AUSTRALIA-WORLD BANK GROUP STRATEGIC PARTNERSHIP IN VIETNAM

Vietnam: Enhancing Innovation System

Vietnam: Science, Technology and Innovation Report

POLICY BRIEF

2020

BỘ KHOA HỌC VÀ CÔNG NGHỆ

WORLD BANK GROUP

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The STI Report is co-task managed by Asya Akhlaque (Lead Economist) from the Finance, Competitiveness and Innovation (FCI) Global Practice (GP), and Kurt Larsen (Senior Education Specialist) from the Education GP starting from July 2019 and prior to that, Dilip Parajuli (Senior Education Economist). The STI Report consists of the Main Report and an accompanying Policy Brief. The main report is authored by Asya Akhlaque, Jaime Frias (Senior Economist), Xavier Cirera (Senior Economist), with skills inputs from Kurt Larsen, Dilip Parajuli, Koji Miyamoto (Senior Economist) and Syd M. Dinlemez (Consultant), and innovation ecosystem inputs from Lien Anh Pham (Senior Private Sector Development Specialist), Anne Lopez (Economist, consultant), Gaurav Nayyar (Sr. Economist), Brian Mtonya (Sr. Economist) and Shanthi Divakaran (Sr. Financial Specialist). Excellent logistical support is provided by Nga Thi Phuong Bui, Huyen Thi Thanh Le, Hoa Chau Nguyen, Mary Dowling, and Susana Rey.

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Rebalancing STI Policies towards Business Innovation

Objective & motivation

The Science, Technology and Innovation (STI) Report provides analytical support for Vietnam's upcoming ten-year Science and Technology Innovation (STI) Strategy 2021-2030 and the Socio-economic Development Strategy (SEDS) 2021-2030. The STI Report and the accompanying Policy Brief have been prepared in response to a request from the Ministry of Science and Technology (MOST). The Policy Brief summarizes the key findings, recommendations, and lays out a STI roadmap to guide priority actions towards supporting business innovation in Vietnam. As the COVID-19 triggered economic shock continues to spread globally and its impact deepens in Vietnam,[1] the importance of technology adoption and innovation for business resilience as well as for productive growth has been amplified.

BOX 1. **Conceptualizing innovation beyond formal R&D**

Innovation is defined as the introduction and adoption of new products, technologies, business processes, business models and ideas in the market, as well as invention of new ideas.

Traditionally, innovation has been viewed through the narrow lens of science, formal research and development (R&D) and inventions. This report conceptualizes innovation more broadly as enterprises adopting existing knowledge that has already been generated as well as new knowledge as salient for enhancing productivity and growth. The potential gains from adoption and diffusion of existing technology are vast, yet paradoxically limited effort is invested by governments, including in Vietnam, to realize these gains.

Source: Cirera and Maloney (2017).

The imperative of an innovation-driven and productivity-led growth model

Vietnam has been a trailblazer in its development success over the last 30 years. Sustained rapid growth averaging around 7 percent since 1988 has led to an almost five-fold increase in its per

1 Vietnam has had impressive success in limiting the human costs of the COVID which is attributed to the effective early action on social distancing and mobility restrictions. At the same time, there has been massive reduction in economic activity as the virus has spread throughout the world - including Viet Nam's trading partners - with countries implementing various forms of lockdown. Vietnam's economy grew by 2.9 percent in 2020 - the lowest GDP growth since the last three decades. Nonetheless, Vietnam is one of the few countries in the world to register positive growth in 2020 (IMF, 2020). While the medium-term outlook for Vietnam is overall favorable, significant downside risks are present due to the negative stronger and longer impacts of COVID, weak external demand and the unfinished structural reforms (EAP Economic update, World Bank, April 1, 2020).

capita income, propelling the economy to middle-income status in just one generation. Driven by trade and investment openness, the country has attracted efficiency-seeking direct foreign investment (FDI) and generated jobs in export-oriented, labor-intensive segments of manufacturing global value chains (GVCs). Today Vietnam is the second largest smartphone exporter, producing over 40 percent of Samsung's global phone products – an embodiment of the success of its growth strategy.

Vietnam is entering its new phase of economic transformation at a time of unprecedented global and domestic headwinds that lend urgency to the agenda of promoting innovation. Building on achievements, Vietnam's ambition is to join the club of upper middle-income countries by 2035 with South Korea, Singapore and Japan as its role models.[2] The challenges of the global slow-down in growth and trade, combined with rapid changes in technologies related to Industry 4.0,[3] have been put into sharp relief by the COVID-19 economic shock.[4] Vietnam remains significantly exposed to economic spillovers from this shock due to its deep integration with the global economy, with manufacturing GVCs and tourism particularly at risk. Restrictions on mobility and social distancing requirements have added a domestic dimension to the economic crisis, threatening large numbers of bankruptcies and job losses, particularly among SMEs in manufacturing, retail, in-person services and accommodation and food services.[5]

Adoption and diffusion of digital and new technologies associated with Industry 4.0 offer opportunities for increased productivity growth and are also critical for building resilience in firms in the face of crisis.[6] Accelerated technological change - particularly the new wave of digitalization, automation, and increasingly sophisticated artificial intelligence - is expected to reshape Vietnam's low-cost labor-intensive manufacturing-led export strategy. Technological disruption in production and distribution processes, nonetheless, will affect different manufacturing sub-sectors at varying speeds, and opportunities are emerging in services as a necessary complement to the success of manufacturing.[7] New business models - as evidenced by the entry of digital platform-based start-ups and "super app" firms[8] like ZaloPay and Momo – along with the increasing attractiveness

2 The *Vietnam 2035 Report* (2016) was jointly prepared by the World Bank and the Ministry of Planning and Investment (MPI), Government of Vietnam. See chapter 3, titled "Building National innovation capacity".

3 These technologies include robotics (particularly artificial intelligence [AI]-enabled); digitalization and Internet-based systems integration (IoT), including sensor-using "smart factories" (that may also be AI-enabled); and 3-D printing.

4 The COVID-19 shock is transmitted to businesses through multiple and mutually reinforcing channels – including falling demand, reduced and disrupted input supply, tightening of credit conditions and liquidity crunch, and rising uncertainty.

5 Refer to i) *Covid-19 and the Labor Market in Vietnam* (ILO, April 21, 2020); and ii) the recent assessment by Viet Nam's Chamber of Commerce and Industry (VCCI, 2020), which was undertaken in 46 provinces and cities, that found that more than 76 per cent of the surveyed enterprises had reduced employee working hours through a range of options - from flexible working hours to, ultimately, layoffs. Vietnam's manufacturing, tourism and transport activities fell abruptly in early 2020.

6 Digital technologies are increasingly ubiquitous and either underpin or form an essential element of most business innovation and technologies.

7 For instance, food, chemicals, wood and paper products still are viable manufacturing sectors for Vietnam, as are ICT services. (Nayyar, G, 2018).

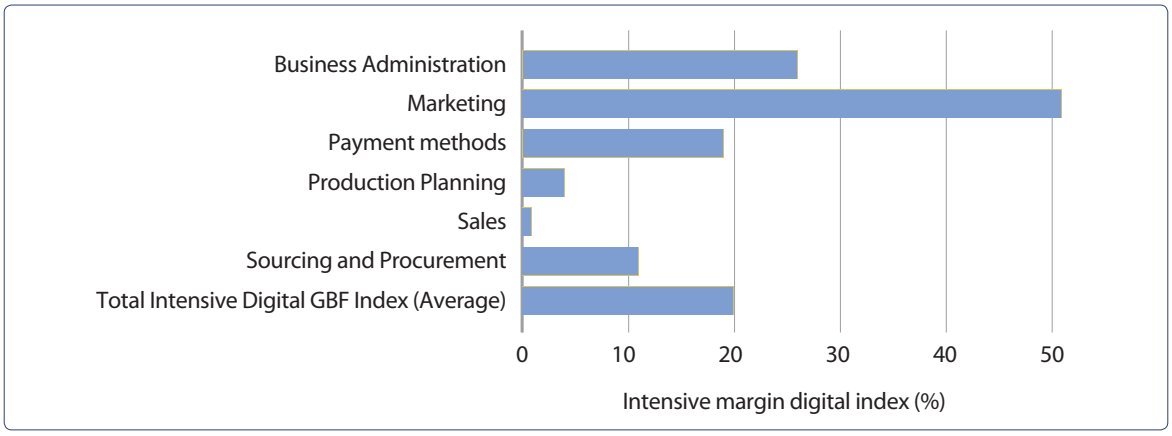
8 The platform-based enterprises usually start by providing one service and then progressively add an ecosystem of services for users – thus called "super app". For instance, ZaloPay is a mobile payment application launched in 2017 but is built on top of Zalo, the most popular messenger app in Vietnam, launched in 2012. Momo is a Fintech startup that allows customers to make cash transfers, pay bills, and resolve person loans, and has moved into purchasing services i.e. e-commerce.

of Vietnam as a destination for Venture Capital and Private Equity (VCPE) investors, are promising.[9] The COVID outbreak has demonstrated the need to step-up the pace of adoption and diffusion of technologies, new business models and digital solutions to support business flexibility and growth[10].

Large room for improving business innovation and digitalization

There is significant scope to improve innovation in domestic firms, especially SMEs. The vast majority of domestic firms in Vietnam are small and medium enterprises (SMEs) representing 98 percent of the total and half the workforce.[11] Twenty percent of SMEs export which is attributed to lack of scale, technology and business sophistication that is needed to boost productivity for market expansion. There is significant room to improve firm performance through technology adoption and diffusion in Vietnam. Focusing on adoption of digital technologies, a recent technology adoption survey (2020) indicates that on average across different business functions only 20 percent[12] of firms use fully digitized processes to perform general business functions (GBF) – that include marketing, payment methods and production planning to sales and supply chain management, sales - in Vietnam (figure 1).[13] There is a lot of room for improvement in terms of digitalization across different functions and tasks of the firm. For example, while most firms in Vietnam have access to online sales, only 1 percent of those firms that sell directly to consumers use some digital sales method more *intensively* than other methods, either social platforms or (most often) their own website. This is reflected in a

FIGURE I. **Digitalization of general business functions in enterprises in Vietnam**



Source: Cirera, Comin, Cruz and Lee (2020).

9 VC funding tripled from $205mn in 2016 to $889mn with 92 deals in 2018. Refer to S. Divakaran and Akhlaque A. (2019), *Vietnam Venture Capital Industry and Angel Investing, World Bank.*

10 Since the first COVID-19 case was reported in Vietnam, the leading e-commerce site Tiki has seen an explosion in the number of purchase orders, and big retailers have seen a dramatic increase in online sales. https://zingnews.vn/

11 Akhlaque, and Lopez A. 2017.

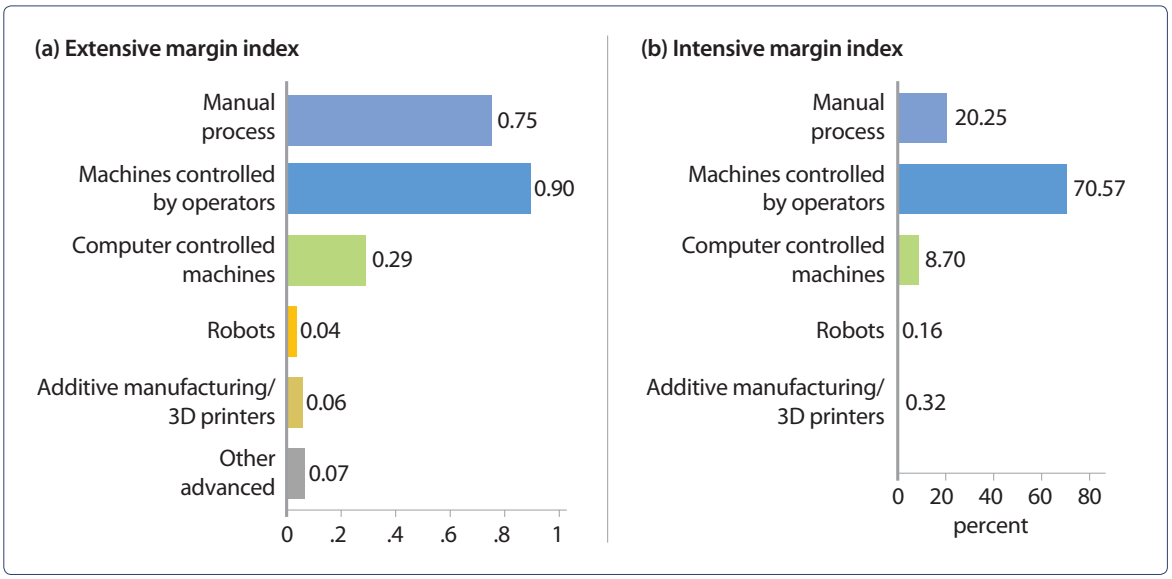
12 A comparable index in the state of Cará in Brazil is 42 percent.

13 The index of digital readiness tries to capture the extent of digitalization of the different business functions of the firm. A firm can be digital in several tasks. For example, a firm can undertake sales online and also manage the supply chain digitally. Capturing the intensive margin, the index ranges between 0 and 1 where a value of 1 for sales corresponds to all sales undertaken on online platforms or own website. (Source: Technology adoption survey for Vietnam, WB, 2020).

digital index of only 0.1 for sales.[14] On the other hand, 51 percent of firms use digital technologies for marketing and advertisement. Looking ahead, Vietnam will need to substantially improve its level of readiness to embrace digital technologies and more flexible manufacturing, as the recent challenges associated to the COVID-19 shock are clearly manifesting.

The digital gap persists when it comes to automation in manufacturing. Perhaps as expected, given the low costs of labor, a miniscule number of firms in Vietnam use technologies associated with Industry 4.0 – for example, robotics or 3D printing. Fig 2 shows the extensive margin (i.e. what technologies are being used) in panel (a) and the intensive margin (i.e. the main and most intensive-used technologies) in panel (b). Given that only 29 percent of firms use machines controlled by computers – i.e. digital technology of Industry 3.0 - and only 8.7 percent use this technology intensively is a matter of concern. The results show a significant distance to the technological frontier and dampens down the prospects of leapfrogging. Firms in Vietnam need to continue accumulating innovation capabilities, first by upgrading processes to the use of digital technologies and then to more sophisticated Industry 4.0 ones. The dividends of doing so can be very large.

FIGURE 2. **Intensive and extensive margin in technologies used for fabrication in Vietnam**



Source: Cirera, Comin, Cruz and Lee (2020).

Redoubling the resolve towards regional integration and diversification.

While the slowdown in global economic activity and trade flows remains a risk for Vietnam, there are opportunities for new growth pathways for Vietnam. Being one of the most open economies in the world and well-integrated into GVCs, Vietnam's economy is potentially vulnerable

14 Part of the explanation for the low uptake is because most of e-commerce transactions in Vietnam are in cash (90%) as compared to 51% for Indonesia and 48% for Malaysia, The potential of digital payments needs to be tapped by expediting the process of developing regulations to allow for non-bank agents to operate in the Vietnamese payments landscape.

to rise in protectionism and continued China-trade war. On the upside Vietnam is strongly positioned to benefit from its decision to deepen regional integration through multiple new trade agreements – CPTPP, EVFTA, ASEAN and RCEP – that offer new growth pathways through diversification of trade flows, markets and products. The ongoing US-China trade tension has presented an opportunity for Vietnam to attract foreign firms that want to move their operations from China to countries such as Vietnam to access the US and global market.[15] Changes in trade (including increased demand for services) and technology offer Vietnam opportunities beyond manufacturing, particularly ICT and other services.

The evolving COVID crisis has exposed the growing reliance of global trade on supply chains that provide inputs from China. Given its integration into GVCs, Vietnam has been affected from supply chain disruptions. Vietnam is an economy that "imports to export", and firms involved in GVCs generally keep "just- in- time" inventory. In the short term, the current disruption in the supply chain of inputs from China represents a threat to Vietnam's economy due the reduced availability of inputs in factories. In the medium to longer term, this could be an opportunity for Vietnam to encourage GVCs to reduce and manage the risk of having their supply chains dependent on factories in China by positioning Vietnam as a competing FDI location for such input suppliers. This would require Vietnam to move from the present low skill assembly manufacturing to higher skilled value-added manufacturing.

Realizing potential opportunities depends on Vietnam's determination to embrace the new challenges and expedite the pace of unfinished policy and institutional reforms. *Vietnam 2035 Report (2016*) laid out the policy direction to strengthen Vietnam's national innovation system (NIS) and the STI policy framework to help the country transition towards a productivity-led and an innovation-driven growth model (Box 2).

In undertaking the analysis, the following three questions are addressed:

- What progress has been made towards meeting the broad directions set out in the 2016 *Vietnam 2035* report in terms of strategic shifts in the STI policy framework and its implementation?
- What are the remaining critical gaps within the NIS – from the demand and supply side - that are hindering Vietnamese firms from improving their capacity to adopt technology and innovate? In light of global shifts that have become more acute with the evolving COVID-19 crisis, are there new policy areas that deserve attention?
- What are the priority recommendations, and how can solutions be devised?

15 https://www.forbes.com/sites/warrenshoulberg/2019/10/16/us-finally-succeeds-in-vietnam-as-more-companies-move-sourcing-there/#1a6eecae4a4e

BOX 2. **Vietnam 2035 - Key strategic shifts and broad areas of reforms**

Vietnam 2035 Report (2016) emphasized that to achieve a productivity-led and innovation-driven growth model:

- Enterprises should be placed at the center of innovation policies as the primary users of knowledge, rather than the current bias towards R&D.
- Given Vietnam's weak and evolving NIS, moving "towards the technological frontier" - through adoption and diffusion of technology from abroad or MNCs - should be the priority, rather than "pushing out the frontier" (through invention). Incremental innovation has the potential for generating the largest productivity gains for Vietnam.

To tackle the demand and supply side weaknesses of the NIS in Vietnam, four broad areas of reforms are laid out:

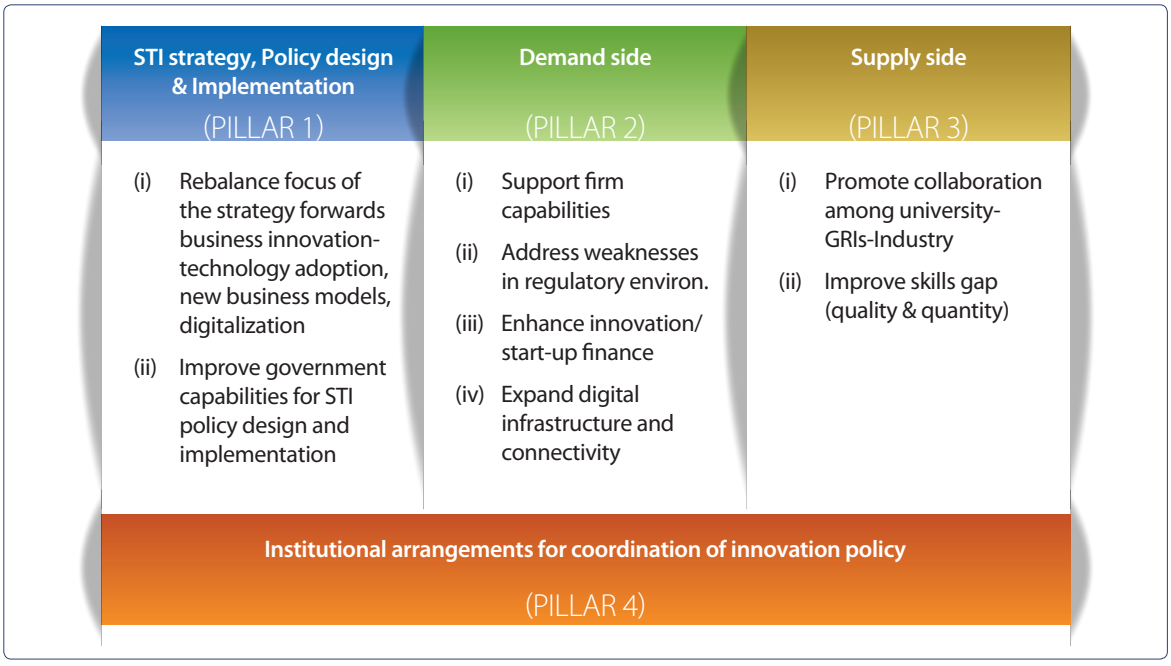
- Addressing constraints in the operating business environment, including unnecessarily restrictive regulations, limits on competition, economic distortions, inadequate innovation and the limited availability of start-up finance.
- Improving firm capacity for technological learning, starting with adoption and eventually invention.
- Improving the quantity, quality and relevance of workforce.
- Raising the quality and relevance of R&D quality and knowledge production.

This policy brief summarizes the key findings and recommendations for the highest priority policies and institutional reforms (based on the analysis in the main report), to inform the upcoming STI Strategy 2021-2030 and the (SEDS) 2021-2030. The analysis deploys the expanded National Innovation System (NIS) framework (Cirera and Maloney, 2017), which presents a systematic view of the demand and supply policies and institutions that enable innovation. Supply side knowledge capabilities, in the form of human capital and R&D institutions, need to evolve and be matched by adequate absorptive capabilities on the demand side i.e. the firms. The framework recognizes the critical role of the government in resolving market and coordination failures as well as the strategic oversight of the innovation system.

Key findings and policy recommendations

Drawing on the analysis, four pillars of reform are identified. Figure 3 captures the key areas of reforms that are needed to reset the new STI strategy towards business innovation and technology adoption. Annex 1 summarizes the current gaps in Vietnam's innovation system that inform the priority actions.

FIGURE 3. **Vietnam: Reset new STI Strategy towards Business Innovation**



Source: Authors' elaboration.

Vietnam's STI policy framework

The STI policy framework needs to shift to support business innovation and technology adoption

The current STI policy and its implementation remain biased toward applied R&D-based innovation with limited focus on non-R&D based business innovation, including adoption and diffusion of existing technologies. The evidence shows that the current STI policy and its implementation is not yet fully aligned to the *Vietnam 2035* recommendation of promoting adoption and diffusion of technology among enterprises. This is manifest through multiple channels:

- ***Resource allocation bias.*** First, the analysis indicates that there is a resource allocation bias towards R&D promotion programs which aims at generating new technologies rather than moving "towards the technology frontier" through adoption and diffusion of existing technology for a wider pool of firms. It is worth noting that some of programs under MOST (national technology innovation programs) contain features that promote technology application and dissemination. However, these activities are not the focus of these programs. Furthermore, the funding of activities that promote R&D-based innovation dwarf that of programs promoting

non-R&D based innovation. There is thus a disconnect between the Vietnam 2035 policy direction and the STI framework. Much more investment is needed in building technological and managerial capabilities to help improve the absorptive capacity of enterprises.[16]

- *The portfolio of innovation policy instruments is narrow, and implementation remains limited.* Second, support instruments currently deployed are too narrow to facilitate technology adoption.[17] Specifically, grants and tax incentives are the most common supporting mechanisms - accounting for more than 50% of the value of the portfolio in 2017. Promoting spillovers and linkages requires active instruments to develop the technological capabilities of potential local suppliers and the flow of knowledge spillovers from MNEs to domestic firms, policies to build the necessary skills, and high-quality engineering departments with incentives to commercialize and work on contract research or on collaborative R&D programs with some of these MNEs. Entrepreneurship and market access– key priorities for the Government - were also found to be underrepresented in the policy mix.[18]
- *Program beneficiaries are tilted towards large firms.* Third, programs appear to focus on a small number of very large MNE firms as beneficiaries. There is a lot of investment in attracting high-tech companies, but not much on maximizing their spillovers to smaller, domestic enterprises.

Investing in government capabilities and competencies to formulate and implement innovation policy

Good design and implementation are central to policy effectiveness. The design and implementation of STI programs in Vietnam is far from using best practices.[19] Even when the right priorities are well identified, the effectiveness of innovation policies largely depends on the quality of design and implementation. If program managers are unable to design instruments that are adequate for the problem they want to address - for example, providing a tax incentive when resolving the innovation problem requires technical assistance, or when implementation is hampered by burdensome application procedures - it is unlikely that these interventions will achieve the desired impact. In Vietnam, key areas of competencies that need to be developed in innovation related ministries/agencies include the ability to follow a logical framework in designing programs, effective M&E systems, and the accumulation of knowledge related to STI instruments for innovation.

Assessment of the national innovation system in Vietnam

Remaining gaps in the NIS need to be addressed to enable businesses to adopt technology and new business models

16 There are a few programs that seem to be promoting technological upgrading among SMEs e.g. the national technology innovation program and the national industry support program (based on the decree 111/2015/NĐ-CP), the program to promote a science and technology market in Ho Chi Minh City 2016-2020, and the S&T Market Development Program until 2020. However, most of these programs are in their inception phase or have very little funding.

17 According to the policy effectiveness review (PER) analysis, policy instruments that support collaboration, and the building of managerial and technical capacity, remain underrepresented in the current policy portfolio.

18 In 2017, less than 1% of the budget was devoted to support young technology startups (and only 7.4% of the value of the portfolio excluding the tax incentive programs).

19 Frias J. and X. Cirera (2019), Vietnam PER, World Bank.

Vietnam has made progress in tackling weaknesses in the demand and supply elements of the national innovation system (NIS) but the pace and quality of reform is mixed. Over the years, Vietnam has implemented a series of reforms, from reducing the cost of doing business[20] and strengthening the intellectual property (IP) protection legal framework, to piloting demand-driven business advisory services for facilitating FDI-SME linkages.[21] As Annex 1 shows more concerted and urgent action is needed to address the remaining weaknesses in the NIS to support firm upgrading and innovation. The unfinished reform agenda includes improvements on the *demand side* – i.e. building firm capabilities for technology adoption and addressing constraints in the policy environment, as well as strengthening complementary factors related to innovation finance and expansion of digital infrastructure and connection; and on the *supply side* – i.e. addressing human capital constraints. Lastly, more work is needed to strengthen government capabilities to formulate and implement effective innovation policies, as discussed above.

Strengthen institutional arrangements for coordination of innovation policy

Given the inherently complex and multi-sectoral nature of the innovation process, effective coordination is needed across a range of institutions. Figure 4 lays out a diverse set of institutional arrangements that are needed for executing innovation policy, underlining the imperative of coordination. When looking at institutional functions along the stages of the policy life cycle (Angelleli et al. 2017), at least four sequential but iterative steps can be distinguished: i) formulation of innovation strategies (long-term policy aspirations), ii) design of innovation policies, iii) innovation policy implementation and supervision, and iv) deployment of innovation instruments and innovation activities. It is also necessary to add the non-sequential functions of coordination and planning, given their importance in the context of innovation policy.[22]

The institutional structure and governance of STI in Vietnam is fragmented, with multiple players and limited coordination. The Ministry of Science and Technology (MOST) plays the lead role in the formulation of the STI strategy and has been given the responsibility of overall management of S&T activities at the national level (Decree No. 95/2017 / ND-CP). In this role, MOST is mandated with formulation and monitoring implementation of the S&T strategy and coordinating the budgetary process. However, this arrangement does not appear to be effective when the scope of policy extends beyond the realm of S&T to include non-R&D based innovation among firms. Other challenges that hamper coordination include the lack of consistency among different laws that impact innovation,[23] and the involvement of multiple institutions in the design and implementation of innovation programs. There are also limited mechanisms for regular consultation with the private sector to help inform policy design and provide feedback on program effectiveness. There is thus substantial scope for strengthening coordination across multiple levels and programs in Vietnam.

20 This is reflected in Vietnam's improved ranking in the *Doing Business index* which has jumped to 70th place in 2020 from 104th in 2007 (World Bank, 2020). The *Doing Business index* provides an important metric for the cost of doing business for enterprises as it measures the regulatory costs and time taken to interface with government.

21 The business advisory services program is a key component of the supplier development program under the *Vietnam Private Sector Development Project* that is jointly being implemented by the WBG with Ministry of Industry and Trade. The objective is to facilitate linkages between domestic firms and MNCs in electronics and automobiles GVCs.

22 World Bank (2020).

23 For instance, the State Budget law and the financial law are not always aligned.

FIGURE 4. **Multi-sectoral nature of innovation makes coordination essential**

Function \ Scope	Innovation skills & Human Capital	Research and development	Innovation	Enterpre-neurship	Enterprise development	Investment and trade
Coordination & Strategic planning	National Planning Agencies / Ministries of Finance					
Strategy formulation	National Councils (Public and Private)					
Policy design	Education / Labor ministries	Science and technology ministries	Economic development and production ministries			Line ministries (Trade / Investment)
Implementation	Science and technology agencies		Innovation (and entrepreneurship agencies		Other complementary agencies	
Deployment of instruments and activities	Universities HE & VTEs	R&D institutes / Universities	Intermediaries / firms and entrepreneurs			

Focal Comlementary

Source: Adapted from Angelleli, et al. (2017)

Turning priority reforms into actions

Seizing opportunities and tackling challenges require consistent and urgent action

As the Government prepares its new SEDS, 2021-2030 – and the STI Strategy 2021-2030 – it is an opportune time to reshape the country's development trajectory towards an innovation-driven model. Vietnam can learn from other countries who have transitioned to this model. This section discusses how the reforms can be operationalized. Good practice examples from other countries who have tackled similar reforms are provided. Table 1 below provides a summary of priority actions in terms of the road map as well as the timeline, while Annex 1 captures the full gamut of actions that are needed to strengthen Vietnam's NIS for improving innovation outcomes.

TABLE 1. **Vietnam National Innovation System - Priority Reform Actions**

Issue	Sequencing actions (Implementing agency)	
	Short-term	Medium term
Pillar 1: Re-orientation of the STI Policy and Development Framework		
• Current STI Strategy biased towards R&D • Resource allocation skewed and portfolio of program instruments narrow that neglects support for non-R&D business technology adoption and diffusion	• New STI Strategy to reflect business technology adoption and diffusion as a key priority • Rebalance resource allocation and broaden policy instruments for supporting SME-MNE linkages; collaborative R&D programs with MNEs; entry of technology firms	• Invest in government capabilities to formulate and implement innovation policies • Set up monitoring and evaluation system for tracking program implementation, and undertake impact evaluation of selected policies for strengthening outcomes

TABLE 1. **Vietnam National Innovation System - Priority Reform Actions (cont)**

Issue	Sequencing actions (Implementing agency)	
	Short-term	**Medium term**
Pillar 2: Improving Business Environment and Complementary Factors *(demand-side)*		
• Weak firm capabilities esp. managerial skills and organizational practices deter technological adoption and diffusion	• Introduce new policy instruments that can be used directly by firms & equipping them with management capabilities for using and/or generating technologies; for e.g. Business Advisory Service (and Technology Extension Service • Attract skilled Vietnamese from abroad to fill the managerial/ skills gap	• Design and roll-out a new technology transfer program and strengthen university-industry collaboration mechanisms • Seek public-private sector collaboration in providing relevant skills
• Dynamism of domestic enterprises hampered by regulatory and doing business environment	• Introduce appropriate regulations to implement Government Resolution 02 that aims to accelerate regulatory reforms particularly, starting a business, and exit of non-productive firms	• Reform the insolvency law to introduce simplified procedures for SME insolvency provisions, introduce a framework for out-of-court workouts, and enhance the role of commercial courts
• Access to innovation and start-up finance deter entry and growth of technology firms	• Support investment readiness programs that improve CEOs/ founders business management and leadership skills, networking and matchmaking • Further reform regulations on secured lending to encourage Vietnamese banks to move away from traditional real estate secured lending and develop more movables financing	• Stimulate the supply of early stage finance using public capital in the stage with the largest market failure i.e. pre-seed and seed stage. • Continue to reform the insolvency law and the secured transactions regulations to further promote movable collateral in lending to SMEs and startups
• Digital Infrastructure and connectivity need to be enhanced in businesses to realize the promise of Industry 4.0	• Incentivize firms to use digital infrastructure (computers; on-line platforms, cloud services) • Provide advisory services to facilitate the upgrading of technologies across firms	• Deepen the data ecosystem, including regulatory framework, data security, and privacy to promote use of technology and knowledge flow

TABLE 1. **Vietnam National Innovation System - Priority Reform Actions (cont)**

Issue	Sequencing actions (Implementing agency)	
	Short-term	**Medium term**
Pillar 3: Enhancing Skills and Knowledge *(supply side)*		
• Human Capital: Skills Gaps (poor quality of skills) and skills shortages (inadequate quantity of workforce with required skills) are major constraints for engaging in/investing in firms' innovation practices	• Develop a national skills development strategy in the education and training systems for (a) re-skilling of current workforce (stock) and (b) investing in skills of new cohorts (flow) • Incentivize enterprises, TVET institutions, and universities to partner on investing in continuous learning and training through design and implementation of more relevant and innovative curriculum and pedagogy, work-based training (internships)	• Strengthen the national qualification framework to make Vietnam's education and training system more transparent so that students, workers and employers better understand the required qualifications for the type of occupations and tasks envisaged • Integrate socio-emotional skills into curriculum and extra-curriculum programs in primary, secondary, and tertiary education
• **University/GRI-Industry** research linkages are weak: enterprises rarely find public sector R&D a useful source of knowledge for their innovative activities	• Strengthen University/GRI-Industry partnerships by scaling up existing and introducing new innovation funding schemes targeted for joint/collaborative research and innovation projects between universities/GRIs and enterprises • Establish organizations dealing with market and technology brokerage, technology agents, and centers for leasing and contracting manpower for science and technology activities	• Rebalance public funding at universities and GRIs based on national priorities and performance-based funding. • Establish a better incentive system to encourage innovative research at universities/GRIs and allow them to keep the revenues from commercialization of the research results
Pillar 4: Strengthen Institutional Coordination and Partnership across Public-Private Stakeholders		
• Governance of STI is fragmented with multiple players and limited coordination • Systemize private sector consultation for policy design, and feedback loop	• Improve inter-agency coordination mechanisms • Seek private sector inputs on a systematic basis to develop demand-driven policies	• Evaluate the pros and cons of setting up an innovation agency vs. a high-level coordination mechanism • Establish a community of practice with key stakeholders to create "feedback loops" to strengthen design and implementation of policies

PILLAR 1: STI strategy, policy design and implementation

Rebalancing the focus of the new STI strategy and policy mix towards firm capabilities and upgrading

Looking ahead, the Government needs to formulate and implement a STI strategy with a clear pillar on technology adoption. First, there should be increased focus on promoting adoption of existing technology and non-R&D based innovation, rather than the current bias towards R&D. This would mean recalibrating the financing and not to halt the funding of instruments that foster applied research. A recalibrated STI strategy towards technology adoption would introduce more policies and instruments that support absorptive capacity and upgrading, aligning to the different maturing stages of firm life. The key program focus should include management extension; technology extension; linkages to high-tech MNEs; collaborative R&D programs with high-tech MNEs; and early stage technology-based companies. Beneficiaries should be expanded to a wider number of domestic firms with potential for scale up, digitalization, adoption of new business models and developing linkages with FDI. However, before designing any program, policymakers need to understand the market failure and demand for policy support, and accordingly define the segment of potential beneficiaries that demand support and present some propensity to absorb the technology and yield additionality. It is not about picking winners but about improving targeting and avoiding capture by some public institutions and firms.

Investing in government capabilities to formulate and implement innovation policy

Adopting good practices in the design and implementation of policies is critical for effectiveness and achieving impact. In this regard, building the competencies of technical staff in relevant innovation agencies in the design and implementation of innovation programs is critical. Having up-to-date knowledge about appropriate instruments also is important. In the short term, capacity building initiatives can be undertaken to train program managers to develop logical frameworks when designing a program and to set up monitoring and evaluation systems. In the medium term, undertaking rigorous impact evaluation of selected policy instruments would be valuable to draw lessons (See Annex 1 for details).

PILLAR 2: Demand side - the firm

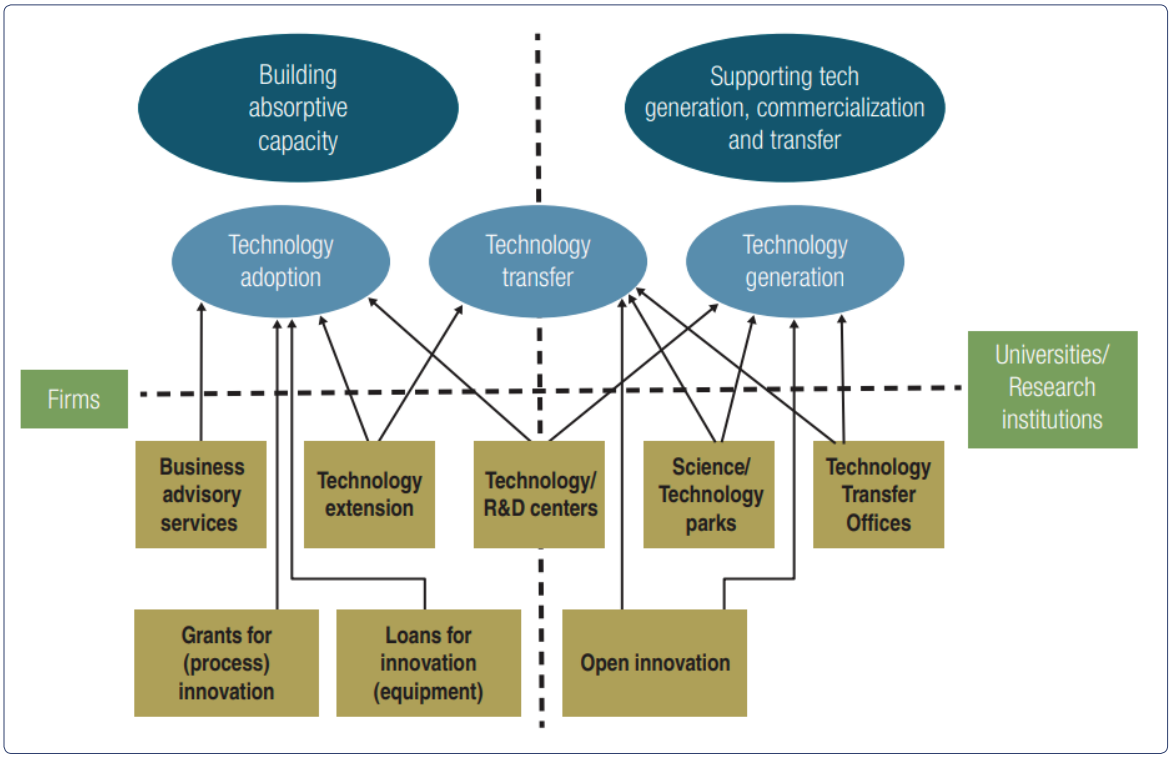
Building firm capabilities should be a priority for promoting access to new technologies

Firm capabilities matter for improving innovation and technology adoption in Vietnam. Successful adoption of a new technology is not just about purchasing machinery but requires integrating that machinery into the full production and business processes of the firm. This is particularly important for SMEs, which must be able to adjust rapidly to evolving markets and changing circumstances but are often limited by knowledge, expertise and financial constraints. Support to SMEs thus needs to start with improvement of more basic managerial and organizational practices, which will enable them to use and adapt new processes, and to proceed to more sophisticated technological knowledge associated with Industry 4.0 further along. Bridging the capabilities gap is just as important for the absorption of new technologies in manufacturing processes as it is for the development digital services.

How can firm capabilities be supported?

Countries have successfully deployed an array of instruments – along with complementary policies - for building firm capabilities and non-R&D activities that in turn facilitate adoption and absorption of technology. At one end of the spectrum, governments want to promote technology upgrading among SMEs by building firms' absorptive capacity (Cohen and Levinthal, 1990) and providing information and know-how on how to adopt new technologies. At the other end is the objective of transferring and commercializing new technologies from universities and Public-Research Institutions (PRIs). As figure 5 indicates, there are multiple instruments that can be used directly in equipping firms with the capabilities of using and/or generating technologies. These include business advisory services (BAS), technology extension services (TES), technology centers, and tech transfer offices. Specifically, BAS focuses on building absorptive capacity for technology adoption, while TES focuses on helping SMEs to adopt technologies.

FIGURE 5. **International Experience – Instruments to support firm capabilities and technology**



Source: World Bank (2020). A Practitioner's Guide to Innovation Policy.

There is considerable heterogeneity in the models for BAS and TES. For example, Malaysia's Cradle Investment Program 300 (CIP300) is a conditional grant under the portfolio of the Cradle Fund. It provides financial assistance of up to RM300,000, with a range of value-added assistance, including coaching and mentoring, matchmaking with investors and Cradle's partners, business advisory services, and media and public relation support. Tables 2-4 provide good practice examples of how countries have deployed a range of policy instruments that have successfully built SMEs capabilities to facilitate technology adoption and diffusion. These can help inform the design of similar programs in Vietnam.

TABLE 2. **Supporting technology adoption in SMEs using vouchers - example of Korea**

Program definition	Case: Vouchers for exporters in Korea
Instrument: Vouchers are small non-repayable grants allocated to non-innovative SMEs to purchase services from external knowledge providers. The main objective is to induce non-innovator SMEs to start collaborating with knowledge organizations and knowledge providers. Vouchers are often entitlement-based rather than competition-based, and they typically require light management with effective auditing	The program supports SMEs by providing export vouchers that list programs in various categories (since 2017 with the budget of 14 mill. U$). All services listed on the service menu are available for all participants regardless of the program engaged. All services are co-financed by SMEs as well to avoid moral hazard, promote accountability and leverage financial resources.
Justification • Voucher schemes aim to address capability failures faced by smaller firms by inducing behavioral changes towards more proactive learning and sustainable collaboration with knowledge providers • There is often severe information asymmetry between knowledge providers (particularly public-sector research organizations) as suppliers of innovation knowledge and SMEs as potential users	**Intervention** Depending on the level of export experience, the voucher program is structured along the following stages: • Preparation stage: translation of webpages and data in foreign languages; optimizing design; education on trade and marketing • Beginning stage: marketing through media/ SNS; support for global market research and matchmaking; participation in exhibitions • Contract stage: checking buyer's credit, writing a contract paper; managing export distribution • Global expansion stage: support to build local branches; consulting on M&A
Evidence • The bulk of the existing evidence draws upon evaluations and surveys of voucher programs in Europe • The review of the evidence detects project additionality and some positive impact on sales and value added in the short-run (Cirera et al, 2020). Behavioral additionality is detected in follow up projects, evidence of a change of attitude towards collaboration, and spillover effects (an improved firm public profile after collaboration with universities). For knowledge providers, benefits included introduction to new research areas, commercial opportunities, and new teaching opportunities	**Design recommendations (Do's)** • Take stock of supply/demand for knowledge services and have 'accredited' providers • Design simple application and selection procedures • Define the range of services covered • Design (small) voucher amounts • Adopt proactive advertising to reach SMEs that are not typically targets for support • Set up brokerage services • Have strong audit function to reduce fraud

Source: Cirera et al. (2020); Yong-Seok Choi, Professor, Kyung Hee University (2019).

TABLE 3. **Managerial extension/business advisory - example of Colombia**

Program definition	Case: Group Management Extension in Colombia
Typically includes direct specialized advice in management strategy, business functions (marketing, financial management, sales) and legal aspects of a business. This type of instrument addresses key absorptive capacity issues, since adopting a new technology is not only about purchasing machinery but also about integrating it into the full production and business processes of the firm.	• The program congregates groups of firms to enhance the efficiency of the intervention. • In Colombia (Iacovone et al, 2018), groups were assembled comprising 3 to 8 firms located in the same region, such that members are not direct competitors to one another, but are instead producing complementary products with similar management problems.
Justification • SMEs owners have trouble identifying what their constraints are and how to overcome them. • SMEs do not have the same access as large firms to information networks, universities, national laboratories, field experts, technical information and know-how, so they face higher search costs. • Firms are unlikely to have the in-house expertise to solve problems and work through the change process. • SMEs tend to operate in isolation and with little access to networks. • Information and advisory markets are not well-developed.	**Intervention** • Leaders from the firms in a group signed an agreement to work together and help each other improve. • The group treatment model was compared to an individual consulting model on a cost-benefit basis and appears to offer a promising approach to scaling management. • Like the individual treatment, the group treatment began with training classes that covered theoretical aspects of management.
Evidence • When designed appropriately, developing country interventions have had significant impact on performance (output additionality), at least in the short term. • Some programs have experienced a few issues with SME take up rates, particularly when the interventions were delivered by government agencies (lack of awareness problems, delayed implementation, etc.)	**Results** • Both approaches led to improvements in management practices of a similar magnitude (8-10 percentage points), so that the new group-based approach dominates on a cost-benefit basis. • The group-based intervention led to increases in firm size over the next 1.5 years, including a statistically significant increase in employment, while the impacts on firm outcomes are smaller and statistically insignificant for the individual consulting. **Design recommendations (Do's)** • Conduct market and feasibility analyses before launching programs. • Ensure that appropriate resources are available to build program awareness. • Have high-quality delivery staff. • Ensure that managers are versed on technology.

Source: Cirera et al. (2020); Yong-Seok Choi, Professor, Kyung Hee University (2019).

TABLE 4. **Supply chain development program – case of Chile**

Program definition	Case: Supplier development program in Chile
Supply chain development (SCD) programs support firms in upgrading product quality and processes with the objective of linking them with existing large buyers, often MNEs. They help link supply and demand within global value chains by scoping opportunities and assisting suppliers and potential suppliers to upgrade so that they can meet the demands of large buyers.	• The program sought to promote mutually beneficial, long-term commercial relations between large buying potential exporters and their small and medium-sized enterprise (SME) suppliers, with the goal of increasing competitiveness. **Intervention** • Program was launched in 1998 and motivated by the trade agreements signed by Chile that created the need for compliance with international production standards by Chilean exporters and potential exporters. The intervention was led by CORFO (Chilean agency), and included: - Provision of information on linkage opportunities (information exchanges). - Matchmaking – through active arrangements between buyers and suppliers. - Provision of tax exceptions and subsidies to promote training and technology transfer. **Results** • An evaluation was able to identify the beneficiaries of the program and to construct a pool of potential control firms. Both groups benefited from the coordination efforts. But suppliers were found to increase their sales, the number of workers they employ and the salaries their employees received, while also increasing their sustainability or survival capabilities. The program also increased the sales of large firms and raised their ability of becoming exporters (Arraiz, et al 2011). **Design recommendations (Do's)** • Ensure that there are high-quality program managers to interact effectively with large and small companies. • Customize the instruments to suit the industry/firm-specific needs (such as specific industry standards). • Utilize group activity and incentivize peer learning as much as possible. • Use performance-based model, firms that demonstrate improvement and capacity building deserve ongoing support.
Justification • SDPs are commonly used to facilitate linkages between domestic SMEs and foreign investors, or other large firms present in the country. • The justification of programs that support supplier development typically rests on the need to address coordination problems. For example, the channels for communication between foreign investors and domestic SMEs is not smooth, and frequently face challenges driven by work standards, organizational practices and business culture.	
Evidence • The evidence of supplier development programs in developing countries is not ample, and thus we are unable to come up with conclusive statements about the effectiveness of these programs. • The impact evaluation of a Chilean program demonstrated results in the form of increased revenues, additional employment, increase in wages, and increased survival of SMEs (Portugal, 2018). In a study of the PROVEE (supplier development) program from Costa Rica, effective between 2001 and 2014, revealed that during this period, the intervention led to 126 new product and service linkages per year.	

Source: World Bank (2020). A Practitioner's Guide to Innovation Policy.

PILLAR 2: Demand side - business environment and complementary factors

More needs to be done to improve the operating environment and complementary factors

Vietnam 2035 recommended strengthening regulatory policies, removing distortions and promoting a level playing field through improving the regulatory framework for competition in Vietnam. In recent years, Vietnam has made efforts to improve its regulatory environment as captured by the World Bank's *Doing Business Report* (World Bank 2020). However, the pace of reforms may have slowed down compared to its regional peers in the last couple of years as indicated by DB indicators.[24] Impediments nonetheless remain, affecting firms' incentives to innovate as well as firm entry, expansion and exit. With regard to starting a business, Vietnam ranks 115th- behind Singapore (4th), Thailand (47th), and China (27th) - underlining the unfavourable business environment for entrepreneurs who are agents of innovation. In addition, due to the lack of a level playing field, domestic private enterprises are unable to compete effectively against SOEs. The continued heavy presence of SOEs in certain sectors, particularly those that provide important input services to other firms, is a key constraint. SOE reform is identified as a top priority in Government policy resolutions, but implementation remains slower than expected.

Intellectual property right (IPR) protection enforcement is instrumental for fostering innovation and technology adoption.[25] To encourage MNCs to share their technologies with local firms as well as enable them to undertake R&D in Vietnam, without the risk of property rights infringements, an effective IPR protection system and its sustained implementation is critical. An IPR protection regime that is consistently enforced is also more likely to attract venture capital and private equity firms to Vietnam to help tech start-ups scale up.[26] As Vietnam continues to deepen its regional integration through new free trade agreements (FTAs) - like the CPTPP, EVFTA, ASEAN and RCEP – the agenda has gained urgency as these agreements commit the country to higher levels of IPR protection enforcement standards.[27]

Vietnam has made progress on its IPR protection legal framework, and multiple efforts are underway in combating violations. In April 2018, new Guidelines for Certain Number of Articles of the Intellectual Property Law and Law on Amendments to the Intellectual Property Law 2009 in Terms of Copyright and Related Rights entered into force.[28] In October 2018, Vietnam's Market Surveillance Agency was upgraded to the General Department of Market Surveillance under the

24 According to the World Bank's Ease of Doing Business (2020), Vietnam's ranking slightly declined from 68th in 2018 to 70th out of 190 countries, and remained well below Singapore (2nd), Malaysia (12th), Thailand (21st) and China (31st).

25 IPR protection spans multiple categories and includes patents, copyrights and related rights, industrial property rights and rights to plant varieties, enforcement, and membership and ratification of international treaties.

26 Refer to www.uschamber.com/ipindex, Global Innovation Policy Center.

27 For instance, the EU-Vietnam Free Trade Agreement that was signed on 30 June 2019 and is now in the process of ratification includes a substantial IPR chapter in which Vietnam has committed to a high level of protection, going beyond the standards of the TRIPS Agreement.

28 Decree No. 22/2018/ND-CP Decree No. 22/2018/ND-CP of February 23, 2013, on Guidelines for Certain Number of Articles of the Intellectual Property Law and Law on Amendments to the Intellectual Property Law 2009 in Terms of Copyright and Related Rights, available at https://wipolex.wipo.int/en/text/472667

Ministry of Industry and Trade, inter alia, to improve the fight against IPR infringements.[29] In 2019 the Law Amending and Supplementing a Number of Articles of the Law on Insurance Business and the Law on Intellectual Property (Law No. 42/2019 / QH14) was approved.[30] The government has recently approved an "Intellectual Property Strategy until 2030" that aims to develop a comprehensive and effective intellectual property system in Vietnam.[31] According to latest official data on administrative IPR violations, the number of cases have fallen from 2954 in 2017 to 1811 in 2018.[32]

More effort is needed towards IPR protection enforcement. Currently Vietnam's IP protection ranking stands at 105th out of 141 countries, well behind Singapore (2nd), Malaysia (25th), South Korea (50th), Indonesia (51th), China (53rd) and Philippines (55th), according to the latest Global Competitiveness Report (GCR, 2019). Third parties' reports and assessments of IPR protection in Vietnam, while noting improvements in Vietnam's IPR legal framework in terms of bringing it in line with international standards, express concern with the lack of IPR enforcement and adequate coverage of on-line enforcement of copyrights.[33] Vietnam also remains an important producer and trader of counterfeit goods in many sectors.[34] Areas of improvement and action include:

- *Online enforcement of copyrights:* The weak enforcement of the legal framework has led to increased copyright piracy and domain name infringements. To address this issue, implementing regulations must be amended to accommodate enforcement of IPRs in the online environment as well as strengthen capacity to underpin enforcement efforts against infringing websites and their owners. In addition, regulations and guidelines on the responsibilities of intermediary service providers, such as the provision of "notice and take down" measures, must be developed and applied.
- *Criminal enforcement:* The current enforcement heavily relies on administrative proceedings. Vietnamese law allows for IPR criminal lawsuits, but implementation faces numerous obstacles due to a dearth of specific rules and procedures to guide investigations, prosecutions and adjudications of criminal proceedings in IPR infringement cases. This has posed challenges for IPR criminal enforcement, and copyright piracy remains rampant. Also, sanctions against infringers have an insufficient deterrent effect and there is still a lack of trained IP officials, including in the customs authorities. More generally, Vietnam's IPR enforcement system has

29 Decision No. 34/2018/QD-TTg dated 10 August 2018 of the Prime Minister, providing for the functions, tasks, powers and organizational structure of the General Department of Market Management directly under the Ministry of Industry and Trade. Provincial-level market surveillance departments are expected to be established under this department.

30 This Law was passed on June 14, 2019 by the National Assembly in shortened order and procedures to timely reflect the obligations to be the CPTPP which came into effect in Vietnam from January 14, 2019.

31 Decision No. 1068/2019/QD-TTg dated 22 August 2019 of the Prime Minister. The IP strategy covers all stages of creation, establishment, protection, and enforcement of IP rights, creating an environment to encourage innovation, meeting international integration requirements, making intellectual property become an important tool to enhance national competitiveness; and includes IPR policies on copyright, related rights, industrial property rights.

32 Refer to 2018 Annual Report on IP activities, Intellectual Property Office of Vietnam, MOST. Along with the 39% decrease in IP violation cases, there was a concomitant increase in total amount of fines. Infringements were still found mostly in trademarks, accounting for 97.8% of the cases and 99.1% of the total fines.

33 For example, refer to EU's: https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc_158561.pdf, and US's: https://ustr.gov/sites/default/files/2019_Special_301_Report.pdf.

34 Refer to 2019 OECD-EUIPO report Illicit Trade - Trends in Trade in Counterfeit and Pirated Goods of 2019.

remained highly complex and the capacity weak, which makes it challenging for right holders to take effective and efficient action against IPR infringements. Vietnam should improve IPR enforcement standards and related procedures and make IPR dispute resolution mechanisms simpler and more accessible, to motivate enterprises to utilize them. China, facing similar challenges, has strengthened IPR enforcement through the launch of specialized IP courts. Among other things, this entails adjustments to IP court procedures, such as strengthened specialized enforcement units, and applying more significant fines and sanctions for non-compliance.[35]

Improving the availability of innovation and start-up finance. Innovative activities are inherently risky and generally entail investments in intangible assets that have limited collateral value, due to difficulties in gauging their proper financial value and the high transaction costs in dealing with them. Equity financing (angel investors and venture capitalists), rather than debt, is thus generally considered better suited for funding activities in industries where investments in intangible assets are relatively large and informational concerns are severe (such as biotechnology, computer software, etc.). In case of "routine" start-ups (such as restaurants, retail outlets, etc.), they are relatively easy to monitor by conventional financial intermediaries.

Despite rapid credit growth, access to innovation finance remains a constraint. Firms continue to require different means of financing as they move from one phase to the next in their life cycle. Vietnam has some representation in most phases of the start-up life cycle; however, it remains small. This is attributed to both demand and supply side issues. On the demand side, many firms are unable to produce business plans to seek out funding and lack investible ventures that indicate capacity to grow. Moreover, many incentives remain "on paper" as cumbersome guidelines, so that the administrative burden involved impairs access. Regulatory mechanisms are unable to catch up with innovation start-up development and serve as barriers rather than facilitators on the supply side.

The development of capital markets, as a complement to banking, has been on the radar screen of policy makers. Vietnam is a potentially dynamic startup market. Driven by the country's position as a vibrant growth hub, rising middle class and young demographics, it is an increasingly attractive emerging market destination for Venture Capital and Private Equity (VCPE) investors. The year 2016 was an inflection point of growth for Vietnam's Venture capital (VC) industry as reflected by the significant VC funding that tripled from year-end 2016 at $205mn to $889mn with 92 deals in 2018. In 2018, in a high-profile venture capital exit, Yeah1 -- an entertainment group and investee of DFJ VinaCapital -- was listed on the Ho Chi Minh City Stock Exchange (HSX). The recent expansion in bond and equity markets notwithstanding, the outstanding market value of these markets remains low compared to peers in the region, suggesting that there is still ample room for growth. Programs that increase the availability of innovation financing should also work with intermediaries to ensure investees possess the technical capacity to utilize the capital effectively. In Korea, credit guarantees for innovation have been used successfully (see Table 5).

35 See Innovate China: New Drivers of Growth (2019), World Bank Group and Development Research Center of the State Council, The People Republic of China.

Some policy options include:

- Supporting the development of the capital markets requires a continued focus on creating the eco-system that includes a sound legal and regulatory framework, relevant financial products, diversified investors and improved governance, disclosure and infrastructure and better coordination among government agencies.
- Reform the insolvency regime and the secured transactions regulations to further promote movable collateral to be used by SMEs and startups.
- Amend regulations to allow new debt-related financial instruments suitable for innovation.
- Review the matching grants process and administration to reduce the burden for potential applicants.
- Enhance access to innovation finance through credit guarantees for innovation (Table 5).

TABLE 5. **Credit guarantees for innovation – case of Korea**

Program definition	Case: Technology Financing in Korea
Loans and loan guarantees are instruments for debt financing to support business innovation, typically targeting SMEs, although large firms can also be targeted. Credit guarantees can cover a portion of the losses experienced by lenders extending credit to firms investing in innovative projects, when firms default on loans. It applies exclusively to assets that have been explicitly covered under its provisions, in return for a fee. Credit guarantees become relevant in the late phases of the innovation cycle when risk is lower.	Korea Technology Finance Corporation (KOTEC) provides technology innovation-oriented SMEs with an evaluation of their technology and its marketability. **Intervention** In Korea, including KOTEC,11 public institutions are designated as Technology Credit Bureaus for evaluating firms' technology. Based on the technology evaluation, KOTEC's Technology Credit Guarantee Program has been operating to provide financing opportunities for SMEs' that have insufficient tangible collaterals but have promising technologies. **Results** While the evidence for additionality of credit guarantees for innovation is limited, results from implementation suggest that this instrument can lead to tangible results, particularly for SMEs with insufficient or intangible assets as collateral that remain credit constrained[36]. As indicated earlier, access to finance for innovation in the EAP region remains an issue, and the use of credit guarantees for purposes other than innovation is widespread (Cirera et al, Forthcoming). Other attractive features include the ability to leverage financial capital
Justification • Imperfections in financial markets • Information asymmetry • Lack of collateral of SMEs	
Evidence • Evidence of the profile of participants is mixed, with some programs featuring older firms (20-years-old on average, CDTI in Spain) while others feature younger firms (less than 5 years old on average in Korea's KOTEC). Most programs showed higher take up from exporters in high-tech sectors and who owned intangible assets, such as patents. CEO education was also linked with higher amounts of guarantees.	

36 Input additionality evidence suggests 30-82% incremental lending value, and about 25%increase in percentage points in the probability of investing in R&D.

TABLE 5. **Credit guarantees for innovation – case of Korea (cont.)**

Program definition	Case: Technology Financing in Korea
• Input additionality of lending seems positive and robust, with the majority of schemes reporting between 35-68% in incremental loan value. Evidence on additionality of R&D investments is scarcer, but at least one program showed an incremental 25 percentage points in the probability of investing (CDTI), and in technologically advanced firms (KOTEC).	from the market, reduce the burden on the government budget (balance sheet) and improve financial records for borrower SMEs. Notwithstanding, the dissemination of this instrument for specific purposes of innovation has not been widespread (Korea and Spain represent 2 case studies featured in the forthcoming innovation policy instrument guide). **Design Recommendations (Do's)** When designing these schemes, policy makers should: • Promote and advertise credit guarantee schemes (CGS). • Provide financial and operational independence to • Provide transparency and disclosure of public funding available, rules, procedures, arrangements. • Build an adequate governance structure for the credit guarantee schemes

Enhancing digital infrastructure, connectivity and access is a necessary condition but not sufficient to realizing the promise of the digital dividends. While the diffusion of internet has been increasing rapidly in Vietnam access to fixed broadband is available to only about 12 percent of the population.[37] Clearly, the digital infrastructure is a necessary but not sufficient condition for the use of digital technologies.

Firm level investment of digital technology infrastructure in Vietnam remains low as indicated by the digital enabling index.[38] The index measures the average investment compared to a situation of full use of digital infrastructure – from cloud services to computers – and ranges between 0 and 100 where a value of 100 indicates complete access of each digital enabler. The enabling index for Vietnam suggests that on average firms are operating at 38 of the full digital infrastructure index.[39] While on average internet infrastructure is at 75 of having full internet infrastructure, the access/use to digital platforms is only 27 of potential and 4 for cloud services (Figure 6).[40]

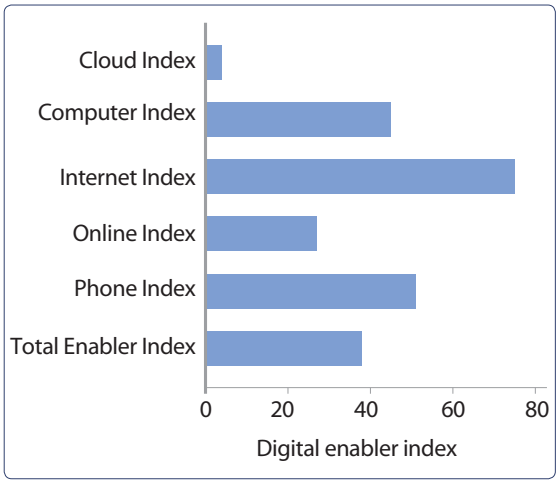
37 Refer to Vietnam ICT White Book 2018, which states that 58.14% of Vietnam's population had access to internet (page 14). At the same time, Vietnam fixed broadband subscribers only accounts for about 12% of the population (page 29). Also, in 2017, 47.9% of the population had a subscription for mobile broadband Internet access (3G&4G) (Page 29). This may indicate that Vietnamese use broadband access primarily for entertainment (news reading, social networks) rather than work.

38 The digital enabling index is a composite index that measures the extent of firms access to cloud services, computers, internet, online platforms and phone. The index uses for each of these general-purpose digital technologies a composite of indicators that measure the number of firms that have access to these technologies with the share of use per worker. For example, phone coverage index measures the extent to which firms have phones and mobile phones and the use per worker. The infrastructure pertains to general purpose technologies and includes access/use of internet, computers, stock of phones and use of cloud services, and on-line platforms. Source: Technology adoption survey for Vietnam (World Bank, 2020).

39 As a point of comparison, the index value in one of the lagging states in Brazil (i.e. Ceara) is 55. More comparison data points will be available when similar surveys are completed in other countries.

40 For the case of cloud computing this also corresponds to the percentage of firms using cloud services, 4%.

FIGURE 6. **Vietnam – Digital enabling index**



Source: Cirera, Comin, Cruz and Lee (2020).

Strengthening this digital infrastructure will enable the use of new technologies to adapt to new business models. For instance, mobile payment systems are an increasingly integral part of ensuring services can be embedded in goods. This will be an important complement to the Industry 4.0 agenda. ASEAN has witnessed significant growth in the use of financial technologies (FinTech) to offer new ways of delivering financial services. The development of a data ecosystem, including regulatory frameworks to support cross-border data flows, will also become increasingly important. With an increasing emphasis on the use of data processes in production, issues relating to intellectual property rights, data security, and privacy must be addressed, in line with international best practices, for firms to adopt these data-driven technologies.

Pillar 3: Supply side - skills & knowledge

Skills

Employees need a range of cognitive, socio-emotional and technical skills to engage in more innovative and complex production. While job-specific technical skills are identified as very important skill, a range of cognitive skills (including problem-solving, oral and written communications) and socio-emotional skills (ability to work independently, and teamwork) – are also key skills for engaging in innovation practices. With respect to socio-emotional skills, evidence suggest that adolescence and early adulthood period is actually a malleable period, and interventions such as apprenticeships have shown to be highly effective in enhancing communication, collaboration and organization skills, when delivered well. Policies to foster socio-emotional skills should take into account the skills development across the lifecycle and integrate socio-emotional skills into curriculum and extra-curriculum programs in primary, secondary, and tertiary education.

Skills gaps (poor quality of skills) and skills shortages (inadequate quantity of workforce with required skills) are major constraints for engaging in/investing in firms' innovation practices. The World Bank Enterprise Survey on Innovation and Skills shows that a large proportion of firms report difficulties hiring employees with the required levels of managerial and leadership skills (73 percent), socio-emotional skills (53 percent), foreign language skills (58 percent), and technical and vocational skills other than IT skills (68 percent). The survey also reveals that firms with employees with (a) average literacy proficiency level of 3 and above, and (b) higher levels of socio-emotional skills - 'engaging with others' and 'managing emotions', are much more likely to engage in innovation practices.

Today's youth have attained a higher level of education, but the workforce at large lacks sufficient education and a balanced set of skills. Only 8 percent of the current labor force in Vietnam has a university education and this share is expected to only marginally increase in the next 30 years, reflecting a low level of current enrollment and slow future expansion. Vietnam should make a major effort to increase adult and continuous learning including the enrollment and the quality of tertiary education. Tertiary education institutions will have to pay attention to 35, 45 and 55-year-olds, not just 20-year-olds. This requires significant changes in the way institutions and the system function. Without a massive increase in the workforce with a higher level of skills in all the three dimensions mentioned above, Vietnam will not be able to get the basics right for an improvement of its national innovation system. The country needs to increase the quality and relevance of its TVET and tertiary education system to (a) re-skill the current workforce (stock) and (b) invest in skills of new cohorts (flow). This can be done by bringing enterprises (employers) to a larger extent into the skills development system. Employers can usefully work with the tertiary education institutions to improve the relevance of curriculum, implement innovations in pedagogical practices, introduce student internships to facilitate students' school-to-work transitions.

Government should revisit its roles as a steward and facilitator for education (quality assurance, autonomy and accountability, LMIS) and Financier (performance-based, co-financing grant, student aid). This entails designing consistent and effective policies, providing appropriate incentives, information, working with many different public and private partners and capacity building to alleviate the many disconnects observed in the tertiary education sector. Today's skills needs cannot be met solely by the current practice in the education and training sector which includes programs that target a narrow set of population and limited coherence across life stages. Instead, Vietnam should provide a range of skill development opportunities across a broad population for continuous learning, which will involve a larger set of actors and will change the roles of the education and training sectors.

Vietnam needs a comprehensive national skills development strategy that: (a) invests in all three broad skills types – cognitive, socio-emotional and job-specific technical skills; (b) builds and implements a national skills standards framework and a national qualification system; (c) develops a well-articulated strategy for expansion of tertiary education within and between the university (overseen by MOET) and the TVET (overseen by MOLISA) sub-sectors as well as through increased private sector provision; and (d) establishes meaningful partnerships between TE institutions and enterprises in renovating and delivering the curriculum towards 21st century skills and innovating learning/pedagogy practices towards more active/blended learning through the use of disruptive technology where appropriate, and through work-based/project-based training such as internships and apprentices.

There are several additional initiatives that can be taken in the short-term (1-2 years) and longer term (3-5 years) as part of the national skills strategy:

Short-term:

- Design and pilot output-based financing for TVET institutes and universities, with enhanced autonomy and accountability (output can be number of graduates with relevant skills) and

hand-over the institution-based learning to TVET institutes and universities via greater autonomy and accountability in the design and provision of their services;

- Provide policy support and incentives for private sector to invest in (internships and ICT skills at work and TEIs) and provide advice (e.g. on curriculum and information) for a more labor market-oriented skills development sector;
- Strengthen adult education programs designed to enhance technical skills literacy and socio-emotional skills;
- Design and pilot labor market information schemes, job search programs, and data analytics (disruptive technology) for informed decision-making;
- Provide incentives for enterprises on employee tuition support and attracting skilled Vietnamese from abroad.

Longer term:

- Institutionalize the steward and financier roles of the Government (next HE or TVET Law Amendment);
- Strengthen the national qualification framework to make Vietnam's education and training system more transparent so that students, workers and employers better understand the required qualifications for the type of occupations and tasks envisaged;
- Build a well-functioning labor-market driven skills development system by designing and implementing a Labor Market Information System (LMIS) for systematic data analysis and managing dissemination platforms for all stakeholders;
- Integrate socio-emotional skills into curriculum and extra-curriculum programs in primary, secondary, and tertiary education.

Knowledge

Companies rarely find public sector R&D activities a useful source of knowledge for their innovative activities. A key challenge lies in inappropriate incentive schemes for the academic system for collaboration with enterprises and the lack of mechanisms to diagnose the innovation needs of firms. It is therefore becoming increasingly important to strengthen University/GRI-Industry R&D linkages as the intensity and quality of these linkages play a rising role in determining returns to R&D investments, firm competitiveness, long term economic growth and job creation. It also plays an important role in ability of countries to attract and retain highly qualified and mobile personnel.

There are several initiatives that can be taken in the short-term (1-2 years) and longer term (3-5 years) to strengthen the collaboration of companies and Universities/GRIs:

Short-term:

- Strengthen University/GRI-Industry partnerships by scaling up existing and introducing new innovation funding schemes targeted for joint/collaborative research and innovation projects between universities/GRIs and enterprises;

- Support master's and PhD students to pursue targeted research projects in enterprises including spending part of their studies in an enterprise;
- Establish mutual board memberships whereby universities/GRIs invite industry members to sit on their boards and vice versa;
- Rebalance R&D support. For example, NAFOSTED funds should also be opened to start ups and R&D investments in enterprises to help commercialization potential;
- Innovation vouchers for SMEs to purchase services from universities/GRIs on innovation projects;
- Establish organizations dealing with market and technology brokerage, technology agents, and centers for leasing and contracting manpower for science and technology activities.

Longer term:

- Rebalance public funding at universities and GRIs based on national priorities and performance-based funding. The GRIs should be restructured into sustainable, larger, fewer, and better performing organizations with clear missions and funding criteria, including performance-based ones set at the appropriate level;
- Increase autonomy and accountability in the governance of universities and GRIs. Modern R&D management practices at universities and GRIs such as peer review, advisory committees, and performance-based evaluations should be thoroughly applied;
- Establish a better incentive system to encourage innovative research at universities/GRIs and allow them to keep the revenues from commercialization of the research results;
- Create and improve a legal system for a technology market (including regulations of science and technology contracts).

Pillar 4: Strengthening institutional coordination and delivery of innovation policy

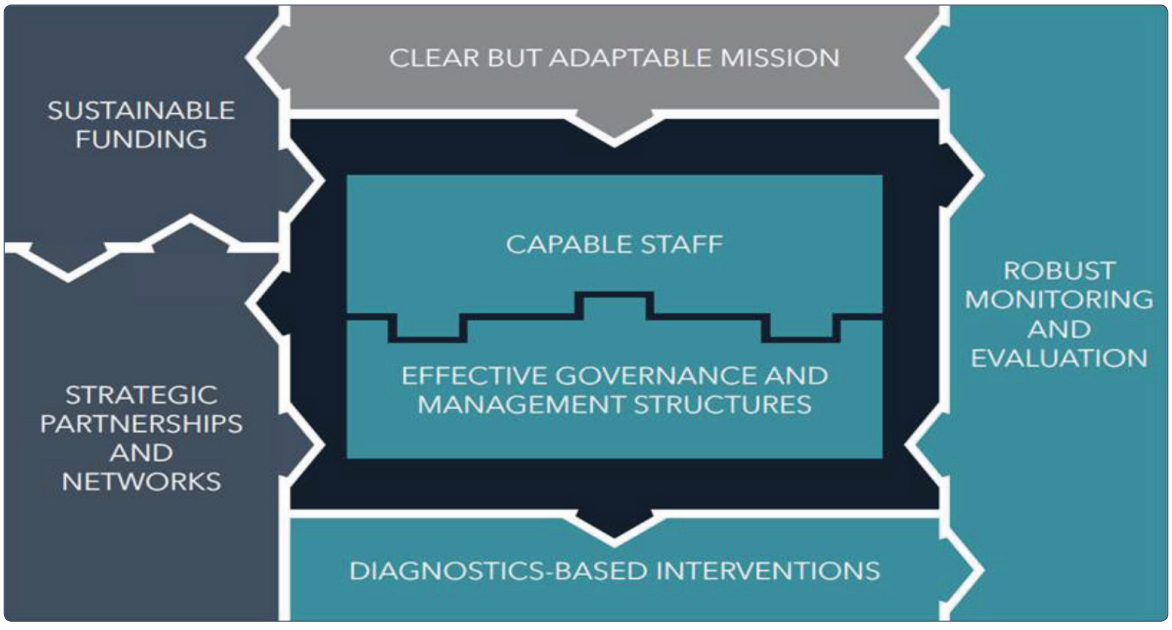
To respond to the strategic focus on business innovation, Vietnam needs to step-up efforts toward effective inter-institutional coordination and adopting good practices in innovation policy design and implementation The earlier findings suggest Vietnam should pursue a strategic re-orientation of STI policy: from one focused on producing science and technology, and R&D innovation to one focused on facilitating non-R&D innovation and diffusion of existing technology. This change in strategic direction has important institutional ramifications. First, policy support for STI will require implementing agencies to work increasingly closer with industry representatives, particularly SMEs. Second, the deployment of solutions that prioritize absorption of technology and promote non-R&D innovation is becoming more important. Third, policy makers should enable beneficiaries to access a set of multidisciplinary solutions that underpin the cross-cutting nature of business innovation. Looking forward, policymakers need to strengthen inter-agency policy coordination and institutional capacities to facilitate quality service delivery to firms. Improving coordination calls for rethinking of the existing model that has led to a fragmentation of approaches and resources across institutions. New institutional capabilities are necessary for a greater focus on firm needs and delivery of quality program design and implementation. Addressing these two key policy issues may require different institutional responses.

Advocates for a bold approach suggest that establishing a new innovation agency can tackle the coordination challenge

Establishing a dedicated innovation agency may not be an optimal option in Vietnam's context as it presents significant costs and requires important building blocks for success (Figure 7). Some countries have established a dedicated innovation agency for centralizing and coordinating innovation policy across institutions. However, the typical motivation behind the creation of such an agency rests not on improving coordination but rather on strengthening design and implementation of innovation policies. Innovation agencies can build technical specialization on innovation policy, attract highly competent professional skills that are necessary to deliver innovation policy. This option entails the flexibility of the government to attract and retain talent and offer prospective staff competitive wages. Furthermore, agencies can operate with political independence, bringing agility to policy implementation – i.e. operating in a less bureaucratic environment than agencies acting directly under line ministries.

Examples of creating and upgrading some of these agencies can be found in Eastern Europe, where countries like Poland and Serbia have introduced modernization and professionalization of these agencies with success. While there is no single model for an ideal innovation agency, a recent review of innovation agencies across countries sheds light on common success factors that include recruitment of capable staff, effective governance and management structures, diagnostic-based interventions, M&E system, sustainable funding, and forging strategic partnerships with private sector and key stakeholders (see figure 7).[41]

FIGURE 7. **Seven building blocks of performing innovation agencies**



Source: Aridi A. and N. Kapil (2019. Innovation agencies, Cases for developing economies (forthcoming).

41 These lessons have been gained through an investigation of 13 innovation agencies located in developing countries, and one comparison case of Singapore. Other countries include Malaysia, Poland, Croatia, Serbia, Georgia, Columbia, Turkey, Lebanon, Armenia among others.

In practice, setting up and nurturing a new agency can carry significant costs and risks. Practitioners should draw on international best practice to find potential solutions to their challenges. However, policy makers seeking to copy institutional forms and arrangements from developed countries into their own institutional landscape often fall into a trap (Cirera et al, 2020). Agencies can take many forms depending on the degree of autonomy and staffing but their effectiveness tends to be highly correlated with the overall level of institutional quality and availability of talent endowment in the country. Singapore's SPRING is a good example of a well-functioning agenda (Box 3). Setting up an agency like SPRING requires human capital and a long-term financial commitment, both of which are currently absent in Vietnam. Vietnam has seen a fair share of similar 'special-purpose' institutions already that did not deliver the expected outcomes. A more gradual approach for building competencies to support business innovation in strategic areas may be an option to consider in Vietnam as it responds to challenging ahead.

BOX. 3. **SPRING Singapore – Enabling Enterprise**

- *Objective:* promote competitiveness of local SMEs and start-ups, SPRING is a Government agency and statutory board under the Ministry of Trade and Industry (MTI)
- In 2018, SPRING merged with International Enterprise Singapore to form *Enterprise Singapore*. The aim of the revamped agency is to enable the growth of Singapore's companies through an integrated support network, providing opportunities to develop business capabilities and access overseas markets.
- *Program includes:* financing, capability upgrading, management development, market access, and other technology and innovation services.
- *Direct Financial Support:* Co- investment initiatives offered under Startup SG Equity- matches investments in eligible start-ups with investors
- *Non-financial Support:* Program to facilitate collaboration between large corporations and SMEs.

Key principles behind successful institutional coordination mechanisms for innovation policy

Vietnam's current STI coordination model needs bolstering but there is not a one size-fits-all solution. Most countries do not have a designated ministry mandated to coordinate and promote innovation as this is typically shared across several agencies and ministries. In other countries, this leading coordinating role is given to cross-cutting institutions, like the Prime Minister's office or a Presidential advisory council, as is the case in South Korea (Box 4). The latter has become popular, and in some cases the Prime Minister chairs the innovation council cross-sectoral meetings to coordinate the implementation of innovation policy. While the institutional arrangements for coordination of innovation policy that work for one country may not be transferable to another, there are key principles that can be considered and adapted in Vietnam's political economy context. First, policy makers should aim to understand what the short-comings of the current top-down model are, and identify the key factors inhibiting innovation outcomes. Second, a key lesson from the international experience is that the process of coordination needs to be bottom up, relying on consultations among the relevant agencies and the provincial governments. Third, deep engagement from ministries that are close to industry – i.e. with functions over industry, trade or SME development policy - is critical when the greatest challenge for advancing innovation is beyond public and private R&D (i.e. extending to adoption and diffusion of existing innovations). Finally, sustained consultation with the private sector remains key to ensure that support is demand-driven and that there are learning loops embedded during the implementation phase.

BOX 4. **Korea's High level Strategic and Coordination Institutional Mechanisms**

Vietnam considers South Korea as an aspirational economic model for its economic transformation. In Korea, innovation policies are closely coordinated between the Ministry of Science and ICT (MSIT), the Ministry of Economy and Finance (MOEF) and increasingly the Ministry of Trade, Industry and Energy (MOTIE). Over time, policy leaders in Korea have evolved their innovation policies – R&D and non-R&D – in line with changing development priorities and country and global circumstances. Given the multi-faceted nature of innovation, policy and institutional coordination mechanisms have played a defining role in Korea's success. The institutional mechanisms and coordination may be multi-layered: i) the *strategic* level that sets the national economic development goals and brings together relevant innovation ministries/agencies stakeholders to realize the objectives; ii) coordination of key ministries; and iii) the *technical* level coordination for design and implementation of innovation and competitiveness policy. What are the key institutional mechanisms that have evolved in Korea over time to support both R&D and non- R&D innovation?

Strategic-level Coordination - Presidential Advisory Council on Science and Technology (PACST)
PACST is a national council, chaired by the President, with the purpose to adopt innovations in science and technology. PACST deliberates on matters concerning national R&D projects as well as coordinating major policies and plans for promoting science, technology and innovation in general. Specific functions include:

- formulating and coordinating major policies and plans for promoting science and technology;
- budget allocation, and adjustment for R&D annually and recommendations for public S&T institutions;
- evaluation of national research and development projects and inspection.

Membership: A cross-sectoral mechanism, it includes civilian members from academia and the private sector. PACST is composed of several committees based on priority areas and expertise required. The R&D committees are supported by the STI Office of MSIT.

Special Committee on Innovation Growth Engine, chaired by the Vice Minister for Science, Technology and Innovation of MSIT, is pertinent for policy coordination for non-R&D innovation activities. Composed of government officials from major innovation-related ministries and agencies, including MSIT, MOTIE, MOEF, the Ministry of SMEs and Startups (MSS), and the Ministry of National Defense (MND), as well as experts from academia and the private sector, this Committee coordinates government policies and programs on next-generation engines for innovative growth.

Coordination at the level of policy design and implementation
The Enforcement Decree of the Framework Act on Science and Technology mandates MSIT and other line ministries to plan, operate and review R&D activities in close cooperation. For instance, Article 21-2 of the Decree states that MOEF and MSIT "shall operate a consultation committee to discuss matters concerning the allocation, adjustment, etc. of the budget for national research and development projects." Furthermore, in order to facilitate collaborative planning of national R&D projects, Article 25 of the same Decree states that "MSIT may designate projects requiring collaborative planning between the relevant central administrative agencies in consultation with the heads of the relevant central administrative agencies, from among the national research and development projects involving two or more central administrative agencies."

Lessons learnt:

- High level strategic vision backed by legal mechanisms that enable close policy coordination among relevant ministries and agencies.
- Strong leadership to set the road map, prioritization and oversight
- Consultation with the private sector and academia
- Setting up technical working committees for coordination of policies and implementation arrangements
- Promoting non-R&D with R&D activities for innovation
- Monitoring and evaluation of results for accountability and learning loops.

There is scope to strengthen coordination across thematic areas of innovation policy. In Vietnam, the coordinating role for STI strategy has been designated to the Ministry of Science and Technology as per the existing legal framework. Under such mandate, MOST can facilitate coordinated responses to redress the most pressing problems inhibiting business innovation. An enhanced coordination model should adopt an approach that is evidence-based and driven to problem solving in key thematic areas of innovation. Under this framework, the relevant stakeholders can agree (collectively) to deploy measures and allocate resources for addressing agreed policy priorities, that can range from adopting existing technologies, upgrading of SMEs, innovation startups or complex R&D projects. Unlike the high-level measures specified in a typical 5-year strategic plan, the scope of the activities under this multi-stakeholder framework will be action oriented and highly focused on removing concrete barriers to innovation. In this model, MOST could facilitate the implementation of these measures (even when implementation is delegated to another highly competent agency under a different ministry), serving as a secretariat, organizing strategic planning and prioritization, and tracking progress toward the defined goals. The response program would be organized under technical working committees for deployment of policies and decentralized field activities. This model offers two distinctive advantages. First, the implementation of measures will draw on the skills and expertise from different agencies, providing a truly multidisciplinary approach to advancing innovation policy. Second, the involvement of specialized agencies will reinvigorate the existing coordinating role of MOST, giving substance to technical meetings and a sense of urgency to a collective and action-oriented agenda, which will contribute to attaining the aspirations of the national STI strategies. An example of this approach is the National Competitiveness and Innovation Commission from Colombia. The President of Colombia chairs the annual meeting of the Commission's public- and private-sector stakeholders, which include the sector ministries and the private sector's competitiveness council.

Annex 1 captures the full gamut of reform actions that are needed to strengthen Vietnam's NIS for improving innovation outcomes. It provides a roadmap in terms of timeline i.e. short-term versus longer-term actions. In each case, the responsible implementing agency is identified. As the reforms are needed across a spectrum of ministries and agencies, a coordinating and monitoring mechanism to track progress will be important. It is worth highlighting that the government is cognizant of the need for these reforms, and the challenge is more about operationalizing these actions by learning from good practices in other countries, as well as expediting the pace of reforms.

Annex 1: A new STI strategy for enhancing business innovation in Vietnam

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
PILLAR 1: Re-orientation of the STI Policy and Development Framework			
Current STI Policy Framework and its implementation is not aligned to the key Vietnam 2035 priorities including fostering innovation in enterprises. Specifically, there is: • Resource allocation is skewed towards R&D and neglects support to non-R&D based innovation • Narrow scope of policies and instruments for business innovation • Program beneficiaries tiled towards larger firms	**Rebalancing the STI policy mix and improving its composition** • Strengthen business innovation programs to support innovation capacity of SMEs and tech start-ups by focusing on: - Maximizing spillovers from FDI by facilitating linkages between MNEs and domestic SMEs - Improving managerial practices as core innovation capabilities - More emphasis on university-GRI – Industry linkages and collaboration	• The new STI Strategy reflects the focus on technology adoption and diffusion in businesses (esp. SMEs) underpinned by resource reallocation and broadening of policy instruments and beneficiaries • Scale up of management, technology extension and linkages programs [MOST + MOIT + MPI] • Minimize policy gaps by creating working groups in the following areas: - Promote SME upgrading and innovation - Early stage innovative ventures and finance • Formal review of instruments to improve management quality and to facilitate technology adoption. [MOST as lead]	• Introduce new thematic strategies by working groups aligning all agencies. • Formal review and evaluation of existing tax incentives to high-tech firms • Design a new technology transfer program and university-industry collaboration • Design a new R&D strategy [MOST as lead]

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
	Improving program targeting of beneficiaries and geographical coverage	• Review and simplification of existing application process for government support • Increase and make mandatory a minimum share of industry representatives in panel experts reviewing proposals	• Increase funding available for program dissemination outside Hanoi and HCM City
• **Government competencies** and processes to generate effective policies needs strengthening	**Building agencies' competencies to design and implement STI policies**	• Make fully developed logical and M&E frameworks mandatory with harmonized indicators • Provide capacity building activities on: - Logical and M&E frameworks - Instruments to support STI • Establish a clear template for the diagnostic of the problem to be addressed, identification of the market failure and justification of the instrument design • Program for training of civil servants in international level STI studies [MOST Lead; with other agencies]	• Implement rigorous impact evaluations of selected policy instruments • Implement a single information system for applicants – single window • Implement a new common IT system for managing beneficiaries' information across agencies [MOST Lead; with other agencies]

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
Strengthening Selected areas of Vietnam's National Innovation System			
PILLAR 2: Improving Business Environment and Complementary Factors *(demand side)*			
Weak firm capabilities deter technological adoption and diffusion	Managerial skills and organizational practices in firms need to be strengthened.	• Attract skilled Vietnamese from abroad to fill the gap • Introduce new policy instruments that can be used directly in equipping firms with the capabilities of using and/or generating technologies; for e.g. Business Advisory Service (BAS) and Technology Extension Service (TES) • Raise awareness among SMEs of the importance of managerial skills for innovation through business associations networks • Facilitate measures (auto-administered) for SMEs to conduct self-diagnostics and enable understanding of their own capacity limitations. [MOIT + MOST + MPI]	• Strengthen quality of business administration programs • Seek public-private sector collaboration • Increase allocation of resources to instruments to improve managerial quality and firm capabilities, and to facilitate technology adoption based on extension models
Competition policy is weak due to large role of SOEs that deters innovation	Unlock private sector innovation through increased competition and bold SOE reforms • Accelerate and deepen SOE reforms • Implement competitive neutrality • Remove distortions to create a level playing field/entry/exit	• Strengthen separation between ownership and regulatory functions of SOEs • Remove barriers for SOEs in using R& D funds [MOIT + MOF]	• Enforce competitive markets (independent competition agency) • Improve corporate governance • Open up services sector [MOIT + MOF]

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
Dynamism of enterprises hampered by regulatory and doing business environment	• **Improve the business environment and competitiveness of domestic enterprises by improving entry barrier (starting a business), and exit of firms (Insolvency law reform)**	• Introduce appropriate regulations to implement Government Resolution 02 that aims to accelerate regulatory reforms particularly, starting a business, and exit of non-productive firms	• Reform the insolvency law to introduce simplified procedures for SME insolvency provisions, introduce a framework for out-of-court workouts, and enhance the role of commercial courts
Intellectual property rights regime is not well-enforced. This deters knowledge transfer as it relies on investor protection. This is particularly important for Vietnam as it attracts large amounts of FDI.	• Intellectual property rights protection regime in Vietnam requires stronger enforcement efforts along with strengthened capacity to adapt to the needs of Vietnam's entrepreneurial ecosystem and specifically SMEs.	• Patent protection enforcement can be strengthened by establishing clear guidelines on how benefits from commercialization of new ideas should be divided among collaborators from universities and think tanks/ industry and research/ foreign and local.	• Strengthen the overall capacity of the IPR protection system to enforce patent protection copyrights, and industrial property rights.
Innovation and start-up **finance** constrained	Start-up finance is constrained by both demand and supply side factors. On the demand side, the inability of firms to produce business plans to seek out funding and lack of investible ventures that indicate capacity to grow; many incentives remain "on paper" as cumbersome guidelines and the administrative burden impairs access. Regulatory mechanisms are unable to catch up with innovation start-up development and serve as barriers rather than facilitators.	• Support investment readiness programs that improve CEOs/ founders business management and leadership skills, networking and matchmaking.	• Stimulate the supply of early stage finance using public capital in the stage with the largest market failure i.e. pre-seed and seed stage.

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
	Improve financing for SMEs through regulatory reforms in secured transactions and insolvency law	• Further reform regulations on secured lending to encourage Vietnamese banks to move away from traditional real estate secured lending and develop more movables financing (i.e. secured by broader types of assets, i.e. tangible and intangible or in other words, receivables, inventory, value paper, Intellectual property, etc.) (MoJ as lead with other agencies)	• Continue to reform the insolvency law and the secured transactions regulations to further promote movable collateral in lending to SMEs and startups. • Change regulations to allow new debt related financial instruments.
		• Review the matching grants administered to make the processes less burdensome for potential applicants	
Digital Infrastructure and connectivity – need to be enhanced in businesses to realizing the promise of Industry 4.0.	• Incentivize firms to use digital infrastructure (computers; on-line platforms, cloud services) • Provide advisory services to facilitate the upgrading of technologies across firms. • Develop the necessary regulatory and data security policy framework		Deepen the data ecosystem, including regulatory framework, data security, and privacy to promote use of technology and knowledge flow.

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
PILLAR 3: Enhancing skills and knowledge *(supply side)*			
Human Capital: Skills Gaps (poor quality of skills) and **Skills Shortages** (inadequate quantity of workforce with required skills) are major constraints for engaging in/investing in firms' innovation practices. Vietnam should make a major effort to increase the enrollment in tertiary education. Tertiary education institutions will have to pay attention to 35, 45 and 55-year-olds, not just 20-year-olds. This requires significant changes in the way institutions and the system function. Without a massive increase in the workforce with a higher level of skills, Vietnam will not be able to get the basics right for an improvement of its national innovation system.	Develop a national skills development strategy in the education and training systems for (a) re-skilling of current workforce (stock) and (b) investing in skills of new cohorts (flow) through more relevant tertiary and TVET as well as primary and secondary education systems. To a larger extent bring enterprises (employers) into the skills development system • Revisit the roles of Government as a Steward (quality assurance, autonomy and accountability, LMIS) and Financier (performance-based, matching grant, student aid) • Investing in all three broad skills types are critical: cognitive, socio-emotional and job-specific technical skills • Incentivize enterprises, TVET institutions, and universities to partner on investing in continuous learning and training through design and implementation of more relevant and innovative curriculum and pedagogy, work-based training (internships)	• Design and pilot output- based financing for TVET Institutes and universities, with enhanced autonomy and accountability (output can be number of graduates with relevant skills) • Provide policy support and incentives for private sector to invest in (internships and ICT skills at work and TEIs) and provide advice (e.g. on curriculum and information) for a more labor market-oriented skills development sector. • Provide incentives for enterprises on employee tuition support and attracting skilled Vietnamese from abroad • Hand-over the institution-based learning to TVET institutes and universities via greater autonomy and accountability in the design and provision of their services. • Strengthen adult education programs designed to enhance technical skills literacy and socio-emotional skills	• Institutionalize the Steward and Financier roles of the Government (next HE or TVET Law Amendments) • Strengthen the national qualification framework to make Vietnam's education and training system more transparent so that students, workers and employers better understand the required qualifications for the type of occupations and tasks envisaged • Integrate socio-emotional skills into curriculum and extra-curriculum programs in primary, secondary, and tertiary education • Build a well-functioning labor-market driven skills development system by designing and implementing a Labor Market Information System (LMIS) for systematic data analysis and managing dissemination platforms for all stakeholders. [MOET +MOLISA+ Enterprises + Vocational + Tertiary Education Institution (TEIs)]

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
Today's skills needs cannot be met solely by the current practice in the education and training sector which includes programs that target a narrow set of population and limited coherence across life stages. Instead, Vietnam should provide a range of skill development opportunities across a broad population for continuous learning, which will involve both a larger set of actors and will change the roles of the education and training sectors.		• Design and pilot labor market information schemes, job search programs, and data analytics (disruptive technology) for informed decision-making. [MOET +MOLISA+ Enterprises + Vocational + Tertiary Education Institution (TEIs)]	
University/GRI-Industry research linkages are weak: enterprises rarely find public sector R&D a useful source of knowledge for their innovative activities A key challenge lies in inappropriate incentive schemes for the academic system for collaboration with enterprises and the lack of mechanisms to diagnose the innovation needs of firms	Build stronger University/GRI-Industry research linkages as the intensity and quality of collaboration between companies and universities/GRI play an increasing important role in determining returns to R&D investments, firm competitiveness, long term economic growth and job creation. It also plays an important role in the ability of countries to attract and retain highly qualified and mobile personnel.	• Strengthen University/GRI-Industry partnerships by scaling up existing and introducing new innovation funding schemes targeted for joint/collaborative research and innovation projects between universities/GRIs and enterprises • Support master's and PhD students to pursue targeted research projects in enterprises including spending part of their studies in an enterprise	• Rebalance public funding at universities and GRIs based on national priorities and performance-based funding. The GRIs should be restructured into sustainable, larger, fewer, and better performing organizations with clear missions and funding criteria, including performance-based ones set at the appropriate level.

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
		• Establish mutual board memberships whereby universities/GRIs invite industry members to sit on their boards and vice versa • Rebalance R&D support. For example, NAFOSTED funds should also be opened to start ups and R&D investments in enterprises to help commercialization potential • Innovation vouchers for SMEs to purchase services from universities/GRIs on innovation projects • Establish organizations dealing with market and technology brokerage, technology agents, and centers for leasing and contracting manpower for science and technology activities. [MOST +MOET+ Enterprises + GRIs+ Universities]	• Increase autonomy and accountability in the governance of learning, teaching and research at universities and GRI. Modern R&D management practices at universities and GRIs such as peer review, advisory committees, and performance-based evaluations should be thoroughly applied. • Establish a better incentive system to encourage innovative research at universities/GRIs and allow them to keep the revenues from commercialization of the research results. • Create and improve a legal system for a technology market (including regulations on science and technology contracts). [MOST + MOF Enterprises + GRIs+ Universities]

Issue	Policy reform actions	Sequencing actions (Implementing agency)	
		Short-term	Longer term
PILLAR 4: Strengthen Institutional Coordination and Partnership across Public-Private Stakeholders			
Coordination among **innovation agencies** as well as sustained partnership/consultation with **private sector** in advancing the STI agenda appears to be ad hoc and needs strengthening	Improve coordination across public innovation agencies and forging partnership with private sector & other stakeholders	• Identify champions in the Government to improve coordinating mechanism across agencies • Seek private sector inputs on a systematic basis to develop demand-driven policies	• Evaluate the pros and cons of setting up an innovation agency vs. a high-level coordination mechanism • Establish a self-sustaining community of practice with key stakeholders from private and public sector to create "feedback loops" to strengthen design and implementation of innovation policies and outcomes

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