per 10,000 people); (iii) the ratio of university graduated and higher-level over the total human resources of enterprises (%); (iv) the number of international S&T publications per 1 million people; (v) the ratio of total applications of technological property rights to GDP (D1,000 billion); (vi) expenditure on R&D and technological innovation by enterprises (% of GDP); (vii) the number of grants of technological property rights to GDP (D1,000 billion); (viii) imports of machinery and equipment (% of GDP); (ix) the ratio of transferred technological property rights to total grants of technological property rights; (x) purchases of machinery and equipment by enterprises (% of GDP); (xi) the ratio of enterprises with quality management certificates to the total number of enterprises (%); (xii) the ratio of exports of hi- and medium-tech products to gross exports (%); and (xiii) exports of machinery and equipment over gross exports (%).

Table 9.9: International Applications by Viet Nam via World Intellectual Property Organization-administered Treaties

Year	PCT System	Madrid System	Hague System
2001–2005	11	103	0
2006–2010	37	212	0
2011–2015	77	355	2
2011	18	65	n.a.
2012	13	80	n.a.
2013	18	70	1
2014	7	77	1
2015	21	63	

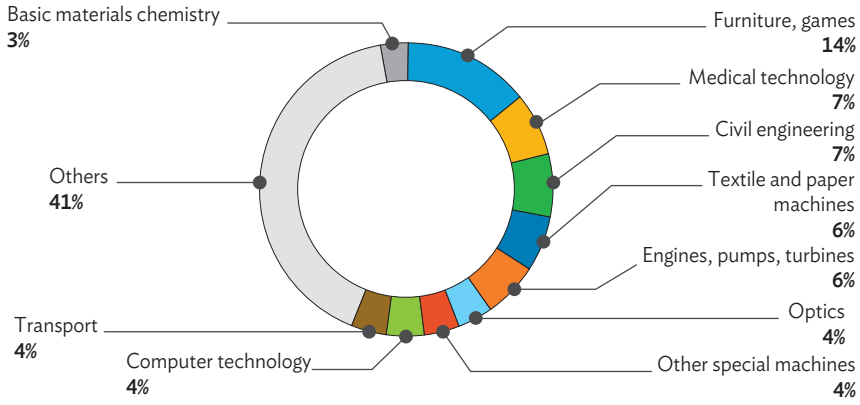
PCT = Patent Cooperation Treaty.

Source: World Intellectual Property Office.

International applications of new-to-the-world technological innovations in Viet Nam are low. This is reflected in Viet Nam's performance in treaties administered by the World Intellectual Property Organization, including patent applications through the Patent Cooperation Treaty, the Madrid System, and the Hague System (Table 9.9). Viet Nam made 434 international applications via these three systems during 2011–2015. This was much higher than the total for Indonesia (79 applications) and the Philippines (268), similar to Thailand's (429), but much lower than Malaysia's (1,473) (World Intellectual Property Office, 2016). The technological field with the largest share of patent applications (14%) was furniture and games. Other fields with significant shares of patent applications included medical technology (7%) and civil engineering (7%) (Figure 9.3).

In 2011–2015, there were 21,296 intellectual property applications for inventions and 1,759 for utility solutions in Viet Nam, compared with 14,697 and 1,292, respectively, during 2006–2010 (Table 9.10). Domestic applications grew rapidly, with the annual number increasing from 52 in 2001 to 301 in 2011 and 538 in 2015 (National Office of Intellectual Property, 2016). The overwhelming majority of invention applications were filed by foreign residents; during 2011–2015, 2,196 invention applications were filed by Vietnamese, and 19,100 were filed by foreigners (90%) (National Office of Intellectual Property, 2016). Viet Nam witnessed a steep rise in both resident and non-resident trademark registrations during 2011–2015. The figure jumped from 134,481 in 2006–2010 to 159,346 in 2011–2015, of which applications filed by Vietnamese accounted for the majority (74% and 80%, respectively). This indicates that awareness of the importance of IP protection has gradually improved.

Figure 9.3: Patent Applications in Viet Nam by Technological Field, 2001–2015 (%)



Source: World Intellectual Property Organization.

Table 9.10: Origin of Viet Nam's Intellectual Property-related Applications, 2006–2015

Period	Origin	Invention	Utility Solution	Industrial Design	Trademark	Geographical Indication	Total
2006–2010	**Total**	**14,697**	**1,292**	**8,865**	**134,481**	**30**	**159,365**
	Vietnamese	1,183	744	6,168	100,137	27	108,259
	Foreigners	13,514	548	2,697	34,344	3	51,106
2011–2015	**Total**	**21,296**	**1,759**	**10,692**	**159,346**	**25**	**193,118**
	Vietnamese	2,196	1,174	7,116	126,959	20	137,465
	Foreigners	19,100	585	3,576	32,387	5	55,653

Source: National Office of Intellectual Property (2016), *Annual Report 2015*.

9.4 | Major Issues

9.4.1 Inadequate pro-innovation policy environment

Overlapping and inconsistency of intellectual property policy design and implementation

The National Assembly and the government oversee the setting of national legal regulations and decide on the broad socio-economic development policies, including S&T policy. At the lower level, many institutions are involved in detailed policy design

and the implementation of S&T and innovation, especially the line ministries and, to a lesser extent, the provincial governments. The Ministry of Science and Technology undertakes cross-sectoral policy coordination with regard to the innovation framework and initiatives; the Ministry of Planning and Investment develops socio-economic development plans and investment plans; and the Ministry of Finance allocates and disburses the budgetary resources for public initiatives. However, the duplication of priorities in legal documents on S&T is common, and the list of sector targets remains inconsistent. Some strategies, plans, and targets are too ambitious and lack adequate resources for implementation, which leaves room for inaction or a lack of coordination by implementing bodies.

Several associations, such as the Viet Nam Union of Science and Technology Associations and the Viet Nam Intellectual Property Association, provide advice and proposals to government authorities. Through their financial and/or technical support programmes, multilateral and bilateral organisations (such as the United Nations Development Programme, the World Bank, the Asian Development Bank, the Korea International Cooperation Agency, and the Japan International Cooperation Agency) play an important advisory role in S&T and innovation policy in Viet Nam. However, the participation of nongovernment organisations remains inadequate, despite their valuable contributions to the design and implementation of S&T and innovation-related policies.

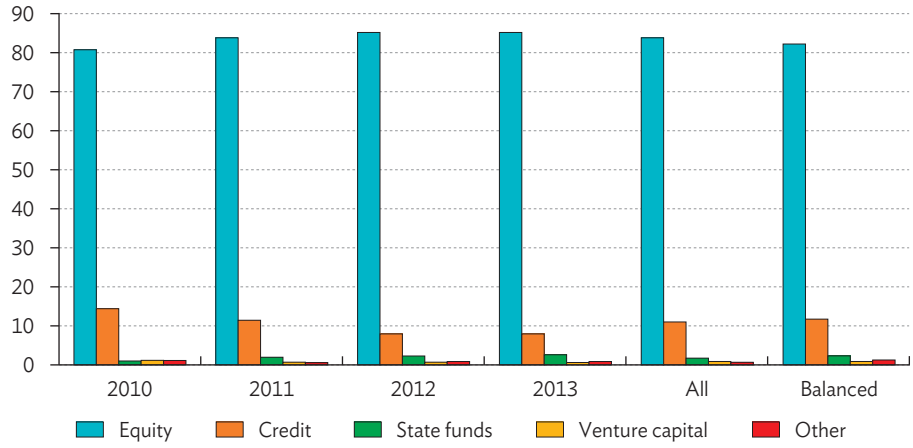
Insufficient and ineffective financing for science and technology

Financing for S&T and innovation activities in Viet Nam still depends heavily on budget support. State expenditure for R&D accounted for 56.7% of GERD in 2013. Limited budgets and fragmented, dispersed investment explain the small average size of project grants.[10] To add to the problem, most public expenditure on S&T is distributed through ministries and entails significant management costs, especially in relation to administrative processes or 'red tape', despite significant improvements due to recent efforts. Consequently, most beneficiaries of the budget expenditure for S&T activities are public research organisations. Only 4% of public expenditure on S&T goes to universities (Tran and Vo, 2011). This represents about 15% of universities' investment in R&D, most of which is financed by international donors (50%) and enterprises (30%). The results of a survey by the CIEM, the General Statistics Office (GSO), and the University of Copenhagen were consistent with this finding, showing

[10] Government funding for a ministerial research project can be as low as D100 million (about US$4,800) a year.

that most firms' R&D expenditure is financed by equity (84%) or credit (12%), while state budgetary assistance for R&D is very modest (2%) (CIEM–GSO–University of Copenhagen, 2015) (Figure 9.4).

Figure 9.4: Financial Source of Firms' Research and Development, 2010–2013 (%)



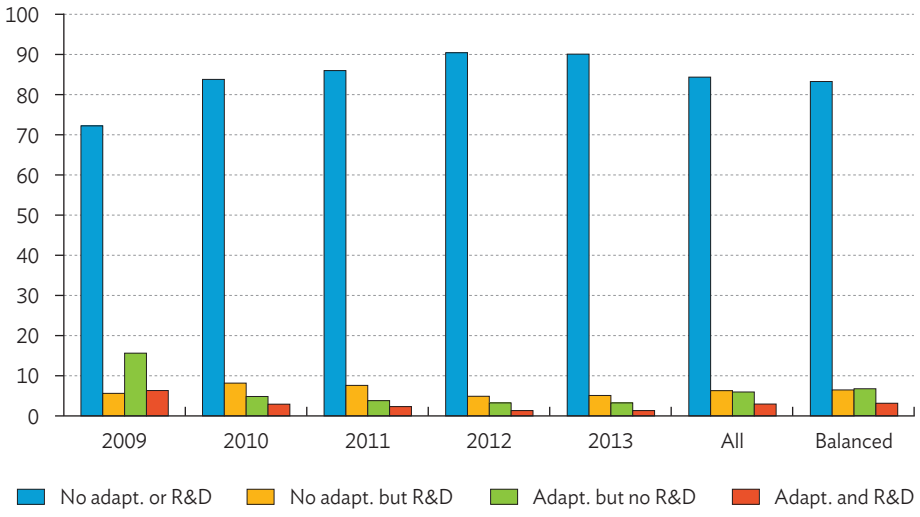
Notes: 'All' refers to gross data during 2010–2013. 'Balanced' excludes firms whose figures for assets and revenue were recorded as zero or missing, or whose figures for assets and revenue were inconsistent.

Source: CIEM–GSO–University of Copenhagen (2015).

Inadequate investment by firms in S&T and innovation in general and R&D in particular poses another concern. The CIEM–GSO–University of Copenhagen (2015) survey of more than 700 firms each year from 2009 to 2013 revealed that most surveyed firms did not engage in any technology adaptation or R&D activities (Figure 9.5). About 7% of firms pursued either R&D or adaptation, while 3% of firms pursued both R&D and adaptation. Adaptation and R&D activities declined over the survey period. Of the firms surveyed, 83% did not have an adaptation or R&D strategy. As adaptation appears to be more cost-effective in the short run (in terms of technological sophistication), greater policy support for adaptation is the preferred choice. Findings from other surveys are similar, including those by the GSO (2014) and the National Economics University (2016).[11]

[11] According to the GSO survey (2014), of 7,450 surveyed firms, only 6.2% participated in R&D activities. Firms' expenditure on innovation accounted for only 0.2%–0.5% of total revenues. Meanwhile, the survey conducted by the National Economics University (2016) showed that of the 300 surveyed industrial enterprises in Hung Yen Province, 58.5% did not engage in any R&D activities; 14.2% spent less than 0.5% of their total revenue on R&D, while 16.2% allocated 1.5%–2.0% of total revenue for R&D (Le, 2017).

Figure 9.5: Share of Firms in Viet Nam Doing Technology Adaptation and/or Research and Development, 2009–2013 (%)



Adapt. = adaptation, R&D = research and development.

Notes: 'All' refers to gross data during 2009–2013. 'Balanced' excludes firms whose figures for assets and revenue were recorded as zero or missing, or whose figures for assets and revenue were inconsistent.

Source: CIEM–GSO–University of Copenhagen (2015).

Insufficient quality and the relevance of the science and technology workforce

The quality of Viet Nam's workforce suffers from the structural deficiencies in Viet Nam's tertiary educational system. As illustrated in Table 9.11, during 2006–2014, secondary and tertiary education accounted for a very modest share of budget expenditure for education and training, with universities and colleges receiving 12.4%, vocational schools 9.7%, and professional secondary schools 3.5%. This indicates that the majority of state resources have been invested in universal basic education rather than higher education, though the latter is arguably more crucial to the development of S&T and innovation.

At the same time, higher education has significant systematic weaknesses in terms of governance (information and incentives) and financing, which constrain its capacity to produce the human resources and skills needed for the labour market. Higher education institutions may be unable to provide the skills the labour market needs because they lack information on demand. Instruments to provide institutions (and students) with labour market information and mechanisms to channel inputs from firms into curriculum and programme design and implementation are limited in Viet Nam.

Table 9.11: Structure of Budget Expenditure by Educational Level, 2006–2014 (%)

Educational Level	2006	2008	2009	2010	2011	2012	2013	2014
Preschool	7.5	7.5	7.9	7.9	8.2	8.2	8.2	8.2
Primary education	31.2	29.9	29.1	28.5	28.2	28.3	28.3	28.3
Lower secondary education	21.6	22.0	22.6	21.5	21.4	21.6	21.6	21.6
Upper secondary education	10.3	11.0	11.3	11.8	11.2	11.1	10.9	11.1
Total of preschool and basic education	**70.6**	**70.5**	**70.9**	**69.7**	**69.0**	**69.2**	**69.0**	**69.2**
Vocational	6.7	10.0	9.8	9.7	9.9	9.7	9.7	9.7
Professional secondary schools	2.6	3.3	3.2	3.4	3.6	3.5	3.5	3.5
Colleges, universities	8.9	12.0	11.7	11.7	12.0	12.4	12.4	12.4
Continuing education	1.2	1.2	1.5	1.8	1.7	1.6	1.8	1.6
Others	10.0	3.0	2.9	3.7	3.8	3.6	3.6	3.6
Total of vocational and higher education	**29.4**	**29.5**	**29.1**	**30.3**	**31.0**	**30.8**	**31.0**	**30.8**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Ministry of Education and Training (2015).

University–industry links in curriculum design are weak, with the result that curricula and training programmes for workers are outdated and lack relevance. According to the OECD and the World Bank (2014), only 9% of firms responding to the 2011 Viet Nam Employer Skill and Innovation Survey were involved in curriculum design.

Even when sufficient information exists, the lack of incentives for public institutions to produce the skills needed by the labour market may ultimately hamper all attempts to improve the relevance of education. The highly qualified faculty members of public institutions often do not deliver because they are not held adequately accountable to parents and students. On the other hand, relatively low salaries and, most importantly, limited opportunities for advancement make it hard to attract high-quality academic staff. Meanwhile, cumbersome promotion procedures do not sufficiently reward academic achievement on the basis of merit.

Viet Nam's public institutions are still protected by financing policies that give them a competitive advantage. Limited autonomy in academic and administrative areas also generates disincentives to tailor programmes to the needs of the local community and to hire and reward the faculty required to deliver these programmes and undertake relevant research. The lower level of development of private higher education is another factor that restricts the capacity to produce higher education graduates and the relevant skills for the economy in S&T fields.

9.4.2 Narrower policy space for supporting science and technology development and innovation

The current policy framework for S&T and innovation in Viet Nam focuses on a wide range of policy support, including tax reduction and exemption, administrative simplification and modernisation, preferential access to credit, trade promotion, education and training, information support, market development, and R&D. However, Viet Nam's increasing integration into the regional and international economies through diversified international commitments, such as FTAs and bilateral investment treaties, presents some potential issues with the remaining policy space.

First, the policy space for tariffs has been significantly narrowed in accordance with tariff reduction commitments. This benefits medium- and high-tech industries that depend heavily on imported inputs. However, the use of tariffs as an instrument to protect domestic production, especially in the case of newly developed products, is no longer feasible in the new context. This also has implications for any high-value-added innovative industries that Viet Nam may wish to develop in the future. Second, the policy space for non-tariff measures is also smaller because measures such as import quotas and the temporary prohibition of imports and/or exports cannot be applied to trade in hi-tech products and their spare parts. Meanwhile, the use of technical standards to prevent inflows of foreign goods and services becomes less possible due to the requirement of justification and/or transparency. Third, credit assistance for industrial production is somewhat restricted. Export subsidies or production subsidies for industrial products, including hi-tech ones, are prohibited. Finally, under current and pending FTAs (such as the TPP), measures such as export ratio and local content requirements are no longer permitted. Foreign investors sometimes even enjoy more preferential treatment than their domestic counterparts.[12] This preferential

[12] Circular No. 20/TT-BKH&CN (2014) on standards of imported used machines was suspended before taking effect (1 September 2014). This suspension was attributed to pressure from foreign direct investment enterprises that wanted to relocate their factories from other countries to Viet Nam.

treatment is not specific to foreign direct investment, but eligibility criteria in terms of capital scale and technology level mean that it is unlikely to be accessible to most domestic enterprises.

Meanwhile, there is still significant space for the government to take other measures to support the development of innovative industries. The education and training of labour and R&D have been mentioned in many policies related to human resources development and technical assistance for hi-tech enterprises. These can be implemented, in principle, through measures such as preferential financial support from the state budget for education and training programmes, part payment of technological transfer expenses, and tariff exemptions or reductions when importing production inputs for hi-tech projects or supporting industries. Hi-tech products are also eligible for trade promotion and market development campaigns.

As reflected by the current legal framework for S&T and innovation development and integration regulations, such policy space has been employed, at least in principle. However, the policy space itself may be restricted by a lack of available funds in the state budget – which sometimes makes it impossible to promote the development of S&T and innovation – and the limited effectiveness of existing polices and/or regulations.

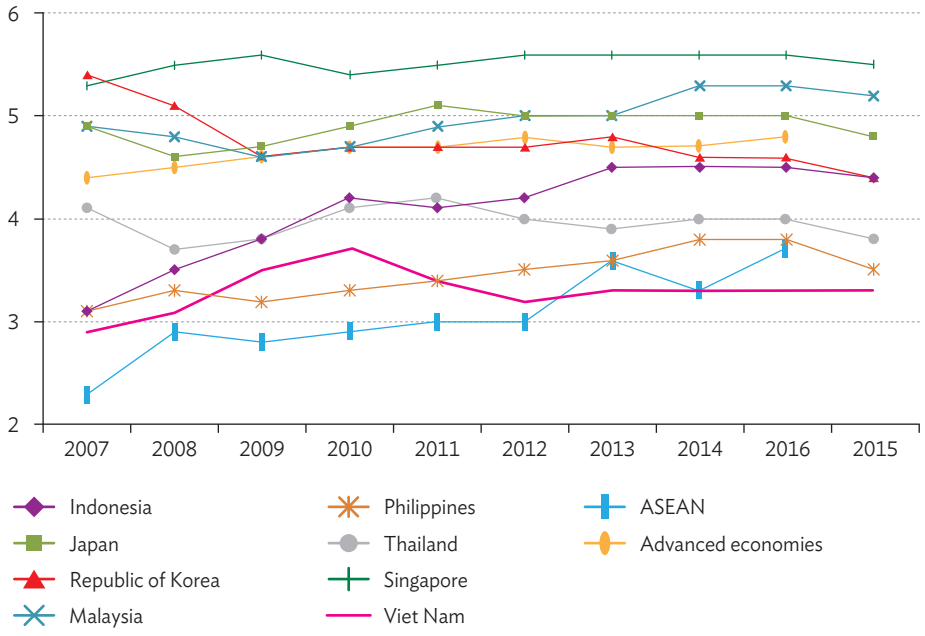
Viet Nam's stage of economic development still requires suitable policy space to protect and/or facilitate the development of S&T and an innovation-based economy. Protection measures remain important for achieving this. Nevertheless, Viet Nam's new-generation FTAs (such as the EU–Viet Nam FTA and the TPP), which incorporate higher standards of intellectual property protection, may be beneficial to the design and enforcement of S&T policy.

9.4.3 Inadequate innovation linkages

Limited university–industry collaboration

The available evidence, while partial and fragmented, points to the existence of very weak links between science and industry in Viet Nam. Figure 9.6 depicts university–industry collaboration in R&D in Asian countries during 2007–2016. Viet Nam's score improved little during this period. After 2010, the figure even trended downwards and Viet Nam was overtaken by the ASEAN average since 2013 and the Philippines since 2012. Compared with the scores of other ASEAN Member States, such as Malaysia, Singapore, and Thailand, or advanced countries, Viet Nam's performance was the lowest.

Figure 9.6: University–Industry Collaboration in Research and Development, 2007–2016



ASEAN = Association of Southeast Asian Nations.

Note: The score ranges from 1 to 7, where 7 is the best.

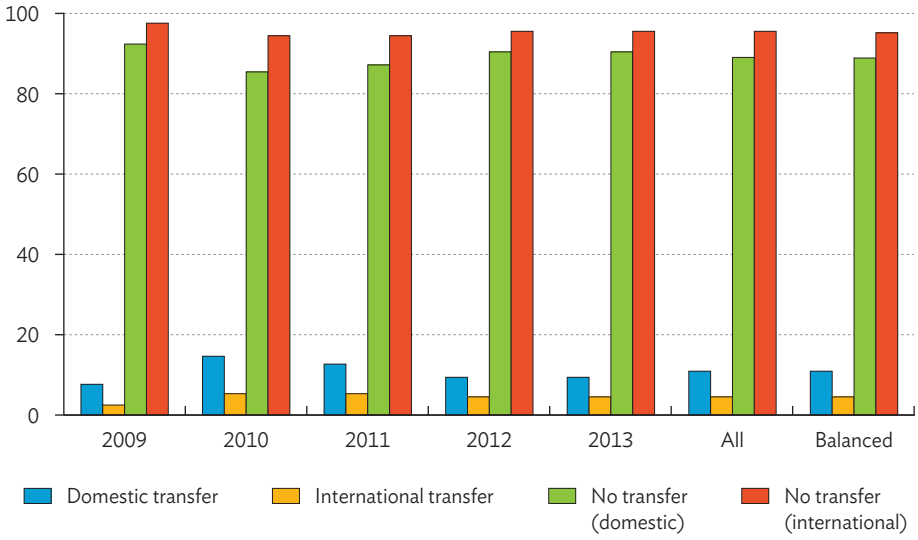
Source: World Economic Forum (2017), Global Competitiveness Index database.

The situation is partly attributable to pronounced resource constraints, which may limit opportunities for collaboration. Many institutes have yet to look for the appropriate S&T market segments, and focus on research using their currently available resources without aligning with the needs of enterprises. Furthermore, the lack of intermediary institutions and agencies, and of consultancies, evaluation, valuation, and the provision of technology-related information is also a constraint on interactions between the public research sector and businesses. CIEM and the World Bank's 2012 Employers Skill Survey involving 352 firms (330 firms in formal sectors and 22 firms in informal sectors) found that only 6% of firms had engaged in innovation-related cooperation with an outside partner, and only 1% had collaborated with research institutes and universities. Another survey by the Hanoi National University (2013) of 583 enterprises showed consistent results. The share of respondents that had collaborated with a research organisation or a university was only 16% and 17%, respectively (Phung and Le, 2013).

Insufficient technology transfer: Backward and forward linkages and horizontal spillovers

CIEM–GSO–University of Copenhagen (2015) found modest levels of backward linkages (technology transfer from customers) and forward linkages (technology transfer from suppliers) between domestic and foreign firms in Viet Nam. Firms that reportedly received technology transfers from domestic customers accounted for 11% of cases, while the share for technology transfers from international customers was only 4.5% (Figure 9.7). This indicates that, contrary to expectations, the main route for technology transfers was through trading relationships with domestic firms and not with foreign firms who operate either in Viet Nam or abroad. Most positive spillovers through backward linkages were formally specified in contracts (more than 70%), while the indirect benefits from interacting with foreign firms in the same sector or region were scarce. Only about 7% of respondents reported technology transfers through forward linkages with international suppliers, both for all suppliers and for transfers through contracts; the equivalent figure for forward linkages with domestic suppliers was 24% – more than triple (Figure 9.8). Thus, as in the case of backward linkages, the evidence shows that technology transfers through forward linkages are more likely to occur from contact with domestic rather than international firms.

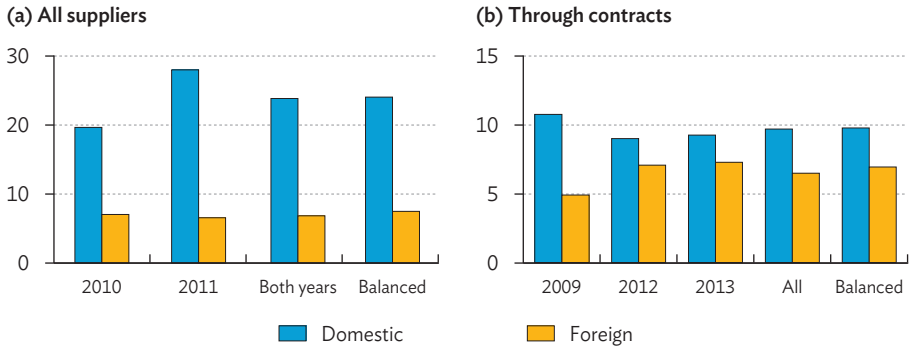
Figure 9.7: Backward Linkages: Technology Transfer from Customers (%)



Note: 'All' refers to gross data during 2009–2013. 'Balanced' excludes firms whose figures for assets and revenue were recorded as zero or missing, or whose figures for assets and revenue were inconsistent.

Source: CIEM–GSO–University of Copenhagen (2015).

Figure 9.8: Forward Linkages: Technology Transfer from Suppliers (%)



Note: 'All' refers to gross data during 2009–2013. 'Balanced' excludes firms whose figures for assets and revenue were recorded as zero or missing, or whose figures for assets and revenue were inconsistent.

Source: CIEM–GSO–University of Copenhagen (2015).

9.5 | Conclusion and Recommendations

9.5.1 Conclusion

Together with its economic reforms and integration, Viet Nam's innovation policy has been gradually expanded and amended. S&T achievements have contributed to economic development in Viet Nam through their impacts on labour productivity and economic structure. The fourth industrial revolution will offer more opportunities for developing countries such as Viet Nam to speed up their technology catch-up process, creating a sound foundation for more sustainable economic growth.

However, there are obstacles to more effective S&T innovation-led growth in Viet Nam. The country's S&T and innovation capacity – the national innovation system – is inadequately developed, and R&D activity is insufficient, in both the business and public sectors. This can be attributed to shortcomings and weaknesses, including in institutions, human resources development, investment and financing for S&T and innovation development, and collaboration and linkages among relevant bodies (both in terms of management and implementation).

For more sustainable economic development, Viet Nam should (i) address the bottlenecks for S&T and innovation development and utilisation; and (ii) pay adequate attention to the constraints of scarce resources and the existing and available policy

space in the context of deeper integration in regional and international value chains and production networks. In the process, the government should continue its leading role in providing a long-term orientation on S&T and innovation priorities, and it should also encourage deeper private sector engagement in innovation.

9.5.2 Recommendations

For a more effective innovation policy, Viet Nam should consider the following five sets of recommendations.

(i) Recommendations for improving the institutional and policy framework for S&T and innovation

- Improve coordination among the bodies responsible for state management and policy formulation and the implementation of S&T and innovation policy. The aim is to foster consistency among strategic visions and priorities. Greater development and use of existing strategic intelligence units and the enhancement of regular and effective communication and networking among policymakers will play a vital role. Foster the accumulation of experience in specialised government departments and agencies to improve the ability of S&T managers to translate high-level policy orientations into achievable objectives.
- Increase the resources for policy evaluation in government agencies and departments to enhance public accountability. Accordingly, the analytical evaluation base for S&T and innovation policy formulation should be strengthened by including internationally comparable S&T statistics and evaluation practices. Encourage the generation, distribution, and analysis of information in more public organisations. Setting realistic and well-defined goals is important.
- Improve the policy formulation and enforcement of IPR. Reinforce efforts to address regulatory obstacles to doing business (such as administrative burden and lack of transparency) to create a favourable business investment environment for innovation.

(ii) Recommendations for strengthening human resources for innovation

- Allocate sufficient funding for vocational training and upper secondary and tertiary education to promote both the quality and the quantity of the human resources base for technical and research personnel.

- Provide more opportunities to enhance the skills of the S&T labour force through short-term training programmes and part-time tertiary education. Pay more attention to entrepreneurship and soft skills, such as creativity, leadership, and teamwork.
- Use public–private partnerships to encourage businesses to play a greater role in the national effort to develop human resources. Firms, especially state-owned and multinational enterprises, should be encouraged to increase their training investments, fund demand-tailored aspects of formal education, and become involved in decisions about curricula and teaching programme design.
- Improve the quality of management. Competitive and merit-based selection of managers in the business and research sectors is necessary to promote firms' participation in S&T and innovation.

(iii) Recommendations for strengthening the role of the business sector

- Expand public support for enterprises' R&D and innovation to strengthen both R&D capacity and linkages with public research organisations. Improve in-house innovation capabilities, which require skills to engage in design, engineering, marketing, information technology, and R&D at the firm level.
- Nurture the development of the enterprise sector by promoting state-owned enterprise reforms that strengthen the overall business investment environment in terms of competition, access to finance, and administrative requirements. A suitably adapted public–private partnership pilot programme for R&D and innovation could help focus and leverage resources, and improve cooperation between public research and business actors, including foreign firms.
- Encourage enterprises of all types of ownership to invest in S&T, especially in hi-tech and creative industries and their supporting industries. Ensure that Viet Nam retains the policy space to use a range of tax incentives and disincentives to steer investment capital, from both domestic and foreign sources, into these priority areas.

(iv) Recommendations for enhancing the contribution of public research organisations

- Reform the mandates and operations of public research organisations towards a market-oriented approach instead of a mission-oriented one. Restructure ineffective organisations (for instance, through mergers or by dissolving them) to enhance the viability and alignment of research work. During this process, the role of MOST is vital for strategy and policy supervision.

- Strengthen the capacity of public research organisations to attract and retain high-quality personnel. This, in turn, relates to aspects such as payment mechanisms, working conditions, and the availability of research equipment.
- Facilitate the process of institutional autonomy and the self-responsibility of public research organisations. The performance-based allocation of funding may help strengthen research–industry links and the transformation to organisational autonomy.

(v) Recommendations for strengthening S&T and innovation linkages

- Develop and enforce appropriate mechanisms, including incentives to encourage greater collaboration between research organisations and industry and integration with national and international S&T networks, to promote high-tech transfers from foreign firms to domestic ones, especially small and medium-sized enterprises. A major concern is the ability of domestic firms in Viet Nam to acquire such technology from foreign investors. Historical records indicate that without such mechanisms, foreign investors are less likely to transfer technology. The added costs of accessing foreign technologies due to tighter and expanded IPR enforcement in many FTAs and bilateral investment treaties are also of special concern in this regard.
- Encourage the establishment of training partnerships between vocational education providers, universities, foreign-invested enterprises, and domestic firms to bridge the large productivity and quality gaps between foreign-invested and domestic private enterprises. State-owned enterprises could act as intermediaries in such partnerships.

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