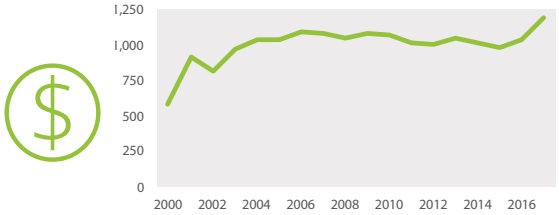
ASTI Country Brief | February 2020

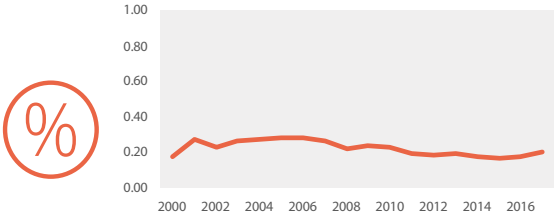
VIETNAM

Gert-Jan Stads, Pham Thi Nguyen, Tran Danh Suu, Alejandro Nin-Pratt, Pham Thi Xuan, Norah Omot, and Nguyen Van Bo

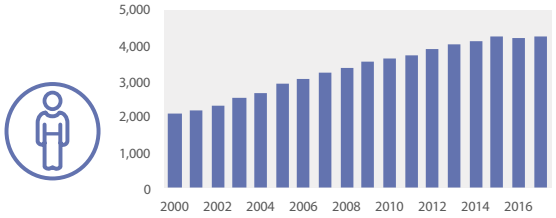
AGRICULTURAL RESEARCH SPENDING



SPENDING INTENSITY



AGRICULTURAL RESEARCHERS

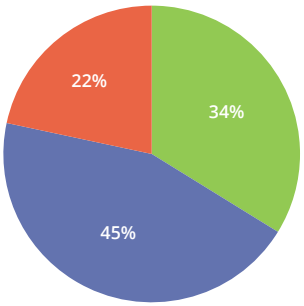


	VIETNAM	INDONESIA	MALAYSIA	THAILAND
Billion dong (2011 constant prices)	1,191.8			
Million PPP dollars (2011 constant prices)	177.6	629.7	629.0	847.2
Agricultural research spending as a share of AgGDP	0.20%	0.17%	0.85%	0.94%
Full-time equivalents	4,250.1	4,289.5	1,543.4	2,911.4
Share of researchers with MSc and PhD degrees	67%	71%	72%	50%

Notes: Data in the table above are for 2017. Research conducted by the private for-profit sector is excluded from this country brief due to incomplete data coverage. Information on access to further resources, data procedures and methodologies, and acronyms and definitions is provided on Page 8. See **www.asti.cgiar.org/vietnam/directory** for an overview of Vietnam's agricultural R&D agencies.

- Agricultural research spending in Vietnam has increased steadily since 2000. Nonetheless, as of 2017, Vietnam only invested 0.20 percent of its AgGDP in agricultural research, which is insufficient to address the multitude of challenges the agricultural sector is facing.
- The country has made considerable progress in building its agricultural research capacity. Average degree levels of scientists have improved markedly over time.
- Recent growth in agricultural research spending and staffing is likely to be reversed in the coming years because the Vietnamese government plans to reduce public research staffing and take steps to stimulate private research and funding.

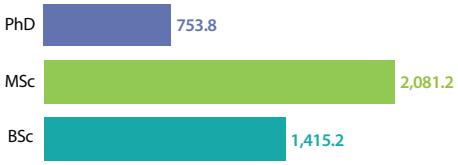
INSTITUTIONAL PROFILE, 2017



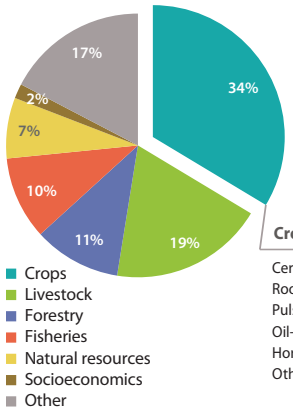
RESEARCHER PROFILE, 2017

By gender (%)

By qualification level (FTEs)



RESEARCH FOCUS, 2017



Crop categories

Cereals	11 %
Roots and tubers	3 %
Pulses	0.5 %
Oil-bearing crops	3 %
Horticultural crops	8 %
Other crops	8 %

KEY CHALLENGE

- Increased R&D efforts by universities and a rapid growth in contract staff at government agencies have prompted an upsurge in Vietnam's agricultural researcher numbers since 2000. However, this uncontrolled growth has led to severe staffing imbalances, with too many young, inexperienced researchers entering the system and a severe lack of senior researchers to train and mentor them. Despite the country's high number of researchers focusing on crops, livestock, forestry, fisheries, and water resources, its agricultural R&D system remains ill-equipped to deliver necessary improvements in productivity, efficiency, and value-added.

POLICY IMPLICATIONS

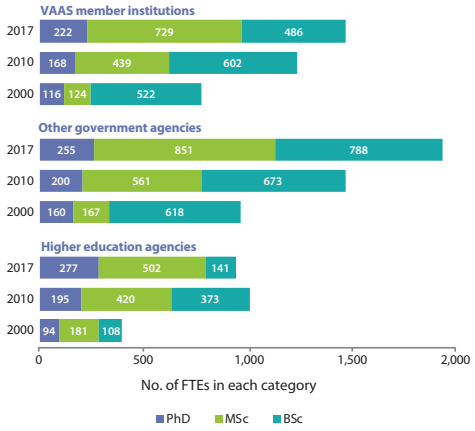
- The government has introduced a number of measures to rationalize the country's imbalanced R&D system, while also improving its responsiveness to the country's agricultural priorities. This has included cutting the number of researchers employed at VAAS's member institutes by at least 10 percent between 2015 and 2021 (primarily by not replacing departing and retiring staff), as well as reducing university admissions into agriculture-related disciplines. Improved research management is needed to address the system's recent haphazard growth and ensure its effectiveness in producing high-value outputs in response to end users' needs.

Vietnam's agricultural research capacity doubled during 2000–2017, and average qualification levels also improved markedly. In 2000, nearly 60 percent of the country's agricultural researchers only held BSc degrees. Large-scale recruitment of scientists with postgraduate degrees, combined with extensive postgraduate training, caused this share to fall to 26 percent in 2017.

CLOSING THE PUBLIC-SECTOR PAY GAP

- Vietnam made considerable improvements to its agricultural research capacity during 2000–2017, both in terms of absolute numbers and average qualification levels. Nonetheless, attracting and retaining qualified staff remains a challenge because salary levels within government agencies are not competitive with those offered by the private sector, both locally and abroad. Nationwide salary reform during 2019–2030 is intended to incrementally introduce parity between the government and private sectors. It will also be important for government agencies to offer other incentives, such as training opportunities, clear career paths, and other benefits, to motivate and retain its younger scientists over time.

Agricultural researchers by degree level, 2000–2017



Notes: Researchers include both permanent and contract staff. Most of VAAS's member institutes and the other government agencies employ high numbers of BSc-qualified staff in official research positions who spend little time focused on research. Researcher numbers are presented in FTEs in order to reflect time spent on research versus nonresearch activities. It was assumed that BSc-qualified researchers at government agencies spend 50 percent of their time on research, and that MSc- and PhD-qualified researchers spend 100 percent of their time on research; scientists at higher education agencies were assumed to spend between 10 and 35 percent of their time on agricultural research.

CAPACITY STRENGTHENING INITIATIVES

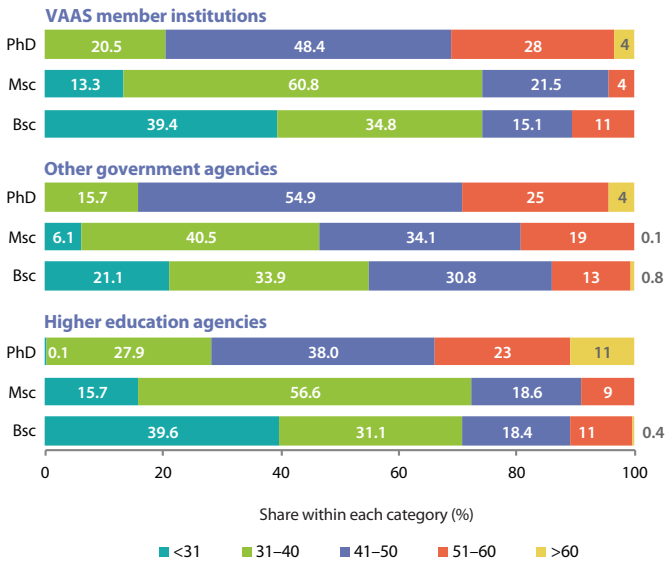
- Historically, researchers employed in the government sector received MSc and PhD training at the institutes where they were employed, but the Ministry of Education and Training recently halted this practice. Such training must now be undertaken at a higher education institution, and recipients must demonstrate a high proficiency in English, as well as a strong record of publishing journal articles. Hundreds of agricultural researchers have benefited from scholarships issued by the Vietnamese government and development partners over the past decade. Key scholarship programs funded by the Vietnamese government include the following:

  - *Project 911 (2010–2020)* funds in-country and overseas MSc and PhD training in agriculture and biotechnology, among other disciplines, for eligible university and research institute staff under the age of 45 years.
  - *Project 599 (2013–2020)* funds civil servant MSc training in a broad set of disciplines, including nanotechnology, postharvest technology, and climate change.
  - ***Mekong 1000 scholarships*** offer young graduates from the southern provinces postgraduate training overseas in a wide range of fields (including agricultural processing, agrochemistry, and biotechnology) with the intention of promoting the industrialization of the Mekong river delta.

Training occurs both in Vietnam and overseas, mostly in Australia, Canada, China, Germany, India, Japan, New Zealand, Russia, South Korea, the United Kingdom, and the United States.

In addition to government-funded training, Vietnamese agricultural researchers have benefited from scholarships funded by bilateral partners and international organizations, such as the Australian Awards Scholarship; the Fulbright Program (United States); the German Academic Exchange Service; the Japanese Ministry of Education, Culture, Sports, Science, and Technology; the Southeast Asian Regional Center for Graduate Study and Research in Agriculture; and the World Bank-funded Support for Autonomous Higher Education project. During 1993–2018, ACIAR supported 49 scientists in obtaining PhD degrees and 26 scientists in obtaining MSc degrees in Australia. In addition, 18 research managers participated in Australian research leadership programs. Many of these individuals have gone on to become leading experts in Vietnam. Although almost all foreign-trained graduates return to Vietnam, retaining them in the Vietnamese research system remains a challenge.

Agricultural researchers by age bracket and degree level, 2017



Vietnam has one of the youngest pools of agricultural researchers in Asia. As of 2017, 56 percent of the country's agricultural researchers were in their 20s or 30s. Although the average age of PhD-qualified researchers is higher, Vietnam is certainly not challenged with an aging pool of highly qualified researchers approaching retirement age, as is the case in many other countries in the region, such as Indonesia, Malaysia, and Thailand. Vietnam's extremely young pool of agricultural researchers actually represents an important opportunity: with well-targeted on-the-job and formal postgraduate training, the country is strongly positioned to build a highly qualified pool of scientists serving a broad spectrum of needs in the decades ahead.

Notes: Researchers include both permanent and contract staff. Researcher numbers are presented in FTEs in order to reflect time spent on research versus nonresearch activities.

PhD-qualified agricultural researchers by discipline, 2017

DISCIPLINE	FTEs			
	VAAS member institutions	Other government agencies	Higher education agencies	TOTAL
Plant breeding/genetics (including biotechnology)	88.2	11.9	37.3	**137.3**
Plant pathology	13.6	3.6	10.5	**27.7**
Plant physiology	6.0	1.4	3.8	**11.2**
Botany	–	1.4	2.5	**3.9**
Seed science and technology	5.0	–	17.4	**22.4**
Other crop sciences	31.6	30.8	41.1	**103.4**
Animal breeding/genetics	0.8	1.8	2.7	**5.3**
Animal husbandry	1.4	–	10.2	**11.5**
Animal nutrition	–	1.6	1.6	**3.3**
Veterinary medicine	–	21.4	11.1	**32.5**
Zoology/livestock entomology	–	–	5.7	**5.7**
Other animal and livestock sciences	–	57.0	2.4	**59.4**
Forestry and agroforestry	–	4.2	16.3	**20.5**
Fisheries and aquaculture	–	23.6	1.3	**24.9**
Soil science	16.0	1.5	10.4	**27.9**
Natural resource management	–	0.1	6.4	**6.5**
Water and irrigation management	–	63.0	24.3	**87.3**
Ecology and biodiversity conservation	0.7	2.5	6.7	**10.0**
Food sciences and nutrition	0.7	9.5	0.6	**10.8**
Socioeconomics (including agricultural economics)	4.7	2.2	26.2	**33.1**
Other	53.7	17.0	38.5	**109.3**
Total	**222.2**	**254.6**	**277.0**	**753.8**

Of the country's 754 FTE agricultural researchers with PhD degrees in 2017, roughly 40 percent were crop scientists, 16 percent were livestock scientists, and 12 percent were water and irrigation management specialists. The country's agricultural R&D agencies employ relatively few fisheries, soil, and socioeconomic researchers with PhD degrees.

Notes: Researchers include both permanent and contract staff. Researcher numbers are presented in FTEs in order to reflect time spent on research versus nonresearch activities.

Number of peer-reviewed publications by government and higher education agencies, 2013–2017

TYPE OF PUBLICATION	GOVERNMENT AGENCIES					HIGHER EDUCATION AGENCIES				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
International journals	141	107	122	133	98	212	243	212	271	180
Asian journals	63	43	21	42	30	89	74	63	115	57
Vietnamese journals	443	493	474	603	589	378	580	640	944	763
Books	20	20	20	14	22	36	27	31	42	65
Book chapters	5	25	8	11	25	–	–	–	6	2
Total	**672**	**688**	**645**	**803**	**764**	**715**	**924**	**946**	**1,378**	**1,067**
Peer-reviewed publications per FTE researcher per year	0.26	0.26	0.23	0.29	0.27	0.98	1.21	1.20	1.85	1.38

Note: Data exclude five government agencies (Center for Technology Development and Agricultural Extension, Vietnam Academy for Water Resources, National Institute for Agricultural Planning and Projection, Research Institute of Aquaculture No 1, and Research Institute for Oil and Oil Plants) and three higher education agencies (Ho Chi Minh City University of Agriculture and Forestry, Hue University of Agriculture and Forestry, and the Faculty of Agriculture and Applied Biology of Can Tho University) for which publication data were not available.

The number of journal articles, books, and book chapters published by Vietnamese agricultural researchers rose during 2013–2017, albeit somewhat erratically. Nevertheless, the publication record of Vietnamese researchers remains low by international standards. In 2017, the average number of peer-reviewed publications was 0.27 per government researcher and 1.38 per university-based researcher (in FTEs).

CHALLENGE

- In 2017, Vietnam's spending on agricultural R&D represented only 0.20 percent of its AgGDP, which is very low given the country's rapid population growth, persistent rural poverty, and low agricultural productivity—all in the context of the adverse impacts of climate change. Given that MARD has reduced its funding for research in recent years, agricultural R&D agencies have been forced to diversify their funding sources.

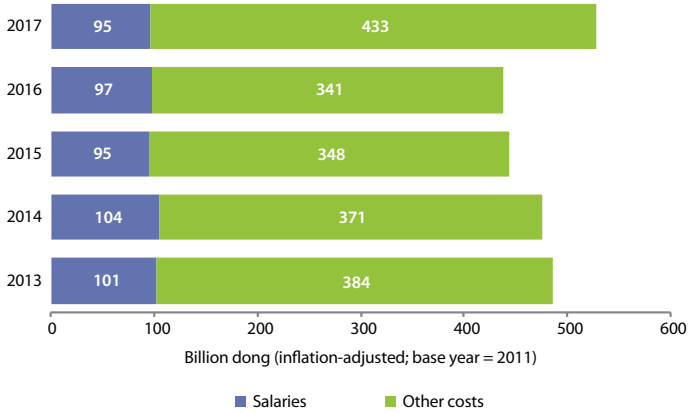
POLICY IMPLICATIONS

- The Vietnamese government has ambitious plans to transform the country's agricultural sector and has passed legislation to create incentives for private investment. Enabling policy, such as facilitating companies' access to credit, and potential measures, such as levies on agricultural exports, are expected to increase research funding; encourage closer collaboration between research performers and agro-industry; and stimulate research on emerging/neglected areas, such as biotechnology, nanotechnology, and postharvest technology.

Expenditures by VAAS member institutions, 2017

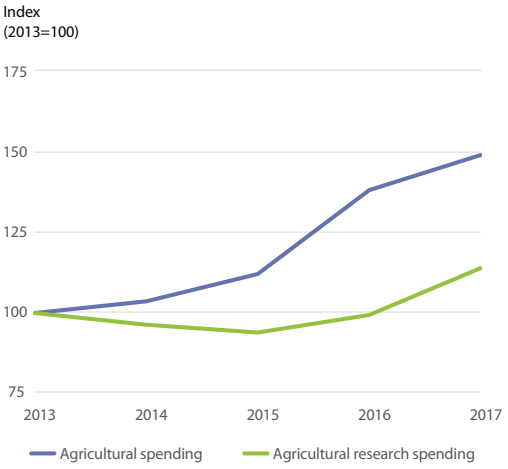
VAAS MEMBER INSTITUTION	Billion dong, 2017 (inflation-adjusted; constant 2011 prices)
Maize Research Institute	60.6
Western Highlands Agro-Forestry Science Institute	57.8
Cuu Long Rice Research Institute	46.1
Soil and Fertilizer Research Institute	44.8
Field Crops Research Institute	39.4
Fruit and Vegetable Research Institute	36.0
Vietnam Academy of Agricultural Sciences (headquarters)	31.3
Institute of Agricultural Environment	28.1
Southern Horticultural Research Institute	27.8
Agricultural Genetics Institute	27.4
Institute of Agricultural Science for Southern Vietnam	25.7
Agricultural Science Institute for Southern Coastal and Central Vietnam	24.4
Northern Mountainous Agriculture and Forestry Science Institute	21.2
Plant Protection Research Institute	14.8
Plant Resources Center	10.8
Vietnam Sericulture Research Center	10.7
Sugarcane Research Institute	7.3
Nha Ho Cotton Research and Agricultural Development Institute	6.4
Agricultural Science Institute of Northern Central Vietnam	4.8
Center for Technology Development and Agricultural Extension	3.1
Total	**528.5**

Breakdown of expenditures by VAAS member institutions, 2013–2017



- Total spending by VAAS member institutions declined somewhat during 2013–2016, in line with MARD's intention to reduce government-sector agricultural research and stimulate private research. Nevertheless, total spending rose in 2017 when greater MOST funding became available under the National Product Development Program to stimulate research on high-yielding rice and coffee varieties and the development of the edible and medicinal mushroom sector. During 2013–2017, salaries accounted for about 20 percent of total spending, and operating costs, program costs, and capital investments for the remainder. The largest VAAS member institutions in terms of spending were MRI, WASI, CLRRI, and SFRI.

Vietnam's total spending on agriculture and agricultural research, 2013–2017



Sources: Data on agricultural spending are from the General Statistics Office of Vietnam (2017); data on research spending are from ASTI (2020).

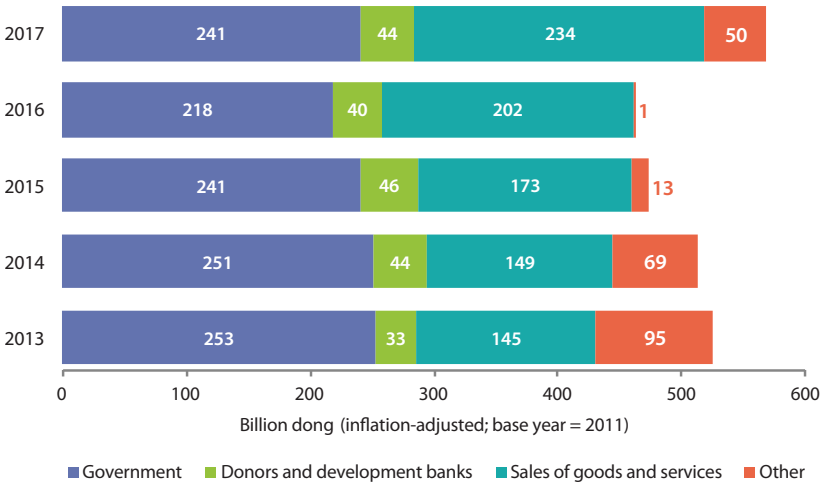
Note: Data include spending on crops, livestock, forestry, and fisheries, and other agricultural areas.

- The Vietnamese government increased its investments in agriculture by nearly 50 percent during 2013–2017. Growth in agricultural research spending during this timeframe was considerably slower. Most of Vietnam's public agricultural expenditures are allocated to the development of large irrigation schemes for land dedicated to cultivating rice (World Bank and Government of Vietnam 2017).

In 2017, public spending in agriculture totaled 44 trillion dong (in 2011 constant prices), whereas agricultural research spending that year amounted to just 1.2 trillion dong (4 percent). Research spending is very low, despite the well-documented evidence of the high returns to such investments in low- and middle-income countries worldwide, especially compared with investments in other agricultural inputs (Avila and Evenson 2010; Fuglie 2012; Alston 2009; Mogues et al. 2012). One of the major contributors to underinvestment in agricultural research is the length of time required for such investments to yield results and, hence, for decisionmakers to reap the political benefit of prioritizing such investments.

Despite the widespread evidence of the positive effects of R&D spending, the Vietnamese government aims to further cut funding to government research agencies and universities. Although the decision to rationalize staffing imbalances in the national agricultural research system is sound, funding for actual research needs to be increased, not decreased, if Vietnam is to succeed in making its agricultural sector more productive and competitive on a global market. Effective targeting of public resources across regions and commodities is vital to accelerate future agricultural growth in priority areas (such as the development of the high-tech farming sector promoted under Decree 57/2018/ND-CP).

Funding sources of VAAS agencies, 2013–2017



▲ During 2013–2017, 47 percent of the funding for VAAS member institutions was derived from government sources, 36 percent was generated internally, and 8 percent was contributed by donors and development bank loans. Government funding is channeled to the agencies through MARD, MOST, or the provincial governments. As a result of the government's decentralization policy, increasing amounts of government funding are being allocated via the provinces.

Since 2005, Vietnam has embarked on a gradual process of giving more financial and managerial autonomy to research institutions, which has demanded that an increasing share of budgets be self-funded through the sale of goods and services. This has led to a proliferation of nonresearch services, such as the production and sale of seed and planting material, as well as consultancies and extension services. As of 2017, 6 VAAS member institutions generated more than half of their total income internally (the Nha Ho Cotton Research and Agricultural Development Institute, MRI, SFRI, WASI, the Agricultural Science Institute for Southern Coastal and Central Vietnam, and the Institute of Agricultural Environment). By 2025, core funding from the government will be further cut, and all VAAS members will be required to self-fund at least 20 percent of their budgets, which will pose a real challenge to some. Similar shifts in the composition of funding are also occurring at non-VAAS government agencies and universities. On the downside, the ability to generate non-research income tends to focus research agencies' attention to areas that are not necessarily high priority or ones that can be better performed by the private sector.

The principal donors to Vietnamese agricultural research are ACIAR, the Japan International Cooperation Agency, South Korea's Rural Development Administration, and a number of CGIAR centers. The Asian Development Bank has provided considerable support for agriculture research since 2000 with loans for the Agriculture Sector Development Program and the Agriculture Science and Technology Project providing US$90 million. Vietnam's agricultural universities are receiving substantial support via a World Bank loan through the Support for Autonomous Higher Education Project (2017–2022), which focuses on strengthening research, teaching, and institutional capacity.

STIMULATING PRIVATE-SECTOR PARTICIPATION IN AGRICULTURAL RESEARCH

▶ Future agricultural growth in Vietnam is likely to be export-led, but the public research community has a relatively poor understanding of value chains and export markets. This has resulted in a disconnect between market requirements and the public research that is being delivered. Vietnam's private sector has traditionally played a relatively limited role in defining the country's research agenda, conducting in-house research, or funding government or university-led research.

In 2012, MARD launched the "Master Plan for Agricultural Production Development through 2020, with a Vision toward 2030," which aims to develop modern, sustainable, and large-scale agricultural production by applying S&T to increase the quality, productivity, and competitiveness of the agricultural sector. As part of this plan, ambitious production and export targets were set for 2020 and 2030. Research plays a critical role in the plan, and the private sector is actively encouraged to enhance its involvement and investment in high-tech agriculture.

Equipped with capital and market experience, private enterprises are increasingly investing in agricultural research. It is difficult to quantify private investment (based on privacy and other factors), but companies like Binh Dien Fertilizer, Hoang Anh Gia Lai Group, Loc Troi Group, Nafoods Group, Que Lam, Thai Binh Seed, TH True Milk, Vinamilk, Vinaseed, and Vingroup, are believed to be the main performers of private agricultural research in Vietnam. Thai Binh Seed has state-of-the-art research facilities and seed-processing infrastructure. The company mostly focuses on rice, but it also conducts research on maize, tubers, and legumes, which has resulted in a considerable number of new varieties in recent years. VINASEED is a strong producer of hybrid seed for rice, maize, and vegetables in Southeast Asia. Binh Dien Fertilizer focuses on improving the efficiency of fertilizer use and mitigating greenhouse gas emissions. Nafoods Group is one of the most innovative fruit and vegetable growers, processors, and exporters in Vietnam; it operates its own R&D institute, which has released a steady stream of new fruit varieties.

KEY CHALLENGE

- Agricultural production and productivity have shown impressive growth since in Vietnam since 2000. The future will be more challenging, however, given (1) falling prices of many of Vietnam's export commodities, (2) the country's low competitiveness in many key commodities due to high production costs and relatively low product quality, and (3) relatively weak linkages between producers and markets.

POLICY IMPLICATIONS

- In order to stimulate future agricultural growth and position itself in global value chains, Vietnam needs to focus on innovation-driven productivity gains. This further entails shifting from a predominant focus on adaptive research to one that takes advantage of targeted R&D. Considerable investment in research, capacity strengthening, and S&T management are required to strengthen and streamline the system. Strong political commitment and improved coordination among ministries, R&D agencies, and the private sector are essential.

New crop varieties released and formally registered in Vietnam, 2013–2018

CROP	2013	2014	2015	2016	2017	2018	TOTAL
Rice	11	13	16	29	49	42	**160**
Maize	1	–	8	12	9	20	**50**
Potatoes	–	7	–	–	5	3	**15**
Horticulture	4	3	7	–	14	30	**58**
Other	4	3	10	9	20	22	**68**
Total	**20**	**26**	**41**	**50**	**97**	**117**	**351**
OWNER							
VAAS member institutions	4	–	3	5	4	14	**30**
Other public agencies	3	4	2	–	16	10	**35**
Individuals	–	–	–	1	6	7	**14**
Vietnamese companies	6	10	20	24	52	56	**168**
Foreign companies	7	12	16	20	19	30	**104**
Total	**20**	**26**	**41**	**50**	**97**	**117**	**351**

Source: Crop Production Department, MARD.

Note: Horticulture includes floriculture; the category "other public agencies" includes both government and higher education agencies.

During 2013–2018, a total of 351 new crop varieties were formally registered in Vietnam, the bulk of which were rice and maize. More than three-quarters of these new varieties were released by local and foreign private companies. The innovative capacity of the government agencies is more limited compared with private entities. VAAS member institutions released a combined total of just 30 new crop varieties during 2013–2018 (24 rice, 3 maize, 2 horticultural, and 1 groundnut variety). A large number of new crop varieties are currently undergoing field trials at various VAAS member institutions (mostly of rice, soybeans, and potatoes).

Vietnam's higher education sector also plays an important role in releasing new varieties and technologies. For example, during 2013–2018, the Vietnam National University of Agriculture released 15 new rice, 4 new maize varieties, 1 new tomato variety, and 1 new cassava variety, as well as various livestock vaccines and advanced technologies.

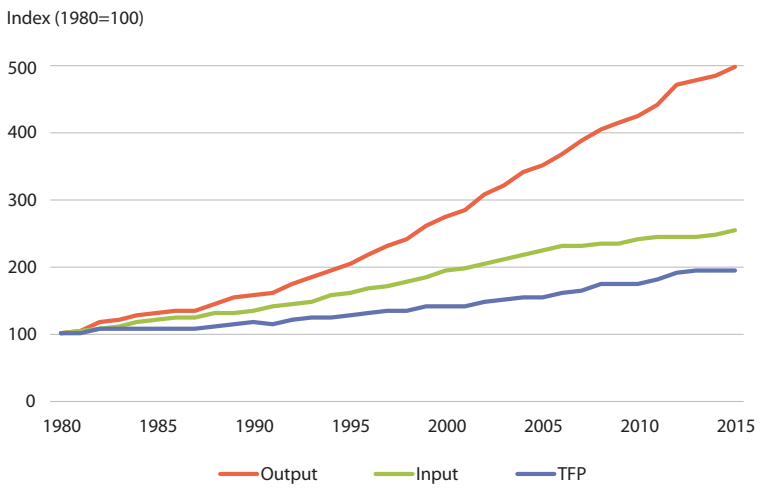
Both the research institutions and universities work closely with the private sector to commercialize the new varieties and technologies they develop. Many varietal patents have been commercially transferred to seed-trading companies. Moreover, some research institutes and universities have mechanisms in place to establish spinoff companies to commercialize products emerging from their research.

AGRICULTURAL PRODUCTIVITY GROWTH

- Increasing total factor productivity (TFP) of agricultural production—that is, getting more output from the same amount of resources—is critical to sustaining agricultural growth in Vietnam. TFP is an indicator of how efficiently agricultural land, labor, capital, and other inputs (seed, fertilizer, and so on) are used to produce a country's agricultural outputs (crops and livestock). TFP is calculated as the ratio of total agricultural outputs to total production inputs, so when more output is produced from a constant amount of resources, TFP increases. R&D activities producing new technologies and innovations are a crucial factor in driving TFP, but technological spillovers from abroad, higher numbers of skilled workers, investments that favor the development of input and output markets (such as roads and communications), and government policies and institutions that promote market development and competition are major factors as well.

Growth in Vietnam's agricultural output peaked at 5.8 percent per year on average between 1991 and 2000. Input growth was responsible for almost 4.0 percent of this growth, and TFP contributed the remaining 1.8 percentage points. This fast growth in the use of inputs (largely in the form of modern technology and capital) set the stage for higher productivity in the following decade. Growth in input use slowed to 1.5 percent per year on average during 2001–2010, but TFP growth accelerated to 2.8 percent per year on average. In recent years, however, agricultural growth in Vietnam has slowed in response to near stagnant input and TFP growth. Future acceleration of agricultural growth will be highly dependent on technical change.

Long-term growth in agricultural input, output, and productivity, 1980–2016



Source: Calculated by authors based on USDA-ERS (2019).

THE PRODUCTIVITY RESPONSE TO HIGHER AND SMARTER RESEARCH INVESTMENTS

Conventional recommendations of agricultural research intensity levels, such as the 1 percent target set by the United Nations, assume that national investments should be proportional to the size of the agricultural sector. In reality, a country's capacity to invest in agricultural research depends on a range of variables, including the size of the economy, a country's income level, its level of diversification of agricultural production, and the availability of relevant technology spillovers from other countries. In efforts to address these nuances, ASTI developed a multifactor indicator of research intensity that comprises a range of weighted criteria (for further details, see Nin-Pratt 2016). Under this approach, countries with similar characteristics (income, size of the economy, and size of the agricultural sector) are deemed to require similar minimum levels of research investment, and investment below that level is interpreted as an indication of potential underinvestment.

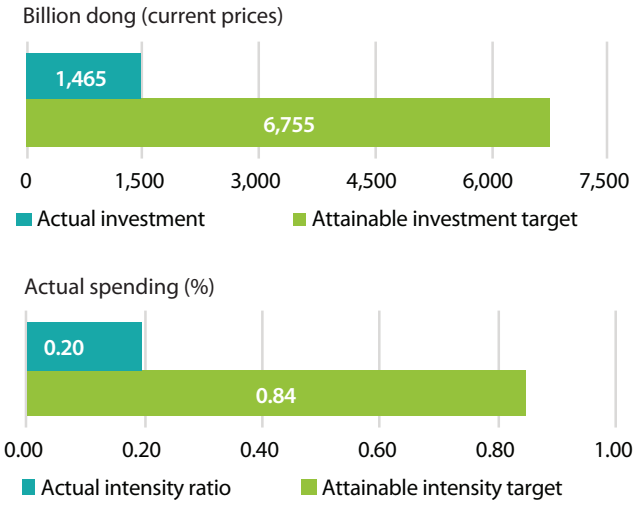
ASTI's indicator of research intensity shows that, despite its investment growth in recent years, Vietnam is still underinvesting in agricultural research. Based on the structural characteristics of the economy and the agricultural sector, the country should be able to invest 0.84 percent of its AgGDP in agricultural research (instead of the 0.20 percent it actually spent in 2017).

What would it take for Vietnam to close the investment gap by 2030, and how would higher agricultural R&D investment affect future productivity growth? In an effort to answer these questions, ASTI ran long-term projections on the impact of historical agricultural research investment on the country's agricultural output and productivity, and on the investments that would be needed to reach future targets. Results indicate that to reach what is considered an attainable target of 0.84 percent investment by 2030, Vietnam would need to increase its research investment by a rate of 11.2 percent per year during 2017–2030. This is very ambitious, given that yearly growth in spending during the 2000–2017 period totaled only 4.0 percent.

ASTI ran long-term projections of the impact of three different future R&D investment scenarios on productivity. The first "business-as-usual" scenario, assumes that investment continues to grow at a yearly rate of 4.0 percent—that is, the actual rate recorded during 2000–2017—and that the allocation of R&D resources across crop and livestock areas remains the same as it was in 2017. A second scenario also assumes investment growth of 4.0 percent per year, but prioritizes export commodities and cash crops: under this scenario, R&D investment in rice, sweet potatoes, coffee, rubber, pineapple, other fruits, nuts, vegetables, and pork doubles during 2016–2030, and investment in other commodities is proportionally reduced. Under the third scenario, R&D investment increases by 11.2 percent per year during 2016–2030 (in order to close the R&D investment gap described above), but the composition of investment remains as it was in 2017 (and as under the business-as-usual scenario).

Results show that shifting investment priorities in favor of export commodities and cash crops increases TFP by 42 percent during 2016–2050, compared with 28 percent under the business-as-usual scenario. Under the third scenario, TFP growth increases to 72 percent by 2050—more than 2.5 times higher than the growth projected under the business-as-usual scenario. These results confirm the validity of the government's plan to transition the country's agricultural sector by increasing innovation, competitiveness, and growing participation of the private sector.

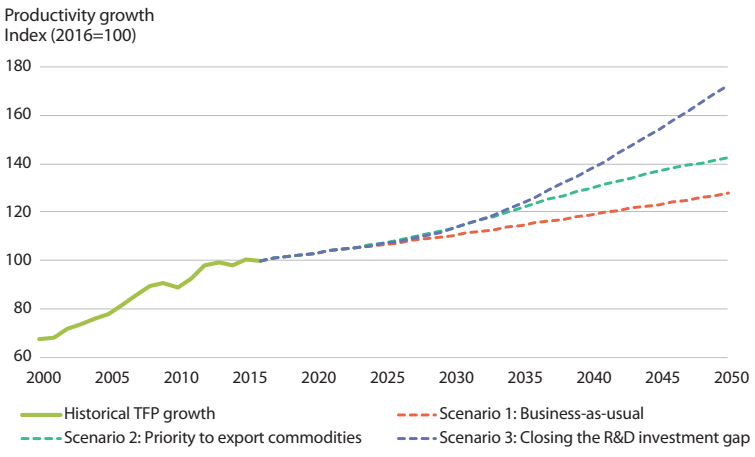
Actual research spending and attainable targets, 2017



Sources: Calculated by authors based on ASTI (2020) and Nin-Pratt (2016)

Notes: Traditionally, agricultural research intensity ratios compare investment and AgGDP levels to determine whether countries may be underinvesting. ASTI's Intensity Index incorporates additional factors that account for the size and nature of a nation's economy and hence facilitate more accurate cross-country comparisons. For more information, see https://astinews.ifpri.info/2017/07/01/a-new-look-at-research-investment-goals-for-ssa/.

Productivity projections under three R&D investment scenarios, 2016–2050

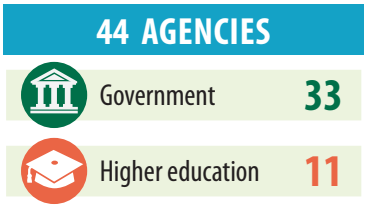


Sources: Calculated by authors based on ASTI (2020), USDA-ERS (2018), Nin-Pratt (2016), FAO (2018), and World Bank (2018).

Notes: Under Scenario 1, investment priorities are the same as in 2017, and yearly investment growth is 4 percent. Under Scenario 2, investment in major export and cash crops is doubled, and yearly growth remains at 4 percent. Under Scenario 3, R&D investment increases by 11.2 per year to 2030, and investment priorities remain the same as in 2017. For more information on the methodology behind these projections, see https://www.asti.cgiar.org/knowledge-stocks and https://www.asti.cgiar.org/tfp-projections.

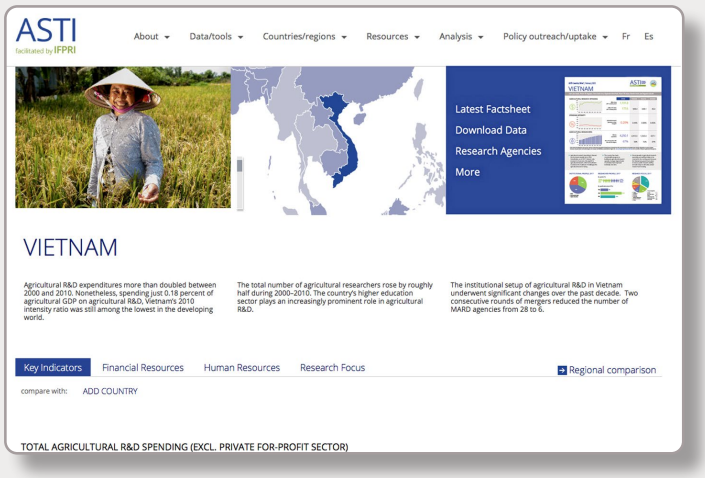
OVERVIEW OF VIETNAM'S AGRICULTURAL RESEARCH AGENCIES

Forty-four agencies conduct agricultural research in Vietnam (excluding the private for-profit sector). More than 75 percent of researchers are employed within 33 government agencies, and the remainder are employed at 11 higher education agencies. VAAS, comprising 19 member organizations, is the main body overseeing crop research. Some VAAS members focus on individual commodities (for example, the maize, fruit, sugarcane, or cotton research institutes), whereas other members have a geographic focus (for example, institutes focusing on the northern mountainous region, the western highlands, or the southern coastal areas). The largest R&D agencies under VAAS in terms of FTE researchers are the Agricultural Genetics Institute (153 FTEs in 2017), the Cuu Long Rice Research Institute (131 FTEs), the Institute of Agricultural Environment (128 FTEs), and the Field Crops Research Institute (118 FTEs). In addition to government crop research institutes, there are 13 noncrop R&D institutes in Vietnam. The largest of these is the National Institute of Animal Science (593 FTEs), which focuses its R&D on poultry, cattle, swine, sheep, and goats. Four government institutes conduct fisheries and aquaculture research (RIA 1, RIA 2, and RIA 3, each with a different geographic focus, and the Research Institute for Marine Fisheries). The Vietnam Academy of Forest Science (284 FTEs) is the main performer of forestry research. Other specialized government institutes focus on rubber, oil plants, water resources, agricultural engineering, and various areas related to policy. The Vietnam National University of Agriculture in Hanoi is Vietnam's main agricultural university. In 2017, it employed 205 FTEs concentrating on research related to crops, livestock, and agricultural engineering. In 2015, the university was moved from the Ministry of Education to MARD, which had a positive impact on its focus on research (as opposed to teaching). Other important universities include the Vietnam National University of Forestry (179 FTEs), Nong Lam University of Agriculture and Forestry (132 FTEs), Thai Nguyen University of Agriculture and Forestry (89 FTEs), and Hue University of Agriculture and Forestry (73 FTEs). The private sector plays an important role in agricultural R&D in Vietnam (see page 5).



For a complete list of the agencies included in ASTI's dataset for Vietnam, visit **www.asti.cgiar.org/vietnam**.

For more information on ASTI's **data procedures and methodology**, *visit* **www.asti.cgiar.org/methodology**; *for more information on agricultural R&D in Vietnam, visit* **www.asti.cgiar.org/vietnam**.



ACRONYM LIST

ACIAR	Australian Centre for International Agricultural Research
AgGDP	agricultural gross domestic product
CLRRI	Cuu Long Rice Research Institute
FTE(s)	full-time equivalent(s)
MARD	Ministry of Agriculture and Rural Development
MOST	Ministry of Science and Technology
MRI	Maize Research Institute
PPP(s)	purchasing power parity (exchange rates)
R&D	research and experimental development
RIA	Research Institute for Aquaculture (Nos. 1, 2, and 3 by region)
S&T	science and technology
SFRI	Soil and Fertilizer Research Institute
TFP	total factor productivity
VAAS	Vietnam Academy of Agricultural Sciences
WASI	Western Highlands Agro-Forestry Science Institute

ABOUT ASTI, IFPRI, APAARI, AND VAAS

Working through collaborative alliances with numerous national and regional R&D agencies and international institutions, ASTI is a comprehensive and trusted source of information on agricultural R&D systems across the developing world. In the Indo–Pacific region, ASTI is facilitated by the **International Food Policy Research Institute (IFPRI)** and the **Asia-Pacific Association of Agricultural Research Institutions (APAARI)**. The **Vietnam Academy of Agricultural Sciences (VAAS)** under Vietnam's Ministry of Agriculture and Rural Development oversees agricultural research agencies performed by 19 agencies located across the country.

IFPRI, APAARI, and VAAS gratefully acknowledge participating agricultural R&D agencies for their contributions to the collection of data and preparation of this country brief. They also thank the Australian Centre for International Agricultural and CGIAR Research Program on Policies, Institutions, and Markets for its generous support of ASTI's work in Vietnam. This country brief has been prepared as an ASTI output and has not been peer reviewed; any opinions are those of the authors and do not necessarily reflect the policies or opinions of IFPRI, APAARI, or VAAS.