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FINANCING OF TECH STARTUPS IN SELECTED ASIAN COUNTRIES

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Abstract

In many Asian countries we observe a rapid expansion of technology-oriented startups. Governments hope that these startups will boost economic growth, create jobs, and foster sustainable development. However, transforming an innovative idea into a successful business is not easy and is constrained by limited access to finance. We analyze access to finance for tech startups in four sectors – greentech, agritech, edtech, and healthtech – that are linked directly to the Sustainable Development Goals. The paper focuses on four countries, Cambodia, India, Thailand, and Viet Nam, and includes insights from interviews with startups, incubators, and other players. We find that tech startups rely on an array of financing sources and that venture capital is not a common source. In addition, greentech and agritech startups produce products that require long-term support through the design, testing, prototyping, and certification stages. Such "patient capital" is in short supply. On the positive side, enterprises in development-oriented sectors can seek funds from impact investors and international development (aid) agencies.

Keywords: startups, enterprise financing, Asia

JEL Classification: M13, L26, G24

Contents

1. INTRODUCTION

Technology-oriented (or tech) startups play a vital role in transforming the traditional economy into a knowledge-based and digital economy through innovative activities. Tech startups are entrepreneurial ventures that deliver new, innovative, and scalable technology-based products and services to the market (Spender et al. 2017). Tech startups are typically managed by the founders who came up with the idea for the innovation. The hallmark of startups is their creativity, which distinguishes them from other small and medium-sized enterprises (SMEs). Another distinctive feature is that startups are relatively young companies, typically less than five years old. Their short lifespan has important implications, particularly for finance, the focus of this paper. Without a long track record and offering a new and untested business idea, banks are often reluctant to provide financing. Yet, tech startups require considerable initial capital due to factors associated with testing new technologies or business models. In this context, it is important to note that startups develop within an ecosystem of agents, institutions, regulations, and other factors. Finance is a key part of that ecosystem and finance can be accessed through different channels. The main objective of this paper is to provide an analysis of access to finance for tech startups in developing Asia, with specific reference to four countries, Cambodia, India, Thailand, and Viet Nam.

Table 1: Four Tech Sectors and the Sustainable Development Goals (SDGs)

Sector	Innovations	SDGs
Clean/green tech	Sustainable energy (i.e., solar, wind) Tech for reduce, recycling, reuse Cleaning air and water discharge	6: Clean Water and Sanitation 7: Affordable and Clean Energy
Agritech	Tech solutions for smart farms Smart irrigation, crop monitoring Automation of farming practices Use of drones	2: Zero Hunger Target 2.3: "…double the agricultural productivity and the incomes of small-scale food producers…," through "technology" and other support
Edtech	In-school teaching solutions Attendance monitoring and administration After-school tutoring apps School, program, scholarship search Grading and feedback mechanisms	4: Quality Education
Healthtech	Tech for improved health treatment Within hospitals and clinics For diagnosis, prescription, treatment, and monitoring outside of hospitals and clinics	3: Good Health and Well-Being

Source: Authors. For SDGs: https://sustainabledevelopment.un.org/?menu=1300.

Our analysis focuses on four sectors, namely greentech, agritech, edtech, and healthtech, as shown in Table 1. We have chosen these sectors because they not only make an important contribution to economic growth, but they also aid the achievement of the Sustainable Development Goals, or SDGs (ADB 2019). Greentech startups, also known as cleantech, help reduce environmental damage, support climate change adaptation, and include solutions to reduce energy consumption and switch to renewable sources. Agritech startups use technology to improve farming methods for crop cultivation, animal husbandry, and produce processing, and contribute to creating what are known as "smart farms." Edtech startups employ technology in creative ways to improve teaching and learning, both within schools and through tutorial and other out-of-classroom activities. It can include digital solutions for improved school and school

system management. Finally, healthtech offers technology innovation in the healthcare sector and can include the creation of new medical devices, innovative approaches to providing diagnosis (e.g., at distance through the internet) and treatment, as well as digital solutions for hospital and health system management.

We used a mixed-methods approach in researching this paper. First, we conducted a review of documents and websites with information on policies, activities, and programs, and combined this with discussions with officials from government, academia, financing organizations (such as venture capital funds), incubators, and quasi-public bodies. Second, we conducted between 10 and 17 interviews with tech startups in each of the four countries. The startups interviewed were engaged in one of the four sectors of interest, except for Viet Nam, where all enterprises interviewed were from the agritech and healthtech sectors. Table 1A in the appendix lists the number of startups interviewed by sector and country. Most of the startups in our sample had been in operation for not more than five years.[1]

A researcher was engaged by the Asian Development Bank in each country to carry out a country study. The interviews were conducted one-on-one, except in India where small groups of entrepreneurs were organized. Researchers used a set of guiding questions but deviated from those questions to explore interesting facets that arose in the course of the interview. This open-ended and nonstructured approach allowed the researchers to explore issues not considered at the outset. Key insights were gained from this approach, including: government not only providing policies and programs but being a major customer; side businesses and day job salaries as a funding source; the time needed for product certification; pitch competition prizes used for financing; and others. Furthermore, because the samples are small and not selected in a random manner, it would be misleading to gather and present quantitative results. Moreover, random sampling requires a sampling frame, which does not exist for startups in these four sectors in these countries. Instead, the insights gained from the interviews are embedded in the paper, either in the general analysis or as discrete examples from specific startups. The four country studies are contained in the list of references.[2]

The paper adds to the current literature by providing an up-to-date overview of the tech startup scene in four Asian countries. We focus on development-oriented tech startups. Furthermore, we contribute to the literature by identifying various financing sources for tech startups and their usage in the four countries. Finally, we show that development-oriented tech startups have special financing needs and opportunities.

The paper is structured into six sections. Following this introduction, we briefly set out the role of finance in the larger startup ecosystem. The third section then maps out the landscape of tech startups in the four countries. In the fourth section, we discuss the different sources of financing available for tech startups. We enrich the analysis here with examples gathered during the interviews. The fifth section shows how the financing needs of tech startups in the development field (greentech, agritech, edtech, and healthtech) differ from those of other tech startups. Our findings show that the development field holds specific risks, but also provides many new financing opportunities. The final section briefly concludes.

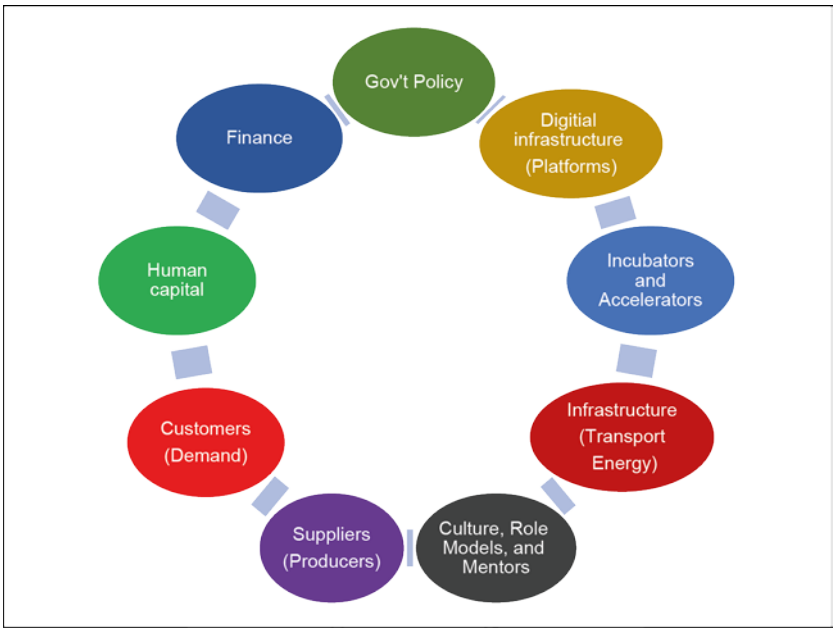
[1] The startups interviewed did not include all four sectors in every country. For example, the 11 enterprises interviewed in Viet Nam were from the agritech and healthtech sectors.

[2] See Sopheara Ek (2019) for Cambodia, Sakdipon Juasrikul (2019) for Thailand, and Thinh Pham (2019) for Viet Nam. The report for India is to be completed in 2020.

2. ECOSYSTEM AND THE ROLE OF FINANCE

Startups arise and develop within an ecosystem that consists of a range of actors, institutions, and relationships. A dense, interactive, and networked ecosystem will allow startups to flourish and it is such an ecosystem that governments in Asia's emerging economies, as elsewhere in the world, are building. Finance is a central component – it might be argued it is *the* central component, as inadequate finance will limit the potential of startups. The range of elements that are part of the ecosystem is vast. Figure 1 seeks to capture the full range. It includes incubators and accelerators, digital and hard infrastructure, and the human capital needed for invention and to master technology. Government policy and programs are key elements of the ecosystem (and support other aspects of the system, such as infrastructure, human capital, etc.). Startups operate within a cultural milieu that can encourage and reward (or constrain) entrepreneurship and includes role models and mentors. Finally, startups seek to create new products or services that create or fulfill demand and therefore the market for their output is important, as are markets (producers) that supply inputs and services to startups.

Figure 1: Startup Ecosystem



Source: Authors. (Note to layout/typesetter: Write the word "Startups" in the middle of the circle, then delete this note.)

Nested within the broader startup ecosystem is a financing ecosystem (or subsystem) that comprises the various financing opportunities, options, and networks. Startups are closely associated with venture capital (VC), not only in Silicon Valley but in other innovation hubs throughout the world. VC is certainly important for startups. However, VC is one among many sources of financing and is certainly not the most frequently used source. Instead, it is often a hoped-for source after a product or service has been introduced to the market and capital is needed to scale up. This is true for startups in developing Asia, but also for advanced countries such as the United States and the Republic of Korea (Appendix A).

3. EMERGENCE OF STARTUPS IN FOUR COUNTRIES

Startups have emerged as an important business model for countries throughout the world, and certainly in Asia. Getting a sense of their significance can be difficult as consistent lists of startups are often not available and seeking comparisons across countries may be difficult as national definitions differ.

The four countries differ substantially in their economic and demographic size, as shown in Table 2. The four countries provide for a range of experiences in developing Asia. India is a huge country with a deep and varied startup community, whereas Cambodia is much smaller, and startup activity is more nascent. Thailand and Viet Nam are in-between, middle-sized countries where startup development appears to be growing rapidly. We chose these four countries as they constitute an interesting set of countries with different characteristics. India has a population of 1.3 billion and generates an annual output of $2.7 trillion. At the other end, Cambodia has 16 million people and a rapidly growing but still relatively small economy of $25 billion. Three of the countries are classified as lower-middle income, while Thailand has reached the upper-middle stage with an annual income per capita of nearly $6,000, more than twice as high as the next highest country. Internet use rose from less than 5% in Cambodia and India in 2008 to nearly or over 35% a decade later. The other two countries have internet usage rates of over 50% of the population, with Viet Nam as high as 70%. Mobile phone subscriptions exceed 100 for every 100 people (i.e., many people have more than one subscription), except India, which is at 87. Expanding internet access and mobile phone usage broadens the market for the many startups engaged in e-commerce, fintech, and digital marketplaces. However, digital access is important but less critical for the four sectors examined in this paper.

Table 2: Main Economic Indicators and Digital Access

	GDP ($ billions)[a]	**GNI per Capita** ($)	**Population** (millions)	**Individuals Using the Internet** (% of population)		**Mobile Cellular Subscriptions** (per 100 people)	
	2018	**2018**	**2018**	**2008**	**2018**	**2008**	**2018**
Cambodia	25	1,230	16	0.5	40.0	30.5	119.5
Viet Nam	245	2,160	95	23.9	70.3	86.8	147.2
Thailand	505	5,950	66	18.2	56.8	92.9	180.2
India	2,726	1,800	1,332	4.4	34.5*	28.9	86.9

[a] $ denotes US dollars here and throughout the paper.

Note: * 2017.

Sources: ADB for GDP per capita (Atlas method) and population. World Development Indicators, World Bank (2020) for other variables.

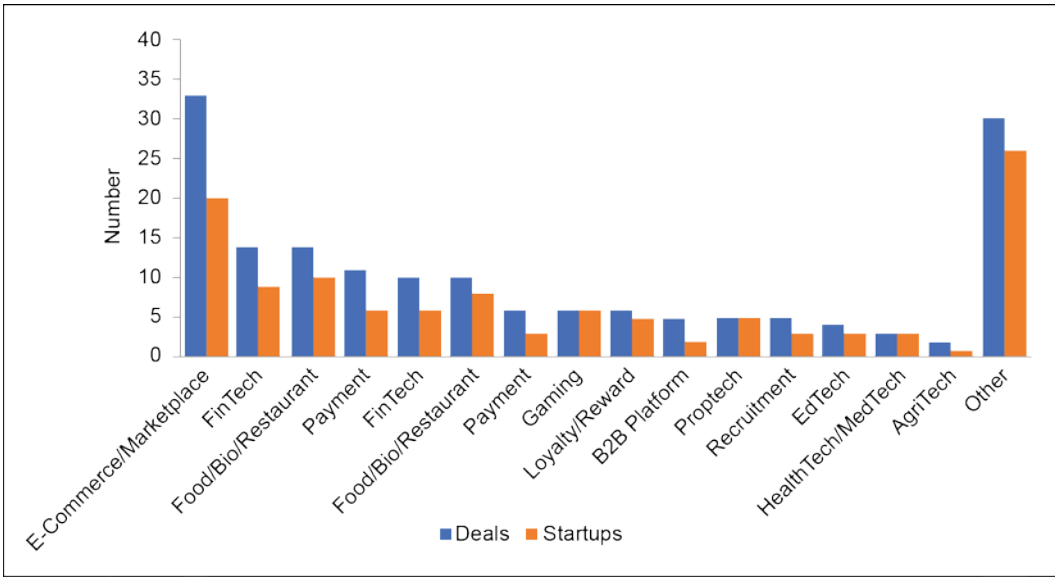
India is a leader in startup development and has been for decades. While the idea of startups is of recent vintage, India developed a community of export-oriented software services and business process outsourcing (BPO) firms from the early 1980s – which were not called “startups” then but would be today. This first wave was followed by a second wave that emerged in the 2000s in which digital technology and the internet were adapted to develop smart solutions for the broader consumer market. A third wave has emerged in the past few years that is deep tech, focused on goods (as well as services), and is engaged in business-to-business (B2B) markets (Choudhury, Sharma, Jain 2019). Through the three waves, the tech sector has been driven by an entrepreneurial culture,

an elaborate system of engineering and related technical education, and the return of professionals from studying and working abroad.

India currently has an estimated 50,000 startups, of which about 8,900 might be considered tech startups (Economic Times 2019a, b).[3] There are reportedly 19 unicorns, defined as startups with a value of $1 billion or more. These include mostly fintech and e-commerce firms, but also BYJU'S, the world's largest edtech enterprise valued at over $5 billion. India also boasts a vibrant venture capital and investment community comprised of local and foreign investors, including Walmart, which paid $16 billion for a majority stake in India's successful e-commerce firm Flipkart.

In Viet Nam, tech startups started emerging as early as the 2000s, but it was only from about 2015 that the startup ecosystem was fully supported by good telecommunications (internet, 4G), and improvements in the country's levels of technology and education. The Ministry of Science and Technology is the lead agency involved in developing support programs and in organizing events for tech startups. A legal framework for startup investment has been established. The activity is heavily concentrated in Ha Noi and Ho Chi Minh City and is driven mainly by Viet Kieu, the generation of Vietnamese who studied abroad and then returned.

Figure 2: Number of Deals and Startups by Sector, Thailand, 2011–2018



Note: The Other category includes: Crowdfunding, Insurance, MarTech, Ticket System, Construction, Enterprise Platform, Hardware, Retail, Car Sharing, Drone and Robotic, Messaging, Online Printing, Professional Service, Real Estate, and Social Media Analytics. Each of these sectors has four or fewer deals and startups.

Source: Techsauce (2019).

There may be 2,000 to 3,000 startups operating in the country, with a concentration in e-commerce, foodtech, fintech, media, logistics, and online travel (Topica Founder Institute 2017). Aside from foodtech, agritech has not been a key sector for startup activity. Overall, new investments (deals) in startups by VC and related investors totaled $291 million in 2017, with 85% of the financing funding coming from offshore venture

[3] Startups may establish and achieve scale but are not necessarily profitable. An end-of-decade review probably overstated the problem but nonetheless pinpointed a concern in noting that India's digitech startups "have built scale and totted up revenues, but none of them has yet found a path to profit" (Datta 2019).

capitalists. The government has recently committed to increasing capital inflows to the country to address financing difficulties for tech startups and venture capitalists (VCs) (VIR 2019). Many startups use cryptocurrency and blockchain technologies, although the country has yet to craft a regulatory framework for those activities (Bathke 2018).

In Thailand, the startup community emerged from the software-based SMEs that developed in the 2000s. The idea of startups, as a distinct segment of the SME community, emerged with two seminal events. The AIS Startup Weekend, organized by the large telecoms firm AIS in 2011, focused on digital innovation and was key to introducing the idea of startups to Thailand. The second event, Startup Thailand 2016, was organized by the government and marked the full development of, and effort toward, startups in the country. The government has seen innovation and advances in technology as a means to reignite growth and overcome the middle-income trap. Fostering startups is a means to meet that objective.

There were only three recorded financing deals for startups in 2012 but that figure rose to 90 in 2017. The number of venture capital funds has increased dramatically to over 100 and includes many corporate venture capital funds. The total number of startups may be over 1,000 and are concentrated in e-commerce and the digital marketplace, followed by fintech, food, payments, and e-logistics (Figure 2). As in other countries, there are relatively few startups in the four sectors that are the focus of this study, namely greentech, agritech, edtech, and healthtech.

Cambodia's startup sector is much less developed than those in the countries cited above. Yet there are some promising developments. The government is promoting the digital economy and Industry 4.0, and a vibrant startup scene is emerging. There is potential for startups given the size of the youth population and high GDP growth that averaged 7% between 2010 and 2018 (ADB 2019). Cambodia has been described as possessing a "promising startup landscape,"[4] with many young people interested in starting a business. The number of tech startups has been increasing rapidly, albeit it from a low base. Official figures are not available, however there were estimated to be less than 50 startups in 2013 and this figure increased nearly sixfold to around 300 by 2018 (Ek 2019). Nearly a third of all startups are engaged in two sectors: fintech, and media and advertising (Table 3). Other sectors include e-commerce, development services, and digital marketplaces. Only a few startups can be identified in the four sectors that are the focus of this study.

Table 3: Active Tech Startups by Sector, Cambodia

Sectors	No. of Startups	Sectors	No. of Startups
Fintech	> 50	Transportation	> 10
Media and advertising	> 40	Internet of things and hardware	> 5
E-commerce and logistics	> 30	Healthtech	> 5
Development services	> 30	Edtech	> 5
Digital marketplaces	> 20	Agritech	< 5

Source: Kem et al. (2019).

[4] https://capitalcambodia.com/cambodias-tech-startup-ecosystem-at-a-glance/ (accessed on 19 November 2019).

The digital transformation is happening rapidly in Cambodia, but many challenges remain. The country received the lowest rank among economies in East Asia and the Pacific on an index that measures the adoption of technology among government, business, and individuals (World Bank 2018). Moreover, a low level of digital literacy constrains digital and technological adaption, which can constrain the market for tech startups that launch services on digital platforms. Less than a third of the population has basic digital skills, such as using a spreadsheet, while less than 3% can connect and install new devices (CDRI 2019).

4. FINANCING SOURCES FOR TECH STARTUPS

Tech startups tap various financing sources throughout their life cycles. Their access to specific types of financing may be easier or more relevant at specific stages of their business development. Table 3 sets out a list of financing sources that we encountered in our analysis of startups in the four countries.

Table 4: Financing Sources of Tech Startups

	Stage	Advantage	Risks/LIMITS	Usage*
Savings	Early	Availability; no screening by bank	Limited	Substantial
Family and Friends	Early	Availability; no screening by bank	Uncertainty about amount and repayment	Substantial
Salary from Other Job	Early	Continuous stream	Relatively small	Substantial
Prize Money	Early	Full fungibility	Relatively small amounts and hard to win	Limited
Company Revenues	Early-late	Possibly continuous stream	Revenues not invested in profitable business	Limited
Government Grants or Loans	Early	Full fungibility	Often small amounts	Limited
Angel Investor	Early	Access to potentially large pool of capital	Difficult to find	Very limited
Crowdfunding	Early-late	Relatively inexpensive	Uncertain response	Very limited
Banks	Early-late	Usually large amounts of capital available	Thorough screening; possibly onerous and restricted use of capital	Limited
Venture Capital	Early-late	Access to potentially large pool of capital	Participation in ownership	Very limited

Note: * Usage in four countries.

Source: Authors.

4.1 Bootstrapping from Savings and Salaries

The initial funding for most startups is contributed by the founders and their families and friends. This was apparent in the interviews we conducted with startups in the four countries. Initial startup activities include developing the idea, designing the product or service, conducting market research (to gauge demand), prototyping, and then testing the result in the market. These stages incur costs for materials,

machinery, computing systems, access to platforms, testing activities, use of design and prototyping equipment, wages of employees, and the time of the founders. However, they do not generate revenue and need to be financed. The founders can use their savings and work full-time on the startup. For example, a Ha Noi-based agritech startup that develops smart fertilization systems began with three founders who worked from home and used their pooled savings as initial funding sources. The founders' savings were spent on product conceptualization and design.

Savings can be supplemented by funds provided by family and friends. In India, for example, data from a recent study by the Reserve Bank of India found that 43% of startups listed "family and friends" as the most frequently cited source. While this strategy helps a startup to advance quickly, the risk is that the savings are fully depleted before the startup starts generating any revenue.

Another option that was revealed by our interviews is that the founders initially work as salaried employees at other jobs and dedicate time to the startup during nonwork hours in the evening and on weekends.[5] Salary income in excess of personal and household expenditures can be invested in the startup. For example, an agritech startup in Cambodia was founded by two government employees and a student currently doing a PhD in Japan. The two employees worked on the startup in their spare time but also waited for the student cofounder to return to move the project forward. While this type of financing provides a continuous revenue stream (that allows the founders to support themselves), it limits the time that founders can spend on developing their startup. In certain sectors, being fast might be highly important.

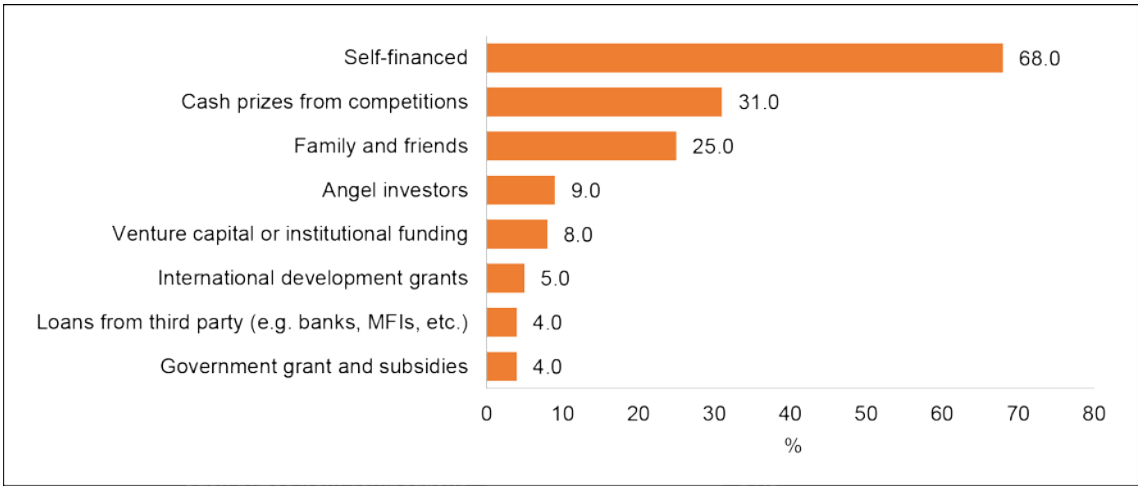
4.2 Pitching: Prize Money and Exposure to Investors

The startup movement has given rise to the unique phenomenon of pitching competitions, in which startup entrepreneurs present or "pitch" their business idea to a group of judges and investors. The pitch competition can provide two sources of finance. One is prize money offered by the organizers and awarded by a set of judges for the best pitch(es). In Cambodia, for example, some pitch competitions offer $5,000, which might seem like small change for a startup in Silicon Valley but provides important seed money for a startup in Cambodia and would be equivalent to the size of a small bank loan. The added benefit is that the funds do not need to be repaid and do not grant equity to an outsider. Prize money from competitions is cited by Cambodian startups as the second most common source of funding, after self-finance (Figure 3). The other source of funding that can arise from pitch competitions comes from investors who attend and identify potential firms for investment.

Pitching competitions are held in all four countries. For example, in Viet Nam they are well-established as part of regular fairs and networking events at provincial and national levels supported by the Ministry of Science and Technology (MOST). The largest and best-known event is the national Techfest organized annually by the National Agency for Technology Entrepreneurship and Commercialization Development (NATEC) under MOST. Techfests are hosted by a different city each year and feature different themes. For example, the 2017 Techfest focused on connecting the local startup ecosystem while the 2019 Techfest highlighted the development of startup hubs outside of Ha Noi and Ho Chi Minh City.

[5] For example, Phil Knight continued to work for an accounting firm after setting up and operating Blue Ribbon Sports, the sports shoe distribution company that he later transformed into Nike.

Figure 3: Sources of Funds, % of Startups per Source, Cambodia, 2018



Notes: Startups could select multiple answers. MFIs = microfinance institutions.
Source: Kem et al. (2019).

4.3 Revenues from Separate Businesses

Another strategy is to generate revenue from a separate business aside from the startup enterprise (or the key startup idea). This can be any type of business that uses the founders' expertise. We found interesting examples of this strategy among young engineering graduates from a college near Delhi in India. Several graduates set up businesses to provide design, testing, and other consulting services to local manufacturers. One graduate established a training college back in his home city to raise revenue. A startup in Ha Noi, which is developing a smart health app connecting doctors with patients, raises funds through a side business (also a tech startup) that provides e-receipt software for the local tax authorities. The stable stream of profits from the e-receipt software is reinvested into the development of the health app.

While operating these businesses, founders are refining their products, discussing partnerships with manufacturers, testing them in the market, or, in one case, moving a product through the long process of national product certification. A product can take several years to bring to market and financing is needed in the meantime not only to support product development but also the living expenses of the entrepreneur(s). This type of financing can not only help at the beginning, but also in the later development of the company. Having two or more businesses can help to better cope with sectoral downturns. In the best case, there might be synergies between business or technological spillovers.

4.4 Grants and Government Credit

Finance can sometimes be secured through grants from government agencies. These programs can vary by country. Sometimes they take the form of research grants, which support the R&D activities of the startup as it develops its product. Such grants support the technology side of development and are particularly important for startups engaged in product development, including in greentech and agritech activities, rather than in e-commerce and fintech. In addition to government sources, grants are also available from international cooperation (donor) agencies. It is difficult to know the full range of granting agencies and their funds, but we found evidence of this source in Cambodia.

Indeed, survey results indicate that 5% of startups received “international development grants” and that it was a more common source of financing than loans from banks and other financial institutions (Figure 3). Such grants may be concentrated in specific sectors, particularly related to greentech, such as energy conservation, renewable energy, and climate change adaptation. Given the global climate change imperative, developed country governments have oriented a portion of their aid to climate change initiatives. Startups may not know about these opportunities and need to make a dedicated effort to search for funding from the global startup ecosystem.

Government may also offer low-cost credit, although the eligibility may not be specific to startups and can include other SMEs. Indeed, programs by government financial institutions to support SMEs predate the startup concept in most countries. In Thailand, the SME Development Bank has been in operation since 2002, while the concept of startups gained general usage only from about 2016. The Small Industries Development Bank of India (SIDBI) has been providing credit since 1990, long before the recent era of startups. Despite the existence of these institutions, they do not necessarily provide a ready source of finance for startups. A study of 1,246 startups in India found that only 0.6% had borrowed from SIDBI. These banks can be conservative in their lending operations, providing credit to only more established businesses. They may require collateral that startups find difficult to provide and they may not be able to properly assess the risk of lending to untested startups.

However, governments are devising new facilities to finance startups. For example, the 2017 SME Law in Viet Nam provides for the creation of funds for preferential lending to “creative” SMEs (startups) and for credit guarantees. Elsewhere, the Small and Medium Enterprises Bank of Cambodia was established in 2019 and the following year an SME Support Fund of $50 million was created to provide funds to private financial institutions for on-lending to enterprises, including startups. In India, the government’s Startup India program includes the creation of a “fund of funds” valued at Rs. 10,000 crores ($1.4 billion) to provide financing over a four-year period to venture capital funds for investments in startups.

4.5 Angel Investors

Angel investors provide another potential source of finance for startups. Angels are normally high-wealth individuals and are often successful entrepreneurs themselves. This means that they may be more likely to provide “patient capital” that does not require a quick return and therefore can be suited to the long product development timespan for product (instead of service) activities in agritech and greentech. Angels provide finance by taking equity and therefore do require repayment, as does credit.

Angel investors are less visible than other forms of finance, having no physical presence, such as banks, and often having no “public” presence, such as government agencies or venture capital funds. Angels are most often found through personal connections and business networks or an appearance at a pitch competition. Because the existence of some angels remains below the radar, an accurate picture of their number and the flow of funds provided is hard to obtain. In some cases, angel investor associations have been formed.

The number of active angel investors in Thailand increased from two in 2012 to 35 in 2018 (Techsauce 2019). Thailand has sought to encourage angel investment by providing a tax break. However, the deduction on personal income tax is applicable to an investment of not more than 100,000 baht (less than $3,500). Angel investments are substantially higher than that and thus the fiscal incentive is not likely to have much impact on encouraging angel investment.

In Viet Nam, only an estimated 4% of investments in startups, by value, came from angel investors in 2016 (Topica Founder Institute 2017). However, tech startups also refer to friends and family as angel investors, so the distinction between these two sources of investment is unclear in Viet Nam. For these family and friend angels, equity is not expected, and repayment of capital may or may not occur. Generally, the small number of angel investors operating in the country make it challenging for more investors to come in because of the low number of people with similar experiences that could provide guidance.

4.6 Crowdfunding

Crowdfunding is another potential funding source. Crowdfunding means that many people contribute relatively small amounts to fund an enterprise. People may have a special interest in supporting the startup. It could be a philanthropic motivation, to support local communities, or other reasons. Today, the internet offers the option to market new ideas at low cost to a large community of possible investors and to collect funds. New communication technologies also allow funders to be continuously updated on the progress and thereby open up the possibility of additional future financing. Some startups use crowdfunding to build up a customer base and repay their loans through products or services.

Crowdfunding was not mentioned as a funding source by the enterprises and key informants we interviewed in the four countries. It is not used in Cambodia as there are no crowdfunding firms registered with the Securities and Exchange Commission.[6] Only 2.2% of startups in India cite crowdfunding as a financing source. (It is also the least cited source of finance in the Republic of Korea and the United States. See Appendix Tables A1 and A2.)

4.7 Bank Credit

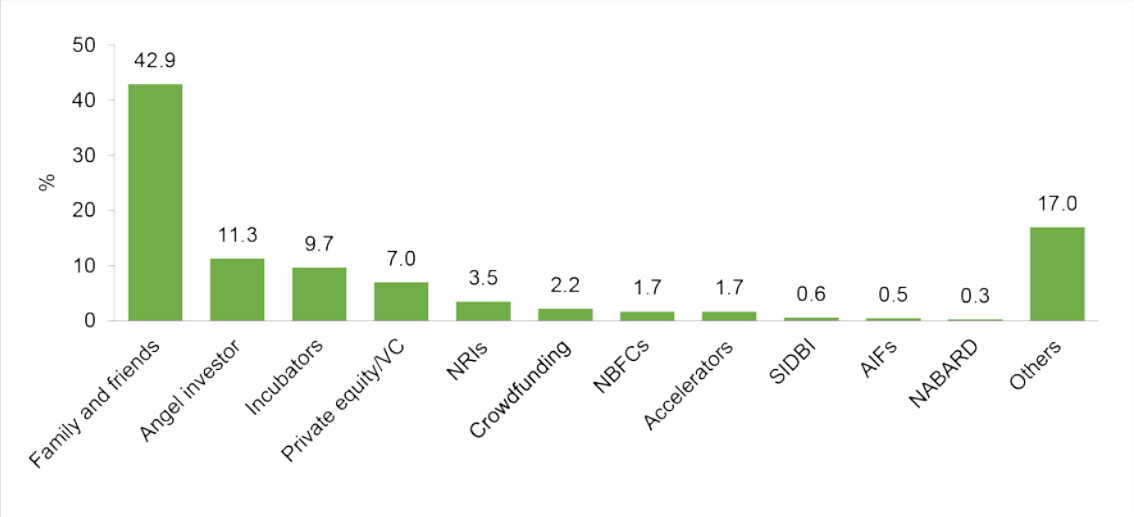
A side business also helps to secure bank credit. The business provides a cash flow that, channeled through a bank, provides a history of transactions. That history demonstrates a capacity to generate revenue and can be used to assess a business loan application. Getting the initial business loan can also be supported by a clean personal credit history. Securing and making timely payments on a car loan, for example, will help a business loan application. In India, for example, banks are quick to check a person's credit history on CRISIL, the main credit rating agency. We came across this strategy in our country case studies. Agritech and healthtech startups in Viet Nam have used banks for financing purposes despite the obvious difficulties young founders have in providing collateral.

4.8 Venture Capital

Venture capital (VC) is the form of finance most directly associated with startups. In most countries, the mass of startup firms has grown in tandem with the expansion of venture capital. Because it is formally organized, it has a more public presence than angel investment and therefore is easier for startups to identify as a funding source.

[6] Cambodia has a regulation that prohibits each crowdfunding firm/platform from raising more than $50,000 for a single transaction/campaign, with a maximum of four transactions allowed per year.

Figure 4: Funding Sources for Startups, % of Enterprises Surveyed, India, 2019



AIFs = Alternative Investment Funds, NABARD = National Bank for Agriculture and Rural Development, NBFCs = Nonbanking Financial Companies, NRIs = Nonresident Indians, SIDBI = Small Industries Development Bank of India, VC = Venture Capital.

Note: Respondents could select multiple sources.

Source: Reserve Bank of India (2019).

Despite the interest in investing in new ventures, VC is often out of reach for early-start startups. Venture capitalists often need to see not just an idea but a developed product or service that is ready for market or is already being sold in the market. VC often provides an important spur to scale up. Venture capital funds can be solely domestically organized or involve an external element. While India has a large pool of venture capital and startups can be domestically financed (or financed by foreigners), in other countries, international venture capital (IVC) has an important presence. They often set up a local operation and search for promising startups to invest in.

An interesting finding from our research is that venture capital funds, notably foreign ones, feel uncomfortable with company regulation and legal processes in many developing Asian countries. As such, they often require startups to register in a country with a trusted legal framework. This is the case for Cambodia, Thailand, and Viet Nam, in which domestic startups are asked – or feel obliged – to register in Singapore. In addition, foreign startups operating in ASEAN countries also register in their home country or in another trusted high-income economy. For example, two prominent foreign startups that we interviewed in Cambodia had registered, respectively, in Australia (home country of the founders) and Hong Kong, China (Japanese founder). Startups may also register in, or indeed operate from, Singapore because that is where much of the region's venture capital is based, and therefore it is more likely that they will access finance if they are based there. Moed (2018) reports that one-third of Thai startups are registered in Singapore as a strategy to access VC.

Corporate venture capital (CVC) funds can also be an important source of finance. These are funds set up by large companies to invest in promising firms, normally in a sector related to their operations. In Viet Nam, large corporations have increased their interest in financing creative startups. For example, Vingroup, the country's largest conglomerate, announced the establishment of two startup investment funds: VinGroup Ventures is a venture capital fund with $100 million and the VinTech Fund has $86 million to both support and invest in innovative tech startups. Also, Start-up Viet Partners now has a 100-billion dong ($4.3 million) venture capital fund, which

focuses on technology-based SMEs. At the 2019 Vietnam Venture Summit, 18 foreign investment funds signed a commitment to invest $425 million in startups over three years.

In Thailand, tech deals completed in 2017 and 2018 were valued at $240 million in total, with the biggest deal valued at $20 million and secured by Eko, a workplace communications platform (Itti 2018). Completed deals in Viet Nam were valued at $291 million in 2017 and were mostly in e-commerce, with 84% coming from offshore venture capitalists (Topica Founder Institute 2017).

In Cambodia, the digital telecoms provider Smart has been particularly active as a source of corporate venture capital.[7] Total, the French petroleum and resources firm, has also been providing funding for startups. Cambodia has about 20 VC and private equity (PE) firms/funds in operation. Many of them provide both VC and PE.[8] They are mainly interested in growth-stage businesses. Given the rise of startups in the country, some of the previously existing VC funds have diversified their targets in recent years to also invest in startups. Only a small number of VCs invest exclusively in one sector, because the total number of investment-ready startups is small and thus limiting to one sector restricts investment opportunities. Of the 20 investment firms/funds, about nine of them have been identified as targeting at least one of the four sectors that are the focus of our study (Ek 2019). Since 2015, at least 25 startups have received investment funding, with 14 deals publicly disclosed in 2018 alone.

In Thailand, the number of venture capital investors, including CVCs, increased dramatically over a short period from only 1 to 108 between 2012 and 2018. The number of deals (investments) and the value have also risen substantially. There was only one recorded investment in a startup in 2011, valued at about $1 million. However, between 2016 and 2018, there were between 31 and 35 deals annually with the aggregate value peaking at $106 million in 2017 and an average that year of about $3 million per investment.

4.9 Incubators and Accelerators

Incubators and accelerators can also play an important role in assisting the financing of startups. They serve as a platform where startups and finance partners can meet and get connected. In India, for example, one incubator we interviewed was regularly contacted by investors looking for promising startups for investment. Some incubators and accelerators also have their own funds that they invest or lend to the startups they nurture. For example, 11.4% of startups surveyed in India indicated that they received funding from an incubator or accelerator (Figure 4). In Thailand, the number of accelerators increased from one to 13 between 2012 and 2018. In Viet Nam, around 50 incubators and accelerators were reported to be active in 2018, most of which were government led. However, we do not have a picture of how many of the incubators and accelerators provide finance in these two countries.

[7] This is the firm owned by Smart Axiata, the Malaysian telecoms company, and is not to be confused with Smart Communications, the mobile service provider in the Philippines.

[8] Private equity takes a controlling equity stake, venture capital takes a minority stake.

5. CONSTRAINTS TO ACCESSING FINANCING IN THE FOUR SECTORS

We have focused on four specific sectors because of their potential development impact. However, there may be particular financing constraints for these sectors that do not affect more common tech startups engaged in e-commerce, marketplace, and fintech activities. Internet-based startups are seen as being at the core of the startups around the world because of the successes and the scale they have achieved. As such, investors may think it more plausible that new successful startups will emerge in those areas and be more willing to provide finance.

For the four sectors we have examined, the internet may be used or may provide partial support for the innovation, but in most cases the internet is not a key aspect of the firm's operations. Instead, these startups produce products. This is particularly true in cleantech and agritech, where startups develop such things as organic plant vaccines, pesticides and fertilizers, and mechanisms for reducing the energy needed to clean wastewater. As such, these products need to be developed, prototyped, refined, tested, and certified before they can be put on the market. Financing these efforts requires patience, which means providing "patient capital." VC investors may generally be less interested in waiting for many years before a product reaches the minimum viable product stage and starts to generate revenue. This point was made by Kerr, Nanda, Rhodes-Kropt (2014, 11), in which they argue that VC is particularly attractive to sectors that are "capital-efficient for both experimentation and subsequent scaling up," which characterizes digital technology or IT-based startups. Other sectors such as renewable energy "need to be proven at large scale to demonstrate technical feasibility" and they require traditional manufacturing plants. These investments in both experimental and production take time and investors are often not that patient. When found this concern about long gestation and a lack of patient capital to be a constraint within agritech and cleantech in the countries that we studied. Furthermore, if the manufacturing capability is not available in-country, producers may need to be found abroad, which we found was the case with Cambodia.

That said, there are opportunities for tech startups in greentech and agritech due to the specific nature of their sectors. The first is that greentech/cleantech is a favored area for impact investors and donors seeking to support environmental management and climate change mitigation and adaption. As such, it is necessary for startups in these sectors to seek out funds with investors who want to invest for impact, rather than approaching traditional VC investors. One greentech startup (distributing energy load) was able to source considerable grant and equity funds by searching out these impact investors, including donors.[9]

The second opportunity arises from corporate venture capital (CVC), which would like to "go green." Large firms providing CVC may want to be part of new innovations that could help their firm to be perceived as "green" or contributing to the SDGs. This might help the companies to attract additional shareholders and build a customer base among people who are environmentally conscious.

In the health and education sectors, there are both similarities with and differences from the other two sectors. A major difference from the other two sectors, and other tech sectors more generally, is that the market can be largely public. This is true for edtech

[9] In fact, the startup contracted a researcher to search for funding sources. The startup's managers then reviewed the potential sources, drew up a shortlist, and submitted funding applications to the most promising ones.

solutions that are used in public schools. It is also true of innovations in healthtech that involve hospitals and clinics. The healthtech innovations that involve products (medical devices) may have similar constraints to agritech and cleantech but they might also have more stringent certification processes because they are related to personal health and would be used in hospitals. For tech startups in these sectors, cooperative relations with government agencies are crucial. The success of new products depends on government approval and the willingness of the government to engage the startup. This setup holds implications for finance. While other startups are subject to the dynamics of the market, these startups face a more dichotomic outcome: either they have no access to the market or they obtain access to a large market that they should quickly cover. In the latter case, they might face no or little competition from other providers and therefore offer interesting investment opportunities for venture capital investors or banks.

Another distinctive feature is that the education and health sectors are heavily regulated and typically not fully open to foreign competition. Providing goods and services for these sectors can thus have the advantage of being less exposed to foreign competition. At the same time, it might also limit the option to easily offer the products abroad. This might reduce the attractiveness of international venture capital, especially if the home market is small in size, such as in Cambodia.

Most tech startups are located in cities, where they have better access to talent, inputs, and finance. However, startups with a development focus might have a large customer base in rural areas. For example, agritech solutions are mostly developed for rural areas. Greentech startups often need to try out their solutions in areas where clean electricity is generated, typically rural areas. In terms of public health, there is a large gap between the provision of health services in cities and in rural areas. The fact that many development-oriented startups have a strong link to rural areas has implications for finance. First, the customer base in rural areas is less tech-savvy and poorer. Second, the startups face additional costs from being present in cities as well as in the countryside. This may have implications for the size of the market for agritech goods and services and profitability, which may deter investors.

6. CONCLUSION

Asia is very much a part of the startup revolution that has swept the world over the last 15 years. Entrepreneurs with a knack for technology and the ability to conjure up good ideas for new services have been able to see their businesses grow to phenomenal levels. Most have been aided by the internet through which they have reached thousands and indeed millions of customer users. The rise of tech startups has occurred in parallel with the rapid expansion of two important elements of the startup ecosystem: incubators and venture capital.

Our review of tech startups in four sectors (agritech, cleantech, edtech, and healthtech) across four emerging Asian economies (Cambodia, India, Thailand, and Viet Nam) has drawn two main findings. First, there are a variety of opportunities to obtain financing aside from venture capital. Indeed, startups at their pre-market and market-entry stages are likely to rely on such sources as savings, money from family and friends, salaried employment, profits from side businesses, pitch competition prizes, and loans and grants from governments, donors, and other organizations. As they develop, funding may also come from angel investors. A small number will access venture capital and a much larger number will struggle, at least in the early stages, to gather less significant funding amounts from other sources.

The second main finding is that while the four focus sectors may be areas that support development objectives and are linked to the Sustainable Development Goals, there are far fewer tech startups in these sectors and they find it difficult to access finance. We can suggest some reasons why this might be the case. Partly, it may be that the business idea is a product, especially in greentech and agritech, that might require more patient capital as product development may take longer and be more costly than startups in other sectors. Similarly, it may be due to the perception that investments in these areas are more difficult, less easily scalable, and more similar to traditional products and services than are investments in e-commerce, digital marketplaces, and other internet-based firms. Investors may be looking for the next Amazon, Facebook, or Gojek and see – rightly or wrongly – less potential in more development-oriented sectors.

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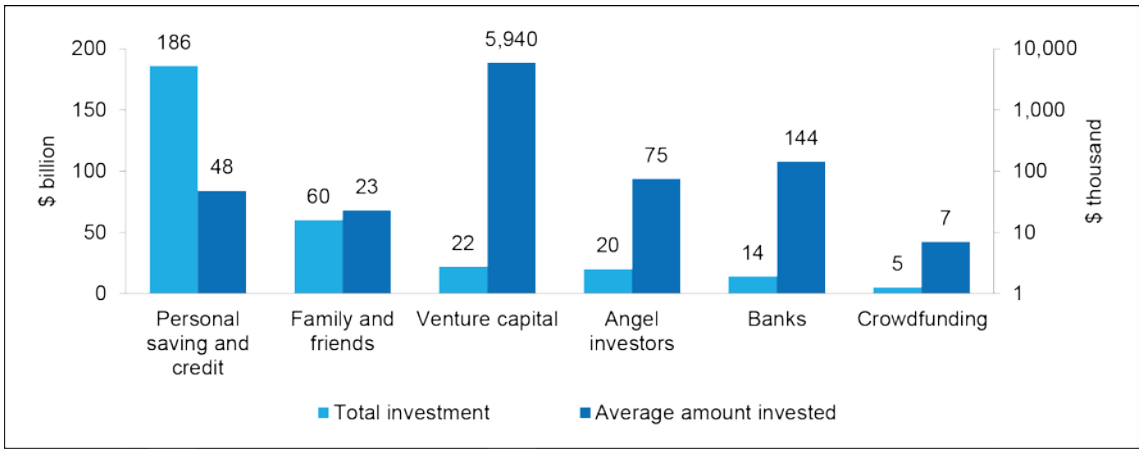
APPENDIX

Table A1: Number of Incubators and Startups Interviewed
(by country and sector)

	Cambodia	India	Thailand	Viet Nam
Agritech	6	5	3	5
Edtech	4	1	2	–
Greentech	4	1	2	–
Healthtech	3	4	4	5
Incubators	5	2	2	1

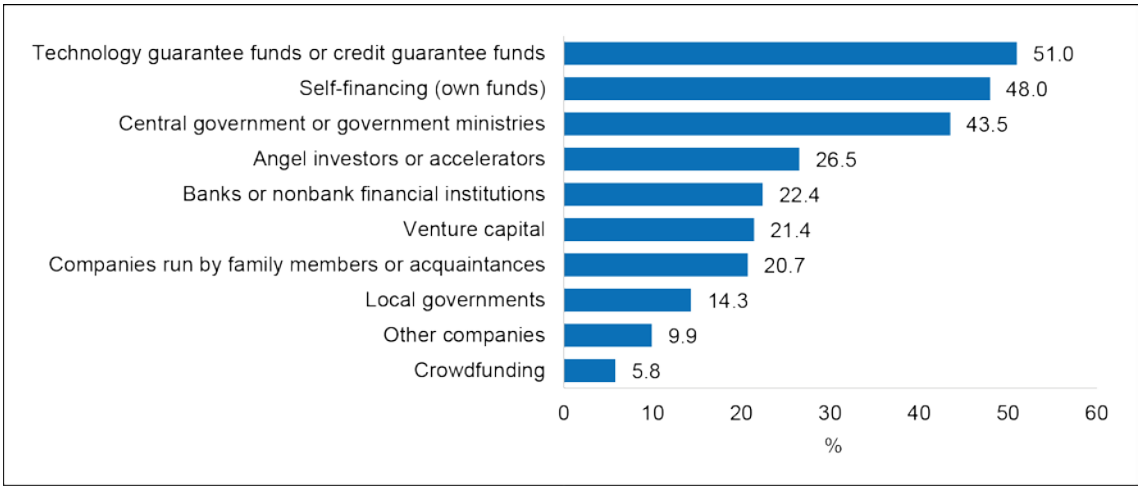
Source: Authors.

Figure A1: Funding Sources for Startups in the United States, 2012



Note: Total investment is on the left axis. Average investment per startup is on the right axis.
Source: International Trade Centre (2019) based on data from Startup Funding.

Figure A2: Funding Sources for Startups, Republic of Korea, 2018
(% of enterprises indicating each source)



Note: Startups could select multiple sources. Local governments include Seoul Metropolitan Government and Gyeonggi Provincial Government.
Source: Born2Global Centre, Republic of Korea. https://www.born2global.com/Korea Startup Index 2018.