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A review of Micro, Small and Medium Enterprises in the ICT Sector

2016

emerge

ITU

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2016

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Table of Contents

List of tables, figures and boxes

Tables

Figures

Boxes

Foreword

The role of Micro, Small and Medium-sized Enterprises (MSMEs) in supporting economic growth and job creation is well established. Recently, tech MSMEs and startups have been thrust into focus, with governments seeking to enable domestic tech ecosystems and encourage home-grown digital products and services, including online marketplaces which make it easier for companies to transact with customers locally and abroad. ICT services have enabled the broader MSME population in general, but have also created unique opportunities for new entrants to introduce products and services which are transforming traditional industries.

In November 2015, ITU and key collaborators decided to launch the Emerge Partnership to help scale ICT entrepreneurship for social impact, and provide a platform for tech MSMEs from around the world to share experiences, grow, and create jobs. Our vision for the partnership is to support rich ICT innovation and entrepreneurial ecosystems in emerging economies, which should be built through close collaboration between public, private, academia and civil society actors. The overall objective of the initiative is to increase the number of small, young and nimble tech firms with high-growth potential from emerging markets, and provide a platform for these firms to expand internationally.

This report is the first deliverable of the EMERGE partnership, and the result of extensive months of engagement and discussion with a range of actors, including Ministries of ICT, Trade and Industry, national innovation agencies, large multinational companies, academic institutions, business and technology schools, incubators, accelerators, financiers, business mentors, industry associations and MSMEs themselves. It seeks to distinguish tech startups and MSMEs within the overall MSME population, describe their symbiotic relationship with the ICT sector, discuss the unique challenges faced and support interventions being applied, and highlight why tech startups and MSMEs in particular are such important drivers of innovation and growth.

I am positive that the publication is just the start of a very fruitful collaboration that will benefit all ITU Members, but most importantly, will improve the environment in which tech MSMEs operate, allowing them to continue delivering transformative services, products and solutions in benefit of the whole society at large.

Houlin Zhao
Secretary General
ITU

Introduction

The issue of why Micro, Small and Medium-sized Enterprises (MSMEs) matter has been an element of national, regional and global debate for several decades. Tech MSMEs have brought a new dimension to the discussion, with 'startups' gaining popularity in mainstream discourse. Fuelled by fairy-tale stories of companies achieving billion-dollar valuations in the period of a few years, the startup craze has swept the world inspiring a new generation of entrepreneurship. With governments seeking to enable economic growth, the ICT sector looking to acquire the next disruptive technology and investors in search of big exits, high-growth potential tech startups and MSMEs have never been more in demand, nor more elusive. This paper seeks to understand these firms, their position within the broader MSME category, and the economic/political/social climate in which they grow. It further highlights the principals by which this entrepreneurial spirit may be harnessed for sustainable development.

1 ICT-enabled Micro, Small and Medium-Sized Enterprises

1.1 Why Micro, Small and Medium Enterprises (MSMEs)?

There is solid empirical evidence confirming that MSMEs are a major engine of growth and job creation[1]. As with regard to the sector's contribution to national income, global estimates show that MSMEs account for 60% to 70% of gross domestic product (GDP). Concerning the relationship between firm size and economic growth, there is consistent evidence that a large share of MSMEs spurs economic growth at the industry or subnational level. The picture is less clear at the aggregate national level. Econometric studies come out with contradictory findings concerning a positive, causal relationship between the prevalence of MSMEs and economic growth. The explanation is probably that the MSME sector is too heterogeneous for one single clear trend to be pinpointed on its contribution to growth.

However, differentiating MSMEs by enterprise age provides a clearer picture. The relatively small subgroup of young dynamic enterprises makes a key contribution to economic growth. Empirical studies have found a significant relationship between the entry of new enterprises and economic growth.

A key ingredient for improving growth performance of countries is innovation. Start-ups and MSMEs play an important role in developing and commercializing innovations. Empirical evidence on firm size and innovation lags behind. OECD data show that MSMEs innovate, but not as much as large firms when accounting for the number of firms introducing innovations[2]. On the other hand, a study focused in the United States suggests that MSMEs and young firms make higher contributions to innovation than large firms[3]. **Thus while findings show** that MSMEs are important for innovation, more data are needed, and a further differentiation analysing the role of high-growth MSMEs and young firms is required.

The contribution of MSMEs to employment is even more important than their addition to national income or innovation. Globally, MSMEs account for 95% of all enterprises and for two thirds of all formal jobs. The sector also plays a critical role in the job creation process. Data from the EU show that 85% of net employment creation[4] is attributable to MSMEs. However, productivity and wages of

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1 With the exception of the remarks on MSMEs and innovation, the following facts and figures are taken from ILO. 2015. *Small and Medium-Sized Enterprises and Decent and Productive Employment Creation*. http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_358294.pdf.

2 OECD. 2010. *SMEs, Entrepreneurship, and Innovation*. http://www.oecd.org/cfe/smesentrepreneurshipandinnovation.htm

3 Jose M. Plehn-Dujowich. 2013. *Product Innovations by Young and Small Firms*. Washington DC: SBA. https://www.sba.gov/sites/default/files/files/rs408tot.pdf

4 Defined as the difference between the jobs created by new or existing enterprises and the jobs destroyed either through contraction of existing enterprises or through business closures.

MSMEs are lower than in large enterprises. Furthermore, MSMEs usually score lower for the quality of employment than larger firms on issues such as remuneration, job security, or skills development.

When analysing further which subgroups of MSMEs have the highest job creation rates, there is solid evidence that firm age matters more than firm size. It is primarily young small enterprises of less than five years that generate most of the new jobs. These high growth enterprises are often referred to as transformational entrepreneurs, graduate enterprises or gazelles.

1.2 Why tech MSMEs?

Information and Communications Technology (ICT) – including cloud computing and the rise of software-as-a-service – has reduced the cost of innovation and market access, allowing small tech businesses to compete with established industries. As the founders of an Egyptian mobile application startup note: "We are lucky that we don't need the support of anything except good wattage, as opposed to manufacturing goods or opening a store"[5]. This phenomenon is creating vibrant startup communities across the world.

Small tech businesses create new sources of employment. The ease of scaling many digital technologies means that successful tech startups can grow rapidly, and though most will fail, overall job creation is increased. Research into the United States job market found that job gains among young tech firms outweigh job losses from early-stage firm failures[6].

Tech startup founders are predominantly university-educated, a factor that could alleviate high unemployment rates among those with a college degree in many developing nations[7]. Traditional business models are failing to absorb this potential talent pool. If nations can successfully harness the tech ecosystem, there could be significant job gains, given that tech startup founders are overwhelmingly college-educated.

The tech startup phenomenon is altering traditional developing country ICT-enabled strategies inward from outward. A number of emerging nations have emphasized ICT-enabled, export led growth, often at the expense of developing their own ICT infrastructure, applications and services. This has resulted in islands of tech expertise, overlooking the wider domestic market. Rapidly rising mobile and Internet use over the last decade has created a tipping point for greater local access to content and services, and startups are stepping in to fill this void. So-called social entrepreneurs are leveraging ICTs to develop services in areas such as financial inclusion and clean technology that are also starting to positively affect developing countries. A related development is the rise of freelancers, independent software contractors who work for themselves rather than a company[8]. Their ranks are swelling in some developing nations. Freelancing is at the intersection of the traditional export-oriented software market and the tech startup world. Freelancers typically provide software and other services for overseas clients but like entrepreneurs work for themselves. Many startups work as freelancers to augment their income while they are developing their product. At the same time, freelancers provide inexpensive expertise in areas many startups often lack skills such as marketing and accounting. Startups can contract freelance work as they scale up or down without the need to hire staff or maintain large offices.

The startup revolution shifts the drivers of innovation from a focus on technology transfer, patents and trademarks to venture capital, co-working spaces, incubators and accelerators, and it pits an urban startup cafe culture at odds with government mega IT parks.

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5 Seligson, Hannah. 2011. "Egypt's Entrepreneurs Look Beyond the Revolution." *The New York Times*, July 16. http://www.nytimes.com/2011/07/17/business/global/egypts-entrepreneurs-look-beyond-the-revolution.html.

6 Hathaway, Ian. 2013. "Tech Starts: High-Technology Business Formation and Job Creation in the United States." Ewing Marion Kauffman Foundation Research Paper. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2310617

7 http://static.wamda.com/web/uploads/resources/Four_Country_Report_-_Aug26.pdf

8 ITU-D, 2014. Digital Opportunities: Innovative ICT Solutions for Youth Employment: http://www.itu.int/en/ITU-D/Digital-Inclusion/Youth-and-Children/Documents/YouthReport_2014.pdf

The following section describes such tech startups and related MSMEs. This includes a working definition for these types of entities and the ecosystem they operate in.

1.3 Definitions

The structure of the ICT sector is defined within the fourth revision to the International Standard Industrial Classification of All Economic Activities (ISIC Rev.4)[9]. The classification provides an internationally comparable framework for measuring ICT goods and services grouping the sector into manufacturing, trade and services (Table 1.1). Of note are e-commerce activities, which are not classified within the ICT sector but rather within the retail trade industry (with a distinctive classification—4791: Retail sale via mail order houses or via Internet—although most national statistical systems do not unfortunately provide this level of detail).

Table 1.0.1: ICT sector definition

ISIC Rev.4	Description
ICT Manufacturing Industries	
2610	Manufacture of electronic components and boards
2620	Manufacture of computers and peripheral equipment
2630	Manufacture of communication equipment
2640	Manufacture of consumer electronics
2680	Manufacture of magnetic and optical media
ICT Trade Industries	
4651	Wholesale of computers, computer peripheral equipment and software
4652	Wholesale of electronic and telecommunications equipment and parts
ICT Services Industries	
5820	Software publishing
61	Telecommunications
62	Computer programming, consultancy and related activities
631	Data processing, hosting and related activities; web portals
6311	Data processing, hosting and related activities
6312	Web portals
951	Repair of computers and communication equipment

Source: http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf

Note: The Information sector includes Publishing industries (except internet); Motion picture and sound recording industries; Broadcasting (except internet); Telecommunications; Data processing, hosting, and related services; and Other information services.

It should be remembered, however, that sector definitions and standard industry classifications inevitably lag the real economy. In addition, they often do not reflect the ways in which ICT is

[9] http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf

transforming other sectors. For example, 'sharing economy' firms such as Uber and Airbnb are fundamentally reliant upon digital technologies, but are typically not classified as part of the ICT sector.

There is no global definition of Micro, Small and Medium-Sized Enterprises (MSMEs). Instead, there are regional or national definitions used for either legal or statistical purposes. Definitions are typically based on the number of employees and/or revenue. The legal definition for employee size used by the European Union (EU), which includes micro and large enterprises, are those used in this report[10]. Revenue figures are not considered since they would not be relevant in a global application of this definition where there is greater income heterogeneity than in the EU. MSMEs are not subsidiaries of other companies.

Similarly, while there is no standard definition of a tech startup, it can be conceptualized as a new entrepreneurial venture where ICT is a critical part of the business model. A number of studies suggest that most startups have less than ten employees. To highlight an example of this, among the over 630 startups pitching to Seedstars Summit 2016, the average number of employees was just over four with the highest at ten[11]. However, this may vary, and later-stage startups may well consist of more than 10 employees, in particular as many companies tend to stick to the term 'startup' to emphasize their aspiration to reach global scale within a short timeframe, and maintain their original company culture.

A tech **startup** represents a unique subset of the MSME category. While these young enterprises may be statistically defined as MSMEs (usually in the micro to small categories) based on revenue or number of employees, they are not yet sustainable in their current form. Very early stage startups will still be trying to create customers (or identify a need), and will be in the process of developing or monetizing their products. Later stage startups may be generating some revenue, and would be looking to expand or scale-up. This report does not distinguish between early and late stage startups, and instead assumes that once a company monetizes its product or services, starts to generate revenue and enters expansion or scale-up mode, it ceases being a startup.

This leads to the following definitions for startups and MSMEs depending on whether they are statistically included in the ICT sector or reliant on ICT services (ICT-enabled). Enterprises that are in the ICT sector or ICT-enabled are collectively referred to as "tech" in this report[12].

Table 1.0.2: Startups, MSMEs and companies

Type	Characteristics	Comment
Tech Startup	– Classified in the ICT sector or business model is reliant on ICT services. – Age less than 5 years old. – Privately held. – Not a subsidiary of another company. – Still searching for a reliable and sustainable revenue stream.	Refers to either an informal or formally registered entity, which is still in the process monetizing their products or services. No statistical limit on employee size or revenue.
Micro tech enterprise	– 1-9 employees and less than €2 million revenue<?>. – Classified in the ICT sector OR business model is reliant on ICT services. – Privately held. – Not a subsidiary of another company.	This category may include startups who are still searching for a scalable and repeatable business model (have not monetized their products or services). Firms older than 5 years which have not graduated from the micro 'category' would no longer be considered startups.

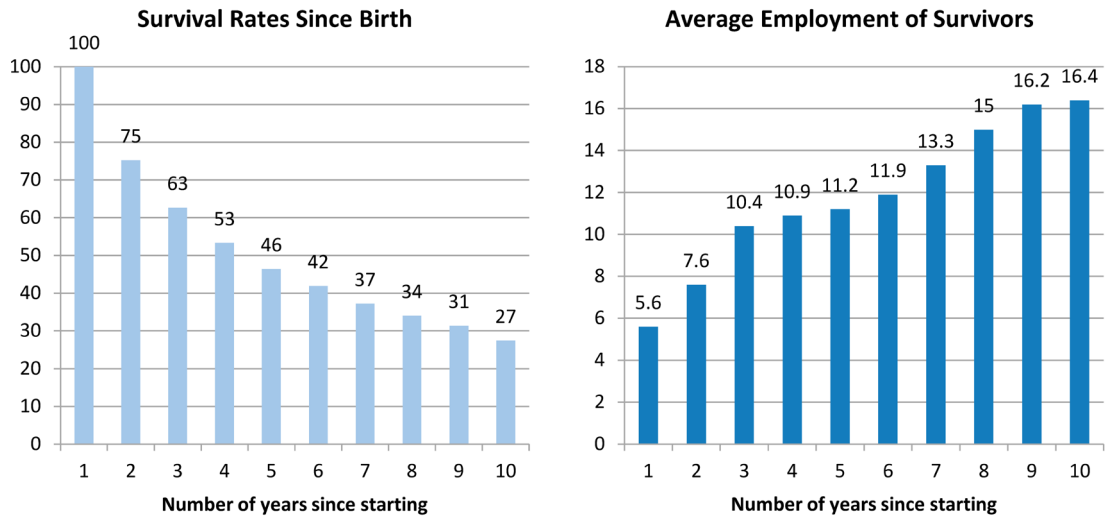
10 http://unstats.un.org/unsd/industry/meetings/eg2005/AC105-22.PDF
11 Seedstars. 2016. *The Rising Startup Ecosystems*.
12 Seedstars. 2016. *The Rising Startup Ecosystems*.

Type	Characteristics	Comment
Small tech enterprise	– 10 – 49 employees and less than €10 million revenue. – Classified in the ICT sector OR business model is reliant on ICT services. – Privately held. – Not a subsidiary of another company.	This category may still include startups who are still searching for a scalable and repeatable business model (have not monetized their products or services). Firms older than 5 years which have not graduated from the small 'category' would no longer be considered startups.
Medium-sized tech enterprise	– 50-249 employees and less than €50 million revenue. – Sustainable or growing business. – Classified in the ICT sector OR business model is reliant on ICT services. – Privately held. – Not a subsidiary of another company.	Although unlikely, this category may still include startups who are still searching for a scalable and repeatable business model (have not monetized their products or services). Firms older than 5 years which have not graduated from the medium 'category' would no longer be considered startups.
Large tech company	– >249 employees. – Classified in the ICT sector Business model is reliant on ICT services. – Publicly listed, privately held, government owned or a mixture,	Includes companies such as ICT equipment manufacturers, telecommunication operators and software firms. Also includes companies engaged in electronic commerce, as well as companies where Internet or mobile access is fundamental for using the product either in terms of ordering and/or payment.

1.4 Survival Rates vs Firm Age and Size

Data on the survival rate of newly established enterprises from the Information sector in the United States indicate that less than half survive to year five and just over a quarter to year ten (Figure 1.0.1, left). The average establishment surviving to year three employs just over ten employees moving from the micro to small enterprise level where it remains until year ten (Figure 1.0.1, right). Of course, these are average figures and a few startups achieving rapid scale will employ many more people and even move to the large enterprise size.

Figure 1.0.1: Establishment Age and Survival, Information Sector, United States, 2006-2015



The charts refer to the ten years following the establishment of a company in March 2006.

Source: US Bureau of Labor Statistics.

A tech enterprise's potential for rapid scale can depend on whether it relies on ICT networks as a central component of its business model, or strategy through which to deliver its product or service. Internet and mobile networks provide a universal platform, which makes it possible for companies with an ICT-based business model to rapidly expand into new markets in almost any corner of the world. These ICT-enabled companies may scale much more rapidly than a company directly situated in the ICT sector in one of the ISIC categories referenced in earlier.

Box 1.0.1: High-Growth Firms (NESTA)

The economist David Birch introduced the term "gazelle" in the early 1980s, to describe a private business with at least US$100,000 in annual revenues (approx. US$250,000 today), and annual revenue growth of more than 20 percent over four years[1]. Today, many policymakers use the similar labels of 'high-growth firms' or 'scale-ups'.

Recent research supports the claim that a small percentage of young gazelles, or high-growth firms (HGFs), account for the majority of economic growth and new job creation. The OECD, for statistical purposes, defines HGFs as enterprises with average annualized growth in employees (and/or turnover) greater than 20% per year, over a three year period. This definition only considers businesses with ten or more employees at the beginning of the observation period[2], and therefore discounts early stage startups.

HGFs are not concentrated in a few sectors, but found across industries. In the UK for example, HGFs are split almost equally between 'high-tech' (advanced manufacturing, biotech etc.) and 'low-tech' (construction, retail etc.). One of the major drivers of firms' growth is their ability to innovate: innovative firms grow twice as fast as non-innovators (in employment and sales)[3]. Importantly, innovation is not just investment in research and development (R&D), but can include 'hidden innovation' such as investment in training, new software and innovative marketing.

HGFs are rare among the overall firm population, but tend to be more productive than other firms, as well as generating the majority of new jobs: in the UK, for instance, around 6% of total firms generated half of the country's employment growth between 2002 and 2008[4]. The story is similar elsewhere, in low, middle and high income settings alike: in Uganda, scaleups also represent around 6% of firms and create 47% of new jobs; in Kenya, 5% of firms create 72% of jobs; in Jordan, it is 9% creating 53% of new jobs; in Colombia, 8% generate 45% of jobs[5].

Given the obvious importance of HGFs, there is a strong argument that economic policy should focus on encouraging more firms with high-growth potential to enter the high-growth phase, rather than broad-based business support programmes for new startups and MSMEs that lack scaling potential. (Although that is not to say that startups are unimportant: without startups there will be no scaleups.) Instead of being viewed as an elitist policy, supporting excellence and innovation should be recognized as the most effective way of enabling wide-spread opportunity and social impact through job creation.

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1 Birch, D. 1979. *The Job Generation Process*. Cambridge, MA: MIT Program on Neighborhood and Regional Change.

2 OECD. 2002. *High Growth SMEs and Employment*. https://www.oecd.org/cfe/smes/2493092.pdf.

3 NESTA. 2012. *Plan I: The Case for Innovation-led Growth*. https://www.nesta.org.uk/sites/default/files/plan_i.pdf

4 NESTA. 2009. *The Vital 6 per cent*. http://www.nesta.org.uk/sites/default/files/vital-six-per-cent.pdf

5 World Bank (2013) *Enterprise Surveys*. http://www.enterprisesurveys.org/ cited by Endeavour Insights

1.5 Tech ecosystem

The tech startup ecosystem is unique, distinguishing it from other MSME environments. Unlike other MSMEs, tech startups have a high failure rate[13] making them risky and reliant on non-traditional financing sources such as venture capital and crowdfunding. Shared working and collaboration spaces and dedicated incubators and accelerators also characterize the tech ecosystem. Networking plays a vital role in the ecosystem by connecting different stakeholders through various types of events such as meetups, hackathons and bootcamps.

A number of stakeholders support the tech startup ecosystem including the ICT sector, investors, universities, citizens, governments, associations/societies and development partners. The ICT sector is a valuable partner operating the networks that enable tech startup products, providing and absorbing talent to and from the ecosystem and contributing to other important ecosystem building activities. Investors provide the cash injection needed by startups to scale and grow. In addition to providing talent, universities can be anchors around which startup communities cluster. Citizens test and use startup products, and increasingly provide support through crowdfunding. Governments, ranging from local to central, can facilitate the ecosystem through relevant legislation, a supportive business environment and providing relevant technical and entrepreneurial skills training in educational institutions. Evidence from startup ecosystems around the world indicates that all these stakeholders and elements need to be actively involved in supporting startups for the ecosystem to be successful.

1.6 Structure of the report

This report will further explore how tech MSMEs can be supported to grow and create jobs. The purpose of this publication is therefore to support knowledge creation for key stakeholders in the ecosystem on how to increase opportunities for tech MSMEs, and create a better understanding for the role of ICT and the Internet in supporting ICT-enabled or high-growth potential companies.

The next chapter looks at how the ICT sector can be a valuable ally of tech startups and MSMEs by providing the networks that enable tech products as well as through initiatives to support the tech ecosystem. Chapter 3 examines how tech MSMEs contribute to the economy and the ICT sector, particularly their impact on employment and their role in diversifying national ICT sectors. Networking aspects of tech ecosystems is looked at in Chapter 4. Funding options for tech MSMEs is covered in Chapter 5, particularly the different forms it takes such as seed, angel, venture capital and crowd investing. Other aspects of the tech MSME ecosystem such innovation, government business processes and entrepreneurship is discussed in Chapter 6. Harnessing innovation for Sustainable Development is addressed in Chapter 7. Conclusions and observations are offered in Chapter 8.

[13] While 75% of SMEs involved in traditional business survive after two years the figure is reversed for tech startups. See: Compass. *The Global Startup Ecosystem Ranking 2015*. https://s3-us-west-2.amazonaws.com/compassco/The_Global_Startup_Ecosystem_Report_2015_v1.2.pdf

2 Contribution of tech MSMEs to the ICT sector and wider economy

This chapter reviews evidence about the economic impact of tech startups and MSMEs in areas such as their contribution to economic growth, employment and investment. It then turns to the contribution of tech startups and MSMEs to the ICT sector itself.

2.1 Benefits for the economy

2.1.1 Value added

Quantifying the economic contribution of ICT and ICT-enabled startups and MSMEs to the economy is difficult. One challenge is that national statistical systems in many countries do not sufficiently disaggregate national accounts data by the size of companies. Even if they did, a far more challenging problem is that there is no common industry in the national accounts that tech startups and MSMES belong to. While many might be classified as software, others such as smartphone-based car hailing services would be classified under transportation and e-commerce startups and MSMEs would be classified under retail trade.

Due to these limitations, most economic analysis of tech startups and MSMEs instead just assumes they are all in a "tech sector". Given that the ISIC includes up to four levels of detail, specific divisions could be rearranged to suit different definitions of the tech sector. This can accommodate the concept of an Information and Communication Technology (ICT) sector incorporating both services and hardware[1]. Silicon Valley measures an "Innovation and Information Products & Services" sector that in addition to information and communication also includes computer hardware, instrumentation (navigation, measuring and electro medical) and life sciences (pharmaceuticals, medical devices, biotechnology)[2]. Studies for New York City have created their own version of the tech sector using two different categorizations[3]. While these classifications are interesting, they are often one-off and differ widely in their interpretation of the tech sector. Some include equipment while others are focused on services and some include information in the wide sense, while others exclude media such as publishing, television and film. None of these studies is able to determine the economic impact of just tech startups and MSMEs.

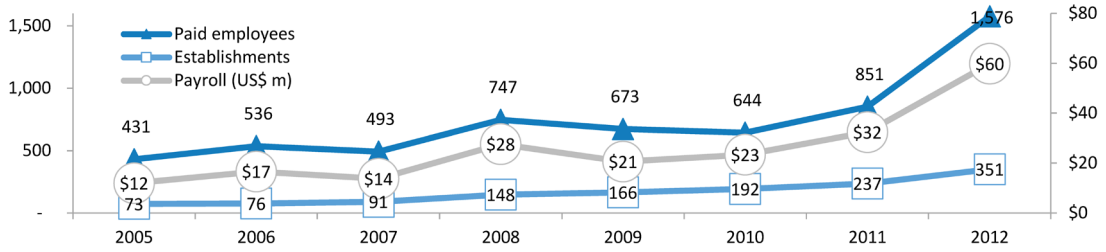
It is possible to infer some information if sufficiently disaggregated sector information is available. For example, sector data from the United States is available on the number of enterprises, payroll and employment by geography. Data on the e-commerce sector[4] in the New York borough of Brooklyn shows the number of enterprises increasing by 278 between 2005 and 2012 or almost five times (Figure 2.0.1). Most are likely new startups or MSMEs though they might be large companies that have suddenly entered the e-commerce space. The latter assumption seems largely unlikely since average employment per establishment dropped from 5.9 in 2005 to 4.5 in 2012. Despite the drop in average employment, over a thousand e-commerce jobs were added in the borough during the period and the payroll value added increased from US$12 million to US$60 million.

Given the difficulty of precisely determining the economic contribution of tech startups and MSMEs, some studies instead look at future impact, where methodologies are less clear. For example, a 2013

1 http://unstats.un.org/unsd/cr/registry/docs/i31_ict.pdf
2 https://www.jointventure.org/images/stories/pdf/index2015.pdf
3 http://www.hraadvisors.com/wp-content/uploads/2014/03/NYC_Tech_Ecosystem_032614_WEB.pdf and https://southmountaineconomics.files.wordpress.com/2013/09/building-a-digital-city1.pdf
4 This refers to the North American Industry Classification System (NAICS) code 454111 Electronic Shopping which in turn corresponds to ISIC 4.0 Class 4791 (Retail sale via mail order houses or via Internet).

study forecast that the tech startup sector would contribute 4% of Australia's GDP by 2030[5]. A similar study for Singapore estimates startups could contribute 2% of GDP by 2035[6].

Figure 2.0.1: Brooklyn-454111: Electronic shopping



Source: Adapted from U.S. Census Bureau.

2.1.2 Employment

There is a growing body of literature about employment impacts generated by startups and MSMEs including some attempting to look more closely at the special case of tech startups. An 18-country study found that MSMEs account for the majority of employment and they create and destroy jobs at an equal proportion[7]. However, young MSMES (less than 5 years old) have been the primary source of net job creation over the last decade (Figure 2.0.2). Even though they only account for 17% of all employment, they created 42% of jobs and destroyed only 22%.

In the United States, one study covered the more specific case of the employment impact of high-tech startups. They were defined as the "group of industries with very high shares of employees in the STEM fields of science, technology, engineering, and math"[8]. Employment gains among young tech firms outweigh job losses from early-stage firm failures with an "up-or-out" dynamic; they either fail or grow rapidly. Young high-tech firms also create jobs at a higher rate than firms in other industries (Figure 2.0.3). The number of new high-tech startups has increased and is 69% higher in 2011 than in 1990 whereas the rate of new firm births in the overall private sector declined 9% over the same period.

Similar to the "up-or-out" dynamic in the United States, an Australian study found that a small proportion of start-ups create the bulk of jobs. These high growth start-ups have high sales and profits compared to other start-ups[9].

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5 Tech startups were defined as where technology is central to the product/service being provided; high leverage of the labour input to the product/service so that the business can scale rapidly; the product/service is a 'disruptive innovation' in that it helps create a new market or new supply chain/network which disrupts an existing market and the startup has revenue under $5 million per year. This definition includes companies whose final product/service is not technology itself, but is technology dependent. See: PwC. 2013. *The Startup Economy*. https://www.digitalpulse.pwc.com.au/wp-content/uploads/2013/04/PwC-Google-The-startup-economy-2013.pdf

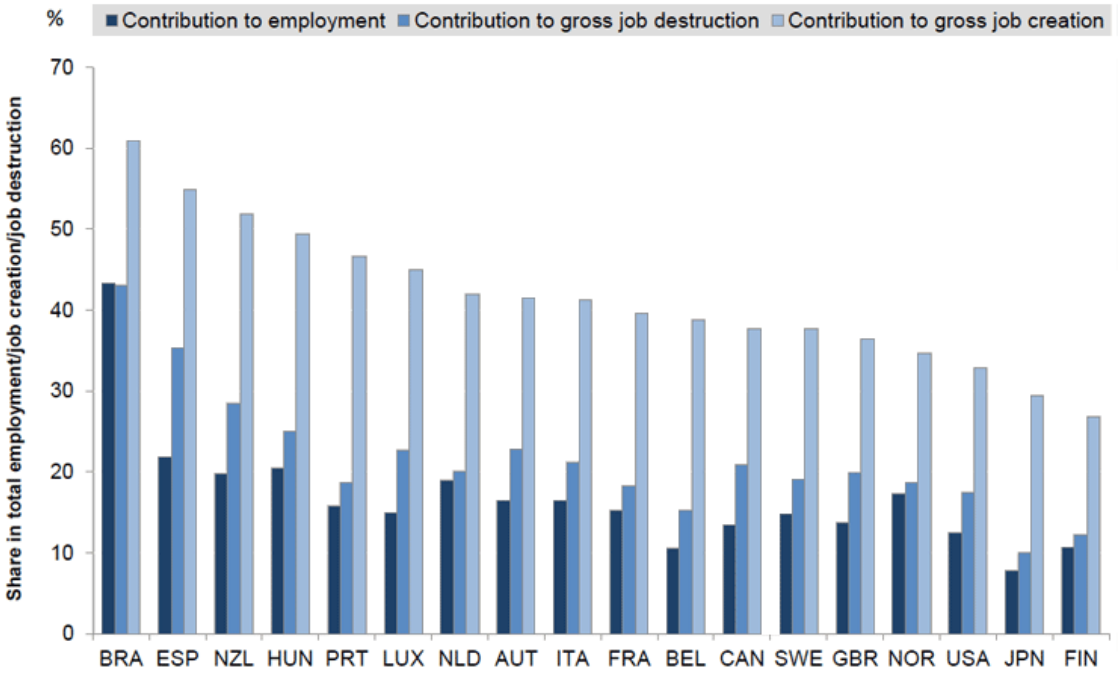
6 http://techsg.io/upload/files/research/1453173164742.pdf

7 Criscuolo, C., P.N. Gal and C. Menon (2014), "The Dynamics of Employment Growth: New Evidence from 18 Countries", OECD Science, Technology and Industry Policy Papers, No. 14, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/5jz417hj6hg6-en

8 Hathaway, Ian. 2013. "Tech Starts: High-Technology Business Formation and Job Creation in the United States." *Ewing Marion Kauffman Foundation Research Paper*. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2310617

9 http://www.industry.gov.au/Office-of-the-Chief-Economist/Research-Papers/Documents/2015-Research-Paper-4-The-employment-dynamics-of-Australian-entrepreneurship.pdf

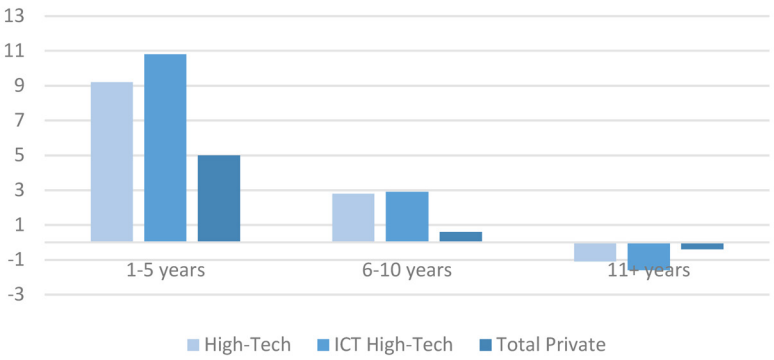
Figure 2.0.2: Contribution to employment and job destruction and creation, young MSMEs, 2001-2011



Note: Young MSMEs refers to those less than 5 years of age.

Source: Criscuolo, Gal and Menon (2014), "The Dynamics of Employment Growth: New Evidence from 18 Countries", OECD Science, Technology and Industry Policy Papers no. 14.

Figure 2.0.3: Average annual net job creation by firm age and industry, United States, 1990-2011



Source: Hathaway, Ian. 2013. "Tech Starts: High-Technology Business Formation and Job Creation in the United States."

2.2 Benefits for the ICT sector

ICT-enabled MSMEs benefit the ICT sector in several ways. Usage of their products drives network traffic, increasing revenues for telecommunication operators. They also diversify the ICT software industry by shifting emphasis from exports to domestic use and spawning new types of innovation. [TO INSERT: MSMEs as drivers of demand for ICT services. Some analysis from INTEL].

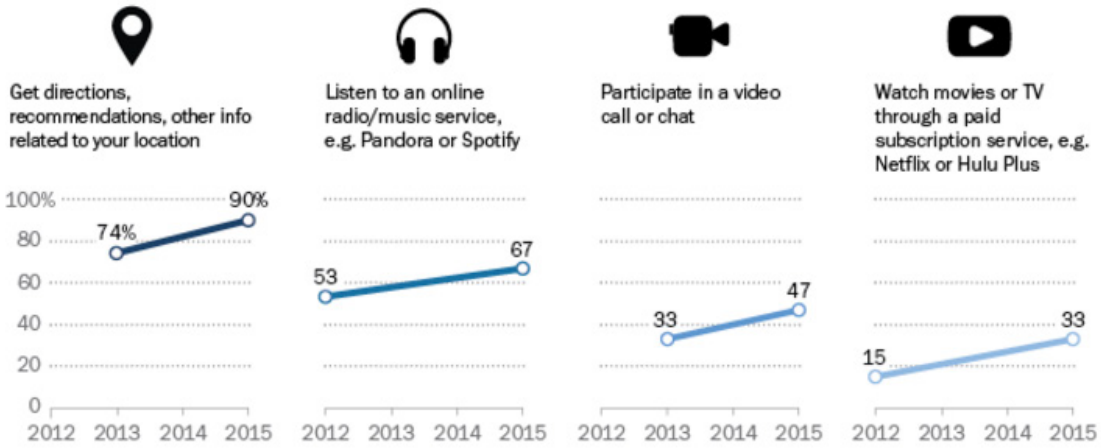
2.2.1 Increasing Demand and Usage

Tech startup products benefit the ICT sector mainly through increased data usage adding to the revenues of ICT network operators. Data usage depends on the nature of the application. A ride hailing application locating a driver and then a payment transaction at the end does not use much data but

in aggregate can account for a significant amount of traffic. Other applications such as video-based cooking lessons generate more data usage. As with much of the startup ecosystem, statistics that show the share of traffic consumed by startup products are impossible to come by. Nevertheless, data from former tech startups that scaled to large companies provide some idea of the magnitude. Take Facebook, founded just a dozen years ago but which today has over 1 billion daily users around the world (only 16% are in North America)[10]. For instance, the Pew Research Center indicated in 2015 that 90% of smartphone users in the US used their device to get directions, recommendations or other information related to their location. The same report indicated that also 67% American smartphone owners used their devices to listen to online radio, 47% for video-chat and 33% to watch movies online[11].

Figure 2.0.4: Americans increasingly use smartphones for more than voice calls, texting

% of U.S. smartphone owners age 18 and over who have ever used their phone to …



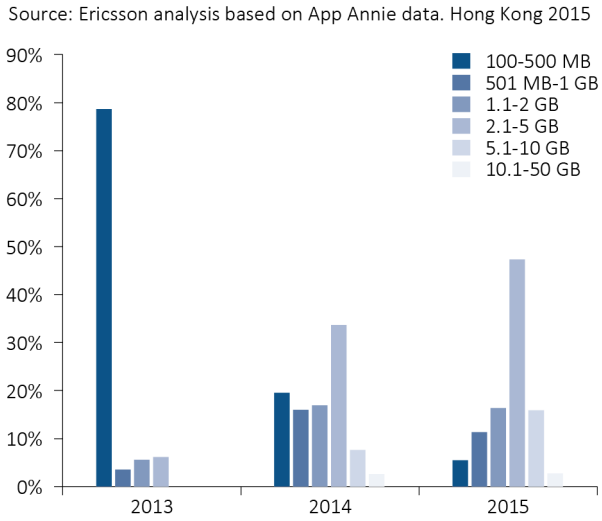
Note: in 2012, the survey question was asked of cellphone owners who use the internet or email or download apps to their cellphones. In 2013, item wording was "Get directions, recommendations, or other information related to a location where you happen to be."

Source: Survey conducted June 10-July 12, 2015. Trend data is from previous Pew Research Center surveys. Pew Research Center.

These figures highlight two trends: the first trend is that this type of applications are increasing the usage of ICT services, making users use more data and require better data plans. An example of this trend was highlighted by the 2015 Ericsson Mobility Report[12], which highlights for the case of Hong Kong how as the networks migrated to 4G, the most common data plan changed from 500 MB/month to 5 GB/month[13].

10 http://newsroom.fb.com/company-info/
11 http://www.pewresearch.org/fact-tank/2016/01/29/us-smartphone-use/ft_01-27-16_smartphoneactivities_640/
12 https://www.ericsson.com/res/docs/2015/mobility-report/emr-mobile-business-trends-2015.pdf
13 Further information available at https://www.ericsson.com/mobility-report

Figure 2.0.5: Most common data plan changed from 500MB/month to 5 BG month with LTE



At the same time, the existence of this applications is increasing the demand for having access to ICTs. In a certain way having access to these applications has already become the main driver for many users to acquire a mobile phone and a data plan, replacing voice as the most popular use of ICT services.

One concern for startups is the use of zero-rated services in developing countries. These services offer slimmed down versions of popular applications such as Facebook free, hoping that users will later use the full-blown version, which will incur data charges. This discriminates against startups offering online applications making it difficult for them to penetrate the market. Ironically, if zero-rated services were available when large Internet companies were startups, it is unlikely they would have scaled to the size they are now. In 2014, Chile ruled zero-rated services illegal, as they contravened the country's net neutrality laws, with similar rulings following in India and Egypt[14].

2.2.2 Accelerating innovation and strengthening collaboration

Having a dynamic ecosystem of ICT MSMEs can create a positive feedback loop in a country's national ICT sector. Existence of startups create a critical mass of professionals who (a) produce demand for value added services, meaning additional business for local ICT providers; (b) create a pool of professionals that could be absorbed later on by local ICT companies; (c) can introduce a number of solutions that could later on be adopted or acquired by local ICT companies.

In addition, having a vibrant MSME ecosystem provides many opportunities for collaboration between tech MSMEs and startups and bigger businesses. It is publication "Winning together", NESTA

Highlights how this type of win-win collaboration is not limited to corporations, presenting concrete steps to develop successful corporate-startup collaborations. to develop new services, renovating brand, expand markets or solve business problems[15].

[14] http://www.theguardian.com/commentisfree/2014/jun/06/government-ruling-net-neutrality-america-europe-mobile
[15] Winning together (2015), NESTA. https://www.nesta.org.uk/sites/default/files/winning-_together-june-2015.pdf

Box 2.0 Startup-Corporate Collaboration (NESTA)

Collaboration between startups and corporates holds great potential for mutual benefit. For startups, partnership with a larger firm may bring not only revenue, but also credibility, industry insight, routes to market, potential investment, and numerous other resources. For corporates, startups may bring innovative technology, fresh talent, new modes of thinking, and opportunities to revitalise a tired corporate culture.

Importantly, startups also have greater nimbleness than corporates; speed and the ability to 'pivot' quickly are arguably the main advantages of small firms. In contrast, many large companies are aware that their own corporate processes, whilst often optimised for 'business as usual', may prevent them from reacting with sufficient speed to the digital disruption around them.

Instead of seeing startups as a competitive threat, therefore, increasingly many large firms are seeking to partner with startups, via structured programmes such as accelerators.

2.2.3 Diversifying the ICT sector

Unlike traditional developing country focus on ICT-enabled oriented exports, tech startups and MSMEs target the domestic market with some then expanding into regional and international markets. This focus first on the local market makes national ICT sectors more sustainable since greater emphasis is placed on local access and use. Instead of creating an island of expertise for often-repetitive tasks for foreign clients, tech startups have the potential to make information technology more rooted and economically sustainable in the country.

Many developing countries have emphasized the development of a software export sector clustered in suburban technology parks. India is the best known with computer services exports of US$53 billion in 2014, second only to the European Union[16]. While computer software exports have benefited some countries, it has often come at the expense of local startup communities. Governments support the software export sector through various incentives, but have often not given equal attention to facilitate startup ecosystems.

The rapid growth of mobile and Internet in developing countries over the last decade has resulted in larger markets for startup products. This introduces a new dynamic for generating locally relevant applications. Young entrepreneurs are developing products relevant for local contexts. Though sometimes imitative of popular Western services, an Uber for rickshaws India[17] or a Spotify for Arab audiences[18], they satisfy needs for apps relevant to local circumstances.

The success of countries in making ICT more nationally relevant can be illustrated by contrasting ICT services exports with the share of ICT spending in the country, shown in the figure below (Figure 2.0.6). Countries in the upper right quadrant focus more on exports (A), those in the lower left have both undeveloped local and export markets (B); economies in the lower right have more focus on domestic than export markets (C); and those in the upper right have well-developed domestic and export markets (D).

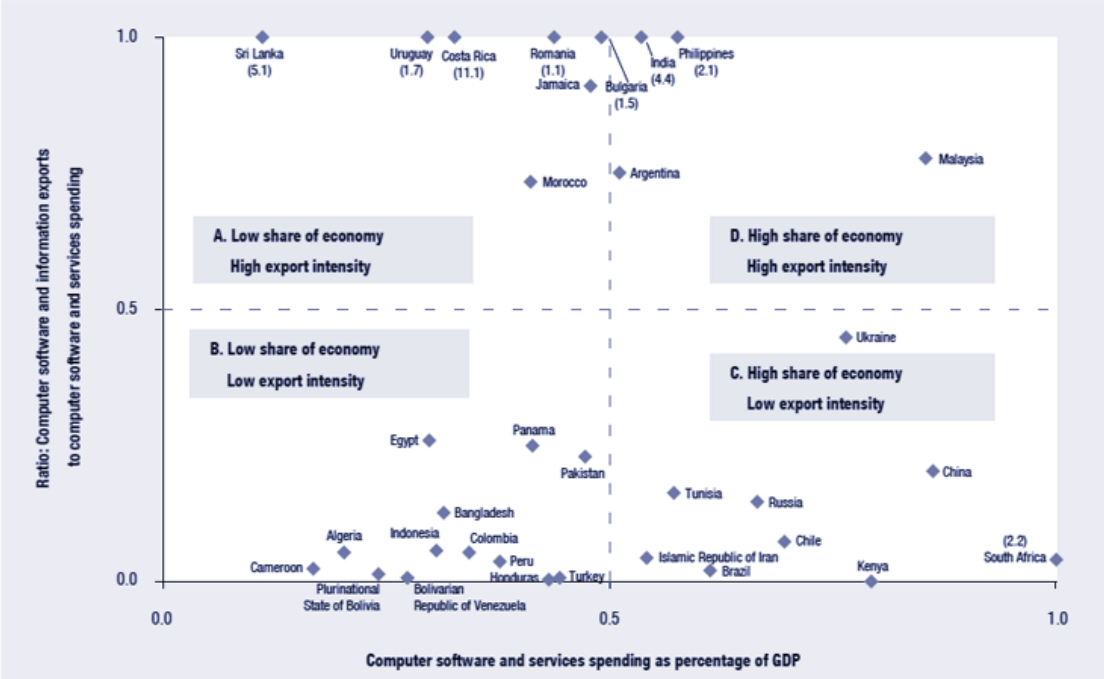
Quadrant C contains some larger economies such as China and Russia that have the scale to develop local versions of popular global services and similarly startups in those countries tend to focus on the

16 https://www.wto.org/english/res_e/statis_e/its2015_e/its15_trade_category_e.pdf
17 https://hbr.org/2016/01/how-mobile-apps-are-improving-indias-rickshaws
18 http://blogs.wsj.com/middleeast/2013/05/30/middle-east-music-streaming-goes-all-access/

large local market. Iran is also noteworthy; given the sanctions it faced, it developed its local market and its startup scene is highly imitative (Box 2.0.1).

Chile and Kenya are also in quadrant C and have been successful in leveraging the potential of ICTs and entrepreneurial innovation for domestic application. According to the World Economic Forum, they rank 29th and 39th respectively in the world in their ability to use ICTs to create new business models, services and products for their countries[19].

Figure 2.0.6: Computer software and services export intensity and computer software and services spending as a % of GDP, 2010



Source: UNCTAD.

[19] See 9.01 Impact of ICTs on new services and products at: http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/

Box 2.0.1: Against All Odds: Tech startups in Iran

The evolution of the Iranian tech ecosystem has been at the mercy of factors outside its control. At a global level, these included sanctions against its nuclear program (lifted in 2016) and perceptions that it is an unsafe place to do business. At the national level, ambiguous policy, particularly in relation to the Internet, and infrastructure constraints affect the tech sector as well as other businesses. The sanctions have shaped the Iranian tech ecosystem making it focused on the local market. Though there was nothing in the sanctions that called for a ban in access to foreign sites from within Iran, confusion over the sanctions' applicability led some global IT firms to make their online services impossible or difficult to use within the country. Covertly this was sustained by lack of access to underlying mechanisms such as payment systems so that even if Iranians could access e-commerce sites they could not buy anything.

Endogenously, growth has been driven by imitation with significant entrepreneurship but rather limited innovation. The three largest startups in the country based on their estimated market valuation are Digikala, Aparat and Cafe Bazaar. They are all imitations of popular online services (*Amazon*, *YouTube* and *Google Play* respectively). *Digikala* ("digital product") is a B2C e-commerce site founded by two brothers frustrated with the lack of choice and service for electronic products at local retail stores. Growth has been boosted by the inability of Iranians to purchase from overseas e-commerce sites due to payment restrictions coupled with good internal postal and logistics services. *Aparat* ("Movie Projector") has exploited the banning of YouTube in the country since 2009 by launching a video sharing site[1]. Erratic overseas Internet connectivity has added to the site's popularity since content is hosted domestically. Founded by Mohammad-Javad Shakouri Moghaddam, a university dropout who studied software, Aparat recently launched a Netflix-like streaming service. The co-founder of *Cafe Bazaar* is emblematic of some of the Iranians returning to launch startups in the country[2]. He came back from Sweden where he was studying and started Cafe Bazaar's Android app market. Today it has some 10,000 local apps and 2,000 developers.

Iran has huge ICT potential with 21 million Internet users in 2013 ranking it 18th in the world and 8th among developing countries. As one analyst puts it:

> "*If you were a globally-minded venture capitalist looking for a potential exciting new market, how would this sound?... A country has two-thirds of its population under the age of 35, with one of the largest Internet reaches in its region. Mobile penetration is over 120% — meaning many people have more than one device — and 3G or better coverage will be rolled out everywhere over the next two years. Among its neighbors, the country has one of the highest per capita GDP, and its graduates are among the highest share of software engineers. eCommerce is in its infancy and little travel is booked online, though it has one of the world's largest consuming populations and has some of the greatest, under-visited tourist destinations on Earth*[3]*."*1

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1 "Iran launches web video channel, Mehr." *BBC News*, 10 December 2012. http://www.bbc.com/news/technology-20663681

2 McFarland, Matt. 2014. "Here's what it's like to launch a start-up in Iran." *The Washington Post*, November 10. http://www.washingtonpost.com/blogs/innovations/wp/2014/11/10/heres-what-its-like-to-launch-a-start-up-in-iran/.

3 Schroeder, Christopher. "Startup Rising: Iran." *PandoDaily*, 20 May 2014. http://pando.com/2014/05/20/startup-rising-iran/.

2.3 Observations

- It is not possible to precisely measure the contribution of tech startups and MSMEs to the economy due to data and classification limitations. Available data infers that as successful startups scale, their economic contribution is significant, particularly through the value add of wage payments.
- A growing body of evidence is finding that young and small firms contribute a disproportionate share of employment. Studies that look at the more specific case of young firms in the ICT sector find similar employment gains.
- While venture capital has grown in both volume and transactions, the amount available for developing regions is much lower than in developed ones. This funding gap is inhibiting the innovation impact that startups and MSMEs can have.
- Tech startup and MSME products generate revenue for the ICT sector through increased usage of and demand for network services.
- The tech startup ecosystem contributes to diversification and innovation of national ICT sectors. It also supports the collaboration between different companies and stakeholders. This is particularly important for making ICT more sustainable and innovative in countries.

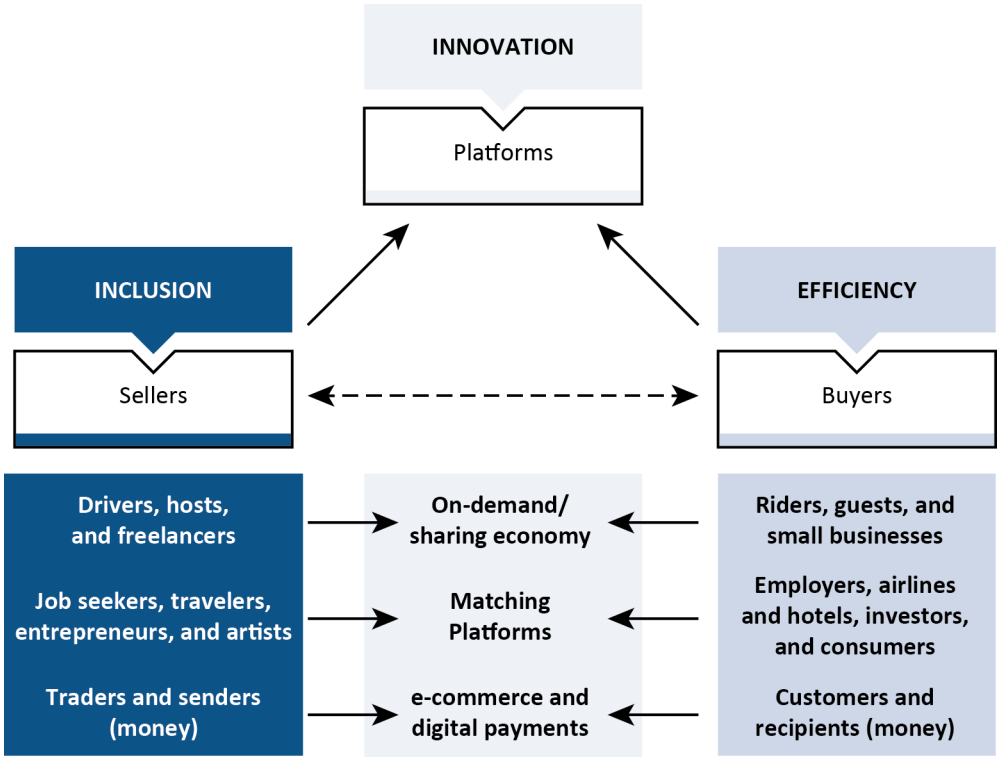
3 Role of the ICT sector in supporting tech MSMEs

The ICT sector is an indispensable ally of tech startups and MSMEs. Tech startup innovations would not be possible without underlying ICT networks, services and applications, which provide a foundation for growth and innovation. The ICT sector also fosters the startup ecosystem in other important ways.

3.1 ICT networks as a global foundation for tech products

ICT-enabled startups need high-speed Internet or mobile networks to distribute content and services. At the same time, users of startup products need access to broadband and cell phone networks. These networks enable the platforms created by ICT-enabled MSMEs to link buyers and sellers. The platforms can be generalized as 1) on-demand/sharing economy such as a ride sharing service that links passengers with drivers; 2) matching services in areas such as real estate, employment, travel, dating, investment, etc.; and 3) e-commerce and digital payments such as auction sites (Figure 3.0.1).

Figure 3.0.1: Platforms, buyers and sellers



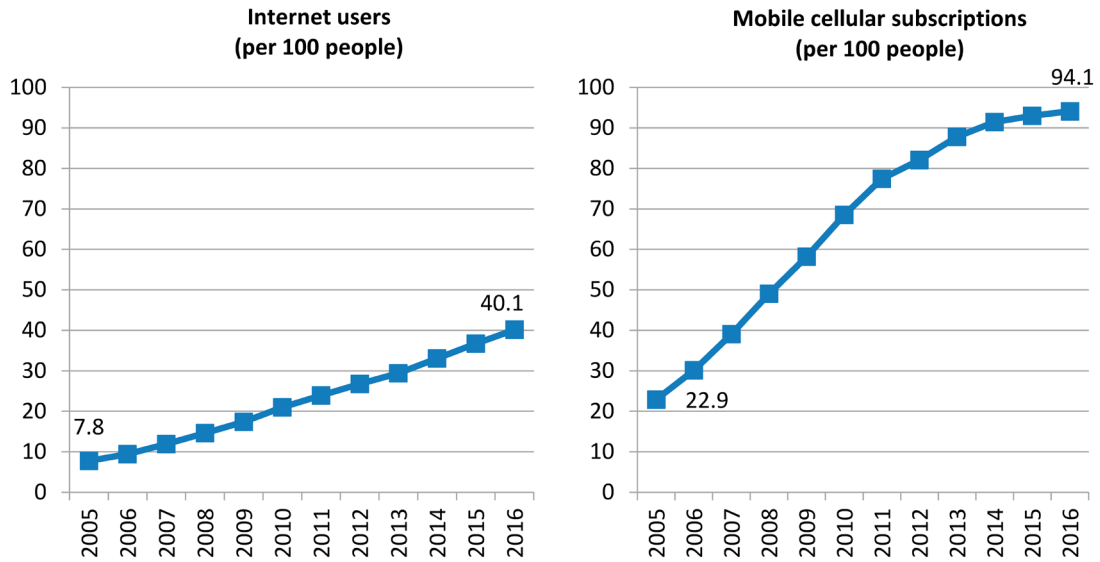
Source: World Bank.

Both the transformation and spread of ICT networks have been critical enablers of the tech startup ecosystem. Networks are getting faster and more mobile enabling many more tech products and services. The introduction of the smartphone, with improved data connectivity, integrated GPS, sensors and camera has enabled numerous startup innovations from ride sharing to citizen reporting. The best indicator of such improved connectivity is the increase in average connection speeds, which according to Akamai have tripled between the fourth quarters of 2010 and 2015 from 1.9 Mbps to 5.6 Mbps[1]. Such increase has made technically possible a number of services, such as video, that consume high volumes of data.

[1] https://www.akamai.com/us/en/our-thinking/state-of-the-internet-report/global-state-of-the-internet-connectivity-reports.jsp

The spread of ICT networks over the last decade has been phenomenal particularly in developing economies. This has increased the market size for ICT-enabled products. The use of mobile in particular has grown dramatically rising from 24 subscriptions per 100 people in 2005 to 90 by 2016 (Figure 3.0.2, left). Though Internet penetration has grown over five times over the same period, it is still low at less than two fifths of the population in developing economies (Figure 3.0.2, right) However, that figure disguises vast differences between countries. A survey examining Internet usage in 2015 found that the median rate in emerging countries was 54% of the adult population, with many Latin American and East Asian countries above the threshold of half the population[2].

Figure 3.0.2: Internet users (per 100 people) and mobile cellular subscriptions (per 100 people), Low- and middle-income economies



Source: Adapted from ITU.

Cloud-based services are critical for tech startups and MSMEs in areas such as e-commerce. Rocket Internet is a German investor, that also provides proprietary cloud services to its portfolio companies including solutions for marketplace sellers to list and manage their products; customer profile information such as location and device; and big data analytics[3]. Hence, infrastructure such as data centres and Internet exchanges are fundamental to the tech startup ecosystem to support cloud services and rapid data transfer. Cisco estimates that global data centre traffic will triple between 2014-2019 from 3.4 to 10.4 zettabytes and more than four-fifths will be generated by cloud applications[4]. According to IDC, data centre space grew 23% between 2013 and 2017, from 1.58 billion to 1.94 billion square feet[5]. Startups themselves are tapping the data centre market with innovative approaches and products such as the utilization of smaller servers, optimization software, server conversion and data de-duplication[6].

Despite the steady progress that has been made in rolling out ICT infrastructure, there are still huge differences in access, affordability and speed. Low levels of usage, high prices and slow speeds negatively affect digital entrepreneurship and innovation. Small online markets discourage innovators and may

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2 Pew Research Center, February, 2016, "Smartphone Ownership and Internet Usage Continues to Climb in Emerging Economies".

3 Rocket Internet. 2016. Annual Report 2015. https://www.rocket-internet.com/sites/default/files/investors/Rocket%20Internet%20Annual%20Report%202015.pdf

4 http://www.cisco.com/c/en/us/solutions/collateral/service-provider/global-cloud-index-gci/Cloud_Index_White_Paper.html

5 http://www.datacenterdynamics.com/content-tracks/colo-cloud/number-of-data-centers-to-decrease-after-2017/91495.fullarticle

6 http://www.businessinsider.com/12-hottest-data-center-startups-2014-5#

encourage brain drain as entrepreneurs look to other countries with better online environments. High ICT services prices discourage use and hinder ICT-enabled startups in developing their products. Slow speeds make some applications unusable, limiting the scope of innovation. Governments should strive to intensify competition in their ICT markets to spread access, lower prices and increase quality. Concrete strategies to make affordable access available should be put in place for locations that the private sector deems uneconomical.

3.2 Nurturing tech MSMEs

Aside from incubation and investment which is covered in a later chapter, the ICT sector has an important symbiotic relationship with tech startups and MSMEs through i) purchase or marketing of their products, ii) supplier of talent to new firms and absorber of staff at failed firms and iii) ecosystem support.

3.2.1 Talent supply and absorption

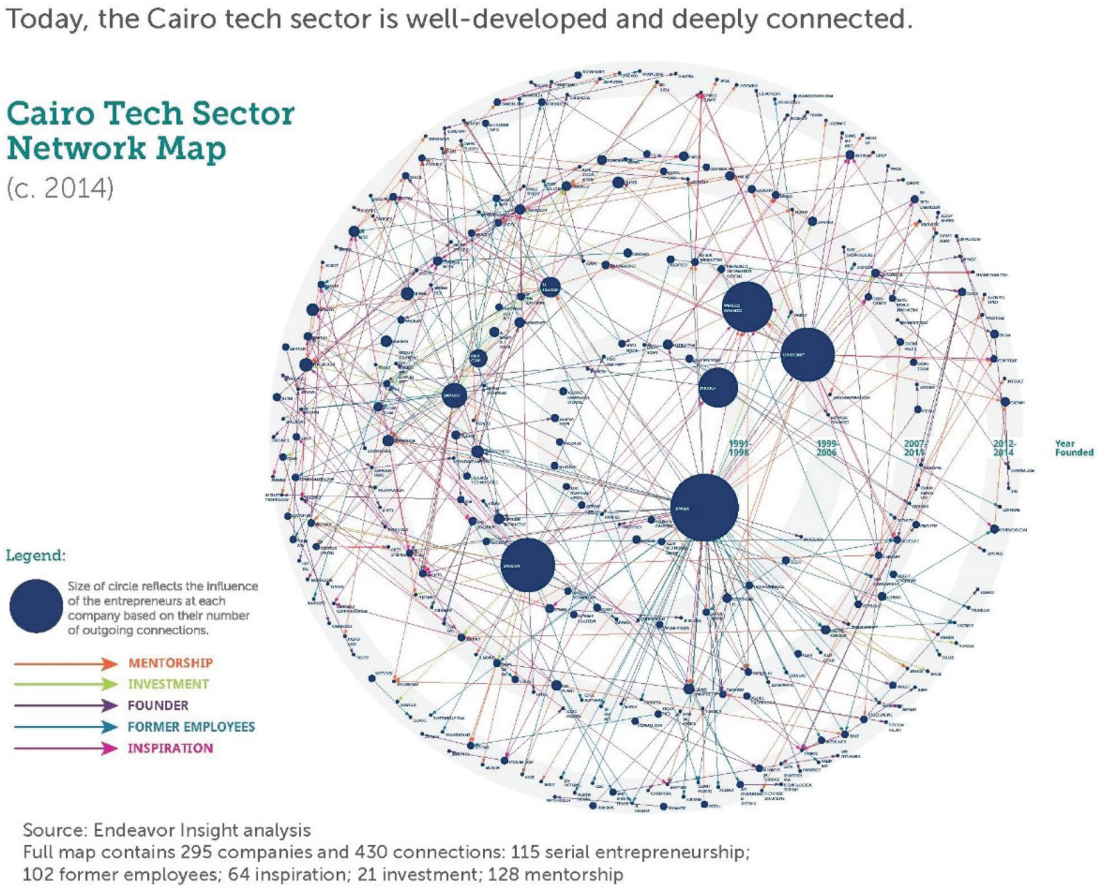
Established ICT and ICT-enabled companies are an important source of talent for new firms, and a place where employees at failed companies can find work. A study on Cairo's startup scene found that established ICT companies were highly influential and the city's tech ecosystem highly connected[7]. In addition to supplying founders and employees for startups, ICT companies also offered mentorship, investment and inspiration (Figure 3.0.3). Former employees of three Cairo-based ICT companies founded almost one third of startups in the city.

There is often a revolving employment door between startups and the ICT sector. Just as employees of ICT companies go on to found or work for startups, there is a reverse migration from startups to ICT companies for supplementing incomes or when startups fail.

Another way ICT companies absorb people from startups is through so-called "acqui-hires" where they purchase talented staff. For example, in February 2016 Google acqui-hired the employees of a Singapore startup Pie, makers of an enterprise chat app[8]. The prospect of an acqui-hire by an ICT company provides a source of motivation for many startups.

[7] http://www.cairotechmap.com/networkonthenile.pdf
[8] http://techcrunch.com/2016/02/18/google-eats-pie/

Figure 3.0.3: Cairo Tech Sector Network Map



3.2.2 APIs & marketplaces

"An API, or application programming interface, is what allows software programs to "talk" to one another and reach a broader audience. APIs are what allow you to share a news article on LinkedIn or send your location on WhatsApp using your smartphone. APIs are also what allow a farmer in Senegal to check crop prices via SMS or a student in the Philippines to pay for their bus ride using their mobile airtime credit. Services like these are powered by the APIs of local mobile operators." GSMA[1].

[1] GSMA, 2016. APIs: A bridge between mobile operators and start-ups in emerging markets

Many tech companies, including mobile network operators and leading social networks, are realizing the potential of allowing third party developers to tap into their source code to programme applications with increased functionality. Such applications typically leverage an existing function of the source code to perform a new task, and the practice is helping to uncover new and innovate uses for existing software by empowering large communities of independent developers around the world.

APIs provide platforms for startups to monetize and market their products to billions of potential users. Apple's App Store offers a marketplace with developers getting 70% of revenue. In mid-2016, the App Store had 2 million applications[9]; generating over US$20 billion in revenue. Similarly, Google

[9] https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/

Play offers an Android selling platform like the Apple store, with an estimated 2.2 million applications in October 2016. However there are sometimes registration constraints such as the need for an overseas bank account, inhibiting their use, especially for startups in developing countries. One alternative is the availability of local app stores. In Kenya, mobile operator Safaricom provides an Appstore for local developers to market their products and widen their reach through exposure across other markets where Vodacom or Vodafone operate[10].

While fairly common in developed countries, open APIs are experiencing rapid growth in emerging markets as increasing numbers of companies tap into this growing trend. Fewer than 400 APIs were globally available in 2006, while in 2016 the number has risen to 15 000 with 40 new ones created every week[11]. Every time an operator opens a new set of APIs, it creates a powerful cycle of innovation as start-ups can combine several APIs to create new services. In many emerging markets where 2G networks, feature phones, and cash payments are still dominant, the most useful local operator APIs are messaging (SMS, USSD), billing (direct operator billing), mobile money, and location APIs. In this context channels like mobile messaging, operator billing, mobile money, or even cellular positioning, remain extremely relevant for emerging market start-ups to reach and charge their end users for mobile services. Table 2-2_4 (below) outlines the most popular emerging market APIs and their use cases.

[10] http://www.safaricom.co.ke/about-us/innovation/social-innovation/safaricom-appstore
[11] GSMA, 2016. APIs: A bridge between mobile operators and start-ups in emerging markets

API	COUNTRY	OPERATOR	START-UP	USE CASE
 SMS	Côte d'Ivoire	Orange	Sycelim	Sycelim created a system to manage medical insurance which connects the insurer, patient and caregiver. The solution uses the Orange SMS API to allow both the doctor and the patient to be kept up to date during the insurance approval process.
 USSD & Location	Sri Lanka	Dialog	Offerhut	Offerhut is a USSD-based promotion platform for enterprises to advertise their offers and for consumers to query available offers (all through a single USSD short code) in their geographic area (using Dialog's location API).
 Billing	South Africa	MTN Vodacom	Hello Doctor	Hello Doctor is a mobile-based (text or call) Q&A service with registered doctors. Patients can pay for the monthly service using their MTN or Vodacom airtime (via carrier billing APIs).
 Mobile Money	Kenya	Safaricom	Sendy	Sendy is a USSD (on the driver's side) and iOS/Android (on the customer's side) on-demand, door-to-door package delivery mobile application. Since integrating with Safaricom's M-Pesa API, Sendy users can now top-up their accounts using M-Pesa within the Sendy app.
 Identity (Mobile Connect)	Pakistan	Mobilink Telenor Zong	Rozee.pk	Rozee is one of Pakistan's largest online job platforms. Since March 2016, mobile users of Rozee can login directly using the Mobile Connect login solution without havin g to type in a login and password. Using Mobile Connect (at no cost) helps Rozee ensure the user has a valid mobile number without using a one-time-password (OTP) to verify the contact details.

Table source: GSMA

3.2.3 Ecosystem building and networking

ICT companies provide important support to foster the startup ecosystem through incubation support, networking facilities and events, and competitions. In Jordan, mobile operators have been active in the country's ecosystem through supporting hubs. Mobile operator Umniah opened *The Tank* in 2014 providing office space as well as networking opportunities[12]. Launched in November 2014, the *Zain Innovation Campus (ZINC)* is the company's initiative to support entrepreneurship, with the aim of nurturing startups in an environment that is equipped with the latest technologies such as 3D printers and a virtual reality room[13].

Some ICT companies run their own incubation programs to nurture startups in their particular sphere of interest. Google for Entrepreneurs partners with stakeholders in the tech ecosystem and also has half a dozen "campuses" for incubating startups[14]. Cisco's Entrepreneurs in Residence is a half-year

12 http://www.tactixconsulting.com/sites/default/files/pdf/news/Umniah%20-%20Innovation%20Center%20-%20PRL%20-%20Eng%20final%20-%20The%20Tank.pdf
13 http://www.jo.zain.com/english/media/pr/Pages/Zain-Launches-Zain-Innovation-Campus-(ZINC).aspx
14 https://www.googleforentrepreneurs.com

incubation program supporting early-stage startups developing products in areas such as the Internet of Everything/Things (IoE/IoT), smart cities, big data and security[15].

ICT companies also support competitions providing motivation for startups as well as potential seed funding. Chinese ICT equipment manufacturer Huawei provided the US$50,000 first prize at the World Startup Competition won by Croatian entrepreneurs for a cloud-based farm management product[16]. The annual Ericsson Innovation Awards, a global competition sponsored by the Swedish IT hardware company, attracted 843 teams from 72 countries in 2016 competing for the €25,000 first prize. The winner was a Canadian startup, SoundVision, whose mobile product assists blind people by converting spatial information into sound[17]. These are just three examples that illustrate the high demand for these competitions, which have become a unique source for identifying talent, and creating new solutions and services.

3.2.4 Investment

ICT companies are actively funding tech startups and MSMEs through venture capital investments and acquisitions. Some also fund social entrepreneurship through corporate social responsibility initiatives or foundations.

3.2.4.1 Corporate venture capital

A number of ICT companies are creating venture capital funds to invest in tech startups and MSMEs. Overall, corporate funding rose to 27% in Q1'16 from 24% Q4'15, 25% Q3'15, 24% Q2'15, 22% Q1'15. "Corporate interest in private markets has steadily risen as companies seek opportunities for growth as well as defense against rapidly evolving technologies[18]". Semiconductor giant Intel, one of the pioneer firms in Silicon Valley, launched a venture capital fund back in 1991 through its Intel Capital vehicle. Overseas investments include Snapdeal, India's largest online marketplace; WSO2, a Sri Lankan middleware company providing enterprise application platforms; and Jordanian ShoeFeeTV, which offers online satellite TV listings for the Arab world. Intel Capital has invested US$12 billion in 1,445 companies in 57 countries[19]. Nokia Growth Partners (NGP), the venture capital arm of the mobile equipment manufacturer, has invested US$1 billion in 61 growth-stage companies (as well as other venture capital funds) across several themes including digital health, connected cars and the Internet of Things[20]. NGP invests in developed or large markets covering North America, Europe, China and India and in later stages for established MSMEs.

While venture funds of large ICT companies do invest in some developing regions, the bulk of the funding is for tech startups in developed nations. Some ICT companies focusing on emerging markets are stepping in to fill the gap. Pan-African mobile operator MTN, the mobile group Millicom operating mainly in developing countries and Rocket Internet, a German tech company, launched Africa Internet Group in 2012[21]. It has funded over 70 companies mainly in e-commerce, food ordering, classifieds and taxi hailing. They include Jumia, founded in 2012 in Nigeria, and now the largest e-commerce site in Africa, with operations in 8 countries. Rocket has set up similar regional Internet groups for Asia Pacific and the Middle East.

National ICT companies are also investing in tech MSMEs. They can be indispensable for providing capital in frontier markets often overlooked by large venture capital firms and where there is often a lack of finance for innovative tech MSMEs. One example is mobile operator Safaricom in Kenya. It

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15 https://eir.cisco.com/about/
16 http://dcamp.kr/contents/views/207
17 https://www.ericsson.com/thecompany/events/eia-2016
18 CBInsights and KPMG Venture Pulse Q1 2016, Global Analysis of Venture Funding. http://www.kpmg-institutes.com/institutes/global-enterprise-institute/articles/2016/04/venture-pulse-q1-2016-global-analysis-of-venture-funding.html
19 http://www.intelcapital.com/asset/docs/Intel-Capital-Backgrounder.pdf
20 http://www.nokiagrowthpartners.com/wp-content/uploads/2014/09/NGP-Quick-Facts-Feb-2016.pdf
21 https://www.africainternetgroup.com

launched its US$1 million Spark Venture Fund in November 2014 to provide late seed to early growth stage capital for Kenyan startups using mobile technology. One of its first investments was Sendy, a startup using crowdsourcing to connect users to on-demand courier services[22].

Table 3.0.1: Examples of Corporate Venture Capital, 2016

Source: CB Insights

3.2.4.2 Acquisitions

Another way ICT companies support the ecosystem is through acquisitions that provide an exit path for tech startups. Acquisitions are a far more common way for tech startups to exit than through public stock listings. Acquisitions by ICT companies are also more likely given the commonalities with tech startups. Take Instagram, a photo sharing application for mobile phones. Founded by two friends moonlighting from their regular jobs in 2010, Instagram received an injection of seed money from the creator of Mosaic, one of the first web browsers[23]. After two rounds of venture capitalist funding, Instagram was acquired for US$1 billion in 2012 by social networking giant Facebook. Another example is Singapore Telecom's 2012 purchase of Pixable, a social phone application for US$27 million. In 2009, Yahoo bought Maktoob, an Arabic portal for US$75 million, then the largest tech acquisition in the Middle East[24].

3.2.4.3 Social responsibility

Foundations spun off from ICT firms help to fund tech startups and key elements of the ecosystem. Omidyar Network, a foundation created by Pierre Omidyar, one of the founders of eBay, invests in both for-profit startups as well as non-profit ecosystem support organizations such as hubs, incubators and venture capital funds around the world[25]. It provided a grant to Ushahidi to develop a tech hub

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22 http://www.cio.co.ke/news/main-stories/safaricom-venture-spark-fund-to-announce-new-investments-in-q1-2016

23 Perlroth, Somini Sengupta Nicole, and Jenna Wortham. 2012. "Instagram Founders Were Helped by Bay Area Connections." *The New York Times*, April 13. http://www.nytimes.com/2012/04/14/technology/instagram-founders-were-helped-by-bay-area-connections.html.

24 http://www.theguardian.com/media/pda/2009/aug/25/yahoo-internet

25 https://www.omidyar.com

in Nairobi that is today one of the largest in Africa[26]. Omidyar Network provided US$954 million between 2007 and 2016 for 453 profit-oriented startups and 501 non-profit social entrepreneurs and ecosystem building organizations.

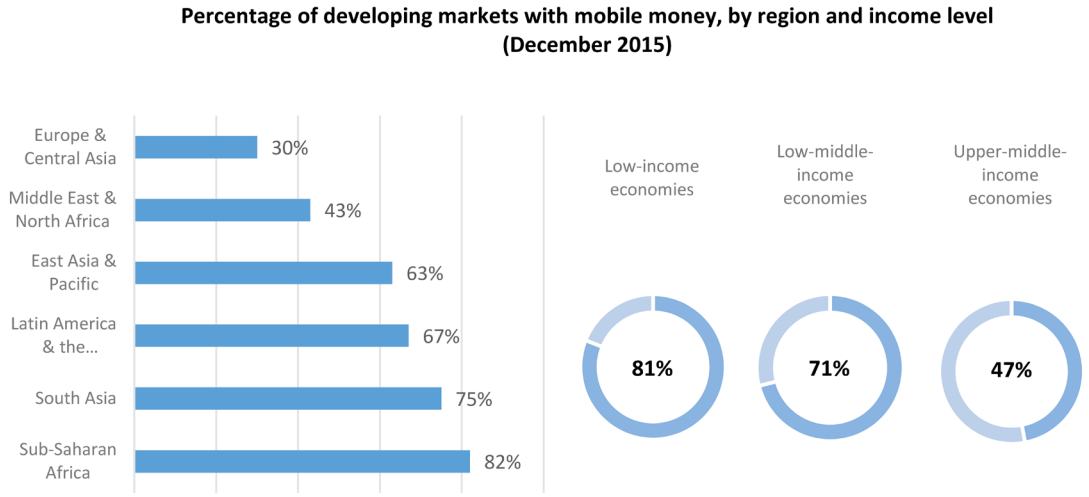
3.3 Electronic payments

The ability to make and receive online payments is critical for the tech startup ecosystem. Many startup business models are based on online or mobile payment. Startups need to monetize if they are going to scale and the non-availability or limited adoption of electronic payments will discourage growth of the ecosystem.

Startup products targeting consumers in the developed world do not generally face barriers due to the widespread availability of credit and debit cards or online payment systems such as PayPal. In developing countries, the low penetration of credit cards makes online payment more problematic. Further, a number of developing nations ban or impose restrictions on online payment services. Take PayPal which can only be used to send payments and not receive payments in some countries and where payments can only be made in about 20 currencies. Some countries have created their own online payment systems with local language interfaces such as Paysbuy in Thailand and Alipay in China[27]. This gap is also providing an opportunity for startups to tackle their monetization challenges[28].

Mobile operators in developing countries have stepped in to overcome the lack of bank accounts by offering mobile money using a no frills cell phone. According to the mobile operator trade group GSMA, mobile money was available in 93 countries in 2015 with high penetration in Sub-Saharan Africa and South Asia (Figure 3.0.4)[29]. Mobile money providers processed just over a billion transactions in December 2015, which is more than double what PayPal processed globally and there were 134 million active accounts compared to 173 million for PayPal.

Figure 3.0.4: Developing markets with mobile money services, by region, 2015



As mobile money permeates across economies, startups are starting to leverage its potential for monetizing their business models. Take Kenya's M-Kopa Solar operating in the clean tech sector and describing its market as "pay as you go" energy services for off-grid customers[30]. It provides solar panels

[26] http://disrupt-africa.com/2016/03/kenyas-ihub-raises-funding-to-scale-operations/
[27] https://www.techinasia.com/a-guide-to-paypal-alternatives-in-asia
[28] http://techcrunch.com/2012/11/23/mobile-money-spawns-a-startup-ecosystem-across-africa/
[29] http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR_2015.pdf
[30] http://www.zayedfutureenergyprize.com/resources/media2/M-Kopa-Entry.pdf

to cater to the huge demand for electricity in rural areas[31]. One challenge is that most rural dwellers cannot afford the outright purchase of a solar panel. M-Kopa Solar provides a solution by lending the money ("kopa" means to borrow in Swahili) and charging a small daily amount for repayment. One of the innovations is its use of ICTs by leveraging the widespread availability of mobile phones in rural areas[32] for payments to be made using the M-Pesa mobile money system. Once the panel is paid for, it belongs to the purchaser. To ensure compliance, the panel circuitry is remotely controlled. Though this clean tech solution may seem low scale, M-Kopa Solar has ambitions to become a US$ 1 billion company[33]. This is not far-fetched, as it will have already earned over US$200 million by the end of 2017. Investors are keen with US$42 million in venture capital provided through three rounds of funding[34]. Ironically, with over 10,000 payments a day, it has become the second largest M-Pesa pay-bill customer after the state energy utility Kenya Power[35].

3.4 Observations

- ICT networks are critical enablers of the tech startup ecosystem. Developing countries need to adopt strategies to boost broadband speeds and enhance access. Though mobile is approaching ubiquity, there are still gaps particularly among the poor. This should be remedied particularly since low-income segments stand to benefit from social entrepreneurship and startup services using mobile money.
- In addition to broadband and mobile networks, startups need other critical Internet infrastructure such as data centers. Countries should enhance strategies for building world-class facilities to grow their startup ecosystems.
- ICT companies are important sources of inspiration and support for the tech startup ecosystem. Countries should encourage national ICT firms to be involved through funding, app marketplaces, ecosystem support, etc. Close relationships should be fostered between ICT companies and the startup community through hubs, network events and competitions.
- Many tech startups use models that are dependent on online payments. Countries should remove barriers to online payment systems and electronic transactions.
- Limited ICT sector support for ecosystems discourages startups and risks their migrating to other countries where ecosystems are more attractive.

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31 According to a 2015 survey, only 16% of rural households had electricity. See: National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. 2016. *Kenya Malaria Indicator Survey 2015*.

32 In 2015, 86% of rural households had a mobile telephone. Ibíd. p. 21.

33 http://www.bloomberg.com/features/2015-mkopa-solar-in-africa/

34 https://www.crunchbase.com/organization/m-kopa#/entity

35 http://www.businessdailyafrica.com/Corporate-News/Solar-lamp-top-ups-on-M-Pesa/-/539550/2439114/-/xxyyxxz/-/index.html

4 The power of networks

4.1 How going beyond local ecosystems is vital for modern tech MSMEs and startups

Tech start-ups are sometimes perceived as being "born global": they often develop products and services for a global audience and leap-frog the usual stages of development. Their internationalization is viewed as a given- it is, however, far from systematic and in many instances, their footprint remains local, or national at best. Ensuring the survival and internationalization of startups requires strong, interconnected and outward-looking ecosystems.

In the 21st century, the actions and success of an entrepreneur is deeply interconnected with the actions and success of others[1]. Developing a business within a networked ecosystem with connections to sources of talent, finance and international players provides a great advantage to bootstrapping ventures. Developer and entrepreneurial communities feeding off each other's talent, creativity and support, achieve more, learn faster and reach farther than it would be possible otherwise. Aligning objectives allows for a significant level of risk and cost sharing[2].

Ecosystems are the cornerstone of tech entrepreneurship development in our increasingly globalized world. Silicon Valley's centralized model has been an impressive success, and continues to be the well-documented benchmark for global ecosystems, by churning out disruptive entrepreneurs and startups year after year. Other locations have been following suit, like Israel's "Startup Nation", building on the same openness to venture capital as its Californian sibling: according to the OECD, while venture capital overall represents a small share of GDP (around 0.05%), it reached 0.38% in Israel and 0.28% in the USA[3]. Indeed, access to finance, which is addressed later on in the report, is a key enabler for startup ecosystems and funding partners are essential players in any ecosystem- their absence or insufficient number slows down entrepreneurship, MSME and startup growth. Israel for instance claims more companies listed on the US NASDAQ than "Europe, Japan, China and the Republic of Korea combined"[4].

4.2 Internationalisation challenges

Ecosystems are partially closed systems with barriers to entry and with localized resources. Taking advantage of an ecosystem requires making the right connections, speaking the right language and entering the culture appropriately[5]. If a business owner seeks resources in an ecosystem where he has no connections, the task becomes time consuming or requires expensive scouting services. It is even more difficult to do business across ecosystems.

In Europe, for example, only 14% of M&As come from outside the region[6] implying there is an enormous untapped potential in linking ecosystems on a global scale. However, achieving such interconnectivity will require collaboration across ecosystems and national borders.

The European Commission, having consulted successful startups across the continent, has come up with the most critical areas that need attention in order to achieve a truly connected Pan-

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1 Muegge, S. 2013. *Platforms, Communities, and Business Ecosystems: Lessons Learned about Technology Entrepreneurship in an Interconnected World.* Technology Innovation Management Review, 3(2): 5-15.http://timreview.ca/article/655

2 Feld, B. 2012. *Startup Communities: Building an Entrepreneurial Ecosystem in Your City.* John Wiley & Sons. https://books.google.pt/books?id=tFNAYRBjsuIC

3 http://www.oecd-ilibrary.org/industry-and-services/entrepreneurship-at-a-glance-2014_entrepreneur_aag-2014-en

4 Statement gathered at the UNECE Startup Nations event, 2 November 2016: http://www.unece.org/info/media/news/innovation/2016/start-up-nations-innovative-entrepreneurship-for-sustainable-development/doc.html

5 Bosma, NNiels and Holvoet, T. 2015.Tine, *The Role of Culture in Entrepreneurial Ecosystems: An Investigation for European Regions (December 8, 2015).* 6th Annual George Washington University (GWU)-International Council for Small Business (ICSB) Global Entrepreneurship Research and Policy Conference. Available at SSRN: http://ssrn.com/abstract=2700798 or http://dx.doi.org/10.2139/ssrn.2700798

6 http://startupeuropepartnership.eu/

European ecosystem: **Education, Infrastructure, Regulation, Harmonization, Internationalization, Investments, Acquisitions, Immigration,** and the **Gender Gap**[7].

The Swedish Startup Manifesto summarizes the type of issues faced by new companies in advanced ecosystems - many of them apply to developing countries as well. The Manifesto lists the main challenges putting the Stockholm ecosystem at risk[8]:

- A business environment that is not "enabling" enough, because the interests of startups are not represented in the private-public dialog between companies, lawmakers and government.
- The lack of a legal definition of "startups", which would clarify the attribution of special public benefits targeting this type of company.
- A 58% tax on the profit related to the sale of a company, which disincentivizes entrepreneurship.
- The lack of a "startup visa", which would increase the access to foreign talent and support foreign founders.
- Insufficient access to public procurement for startups, resulting in reduced spread of innovation across the public sector

Trade support institutions and the public sector struggle to understand and monitor the internationalisation process of this type of enterprise, which are often entirely digital and cannot be tracked like a manufacturing company whose goods are processed by customs authorities. Developing countries face additional challenges that prevent their high-growth potential firms from internationalizing. Infrastructure challenges: costly and slow connectivity, power outages, low penetration rates of hardware (laptops, smartphones) are the most common problems faced by companies and their clients.

4.3 Breaking barriers between ecosystems

This section elaborates on the power of networks by outlining three main benefits that stand to be gained by breaking the barriers between ecosystems:

Internationalisation support: the modern customer is global – many startups are created to be global - removing any and all barriers to access to external markets is key to ensuring success.

Access to finance: funding and investment are seemingly never enough and always seeking better returns- the easiest way to enlarge funding pools is often to look abroad.

Talent: developing a greater talent pool by making it easier to form cross-border teams and work across geographies.

4.3.1 Internationalisation support: From traditional trade support institutions to a new breed of enabling organisations

4.3.1.1 Old Players:

Research shows that solid, and efficient institutions are fundamental "enablers of innovation, mutual learning and productivity growth"[9]. The industrial era relied on trade and investment support institutions that represented and lobbied for the private sector in a specific country or region (e.g. chambers of commerce), in a specific sector (e.g. industry associations), or around a specific function

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7 http://startupeuropepartnership.eu/must-haves/
8 http://en.startupmanifesto.se/
9 Putnam, R. 2000. Bowling Alone*: The Collapse and Revival of American Community. p* 325.

(e.g. such as trade promotion). Business networks have been key advocates for the interests of the private sector for centuries, and were formalized as stand-alone institutions many centuries ago: the first chamber of commerce, for example, is said to have been established in Marseille, France, in 1599.

In advanced economies four hundred years later, these institutions represent a tight network often relying on funding from the private sector, but also frequently supported by the public sector. In Europe alone, there are more than 1700 chambers of commerce, which are members of the Eurochambers network[10]. These institutions have in many instances been trying to defend the interests of traditional MSMEs.

In emerging economies, and even more so in developing countries, trade and investment support institutions are often under resourced and have less outreach capacity, and the local private sector may consist of fewer and weaker formally registered companies. These institutions' portfolio of services is similar to their counterparts in high-income countries, however they offer less business-development opportunities abroad, which require in-market presence and dedicated funding for business-to-business matchmaking opportunities.

The digital economy has seen the emergence of many disruptive business models and companies, that transform the sector or area they are active in, and that do not engage with such traditional trade support institutions. This lack of connection has two major causes:

1. The organizational structure of the startups and high-potential MSMEs distances them from traditional trade support institutions. These firms tend to be lean, scale up and down very rapidly, and rent office space in the "seed phase" on a "pay as you go" basis. Co-working spaces have sprung up quickly. WeWork, for instance, is an American company "which provides shared workspace, community, and services for entrepreneurs, freelancers, startups and small businesses"[11]. WeWork designs and builds physical and virtual communities in which entrepreneurs share space and office services and have the opportunity to work together. The company claimed 30,000+ members across 54 coworking locations in December 2015. WeWork members have access to various services health insurance, an internal social network, social events and works. Impact Hub is a similar "network of hubs which foster entrepreneurship, idea incubation, business development and offers co-working spaces". By mid-2016, there were 86 active hubs with some 15'000 members[12].
2. This workplace transformation is undermining traditional trade support institutions. Young companies, especially in the startup phase, contract small, digitally-enabled, distributed teams, which are hired for specific assignments, sometimes through web portals like Upwork and Freelancer.com. An estimated 53 million Americans are currently employed in freelancing[13].
3. Lean management means innovative MSMEs and startups do not have the time or human resources to represent themselves or engage in the public debates about business and labour-market legislation offered by trade support institutions. The effect of this is that few policy-makers understand the constraints faced by innovative startups and MSMEs.

However the establishment is catching up: Switzerland Global Enterprise and FINPRO offer specific support to high-growth potential tech firms. Chambers of Commerce have also been actively reaching out to this new firm demographic, often with a focus on internationalisation. The British Chamber of Commerce in Belgium organizes workshops for Belgian startups to inform them about the UK market, the opportunities it offers in terms of access to funding, and the benefits of relocating their company to the UK[14]. More interactions like these are essential to understand the unique needs of tech startups and MSMEs in different countries.

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10 http://www.eurochambres.eu/Content/default.asp?pagename=OurNetwork
11 https://www.wework.com/
12 https://www.impacthub.net/
13 Freelance Union. https://blog.freelancersunion.org/2015/10/01/freelancing-america-2015/
14 http://britishchamber.be/event/uk-tech-ecosystem-startups

4.3.1.2 New Enablers

Startups and high-growth companies tend to emerge out of ecosystems that enable easy access to venture capital (financing) and stock markets (exits); that encourage and rely on innovation, and that nurture interaction and collaboration between academic institutions, entrepreneurs and, increasingly, a new breed of actor. The latter contributes mentorship, networking and business-development opportunities. They may be public, semi-private or private, and are often uniquely placed to understand and support the needs of tech startups and MSMEs. They include:

- **Business incubators and accelerators** help firms establish themselves and grow successfully. They provide a range of services that may include marketing support, office equipment, funding and business development programmes tailored to the needs of the market. They are often located in dedicated buildings, and may cluster together around related actors in a specific neighbourhood[15].
- **Technology Parks**, also called Cyber Parks, Science Parks, Research Parks and Technopoles, are often linked to educational or research institutions, and provide infrastructure and support services for businesses, particularly real estate and office space. They promote technology transfer and tend to host larger, more established businesses; however they can also be actively incubating new companies. They tend to focus on a particular industry, often in the ICT sector. Export promotion is frequently part of their mandate[16].
- **Industry Clusters** emerge when there is a concentration of businesses in a geographic area specializing in a common core activity. Multiple actors, including large firms, public authorities, academia, the financial sector and collaborative institutions are involved in the cluster to ensure there is a critical mass to achieve business results.
- **Trade Accelerators** rely on an ecosystem of support for youth-owned MSMEs, managed by a host institution, and delivered by trainers, advisers and mentors. A Trade Accelerator provides youth-owned MSMEs with tailored services specific to their needs, to help them gain a sustainable presence in international markets. A good example is the International Trade Centre's approach, which is specifically aimed at supporting the internationalization of high-potential MSMEs in Morocco [17].

4.3.2 Access to Finance

Internationalisation starts with access to capital and as illustrated in the next chapter, traditional funding sources are not readily available for tech MSMEs and startups in many countries. Regulation and legislative frameworks are still not conducive to international capital transfers, and instead startups tend to follow the money, which leads to a concentration of activity in well-known 'hubs' like Silicon Valley, Cambridge, Berlin, Tel Aviv etc.

Many small or developing country economies cannot support large-scale institutional investors and domestic capital markets. Political blocks like the European Union are helping to make capital markets more accessible to tech startups and MSMEs, with some smaller EU countries seeking to develop cross-border funds to leverage capital from others in the block[18]. A common regulatory and legal framework makes this easier, and there are many countries who do not have access to such a common market for goods, people and capital.

Another key challenge is in facilitating connections between investors and potential opportunities. There are a growing list of online platforms, communities and social networks seeking to connect entrepreneurs with potential dealmakers or investors. Venture Capital for Africa and Angel List are

15 http://www.infodev.org/business-incubation-toolkit
16 http://www.iasp.ws/the-role-of-stps-and-innovation-areas;jsessionid=1f8c0031a8dc0ca236cbaa6eeb12
17 http://www.intracen.org/youth/Our-Toolkit/
18 http://startupeuropeclub.eu/startup-europe-nations/

two such examples, while the growing popularity of crowdfunding platforms is slowly overcoming regulatory barriers to become truly global[19].

4.4 Access to talent

There is a demonstrated shortfall of digital skills in countries around the world. According to a 2012 report by the McKinsey Centre for Government, across nine countries surveyed (Brazil, Germany, India, Mexico, Morocco, Turkey, Saudi Arabia, the United Kingdom, and the United States) only 43 per cent of employers said they could find employees with the right skills[20]. Workforce skills are not keeping up with growth in the ICT sector, and many companies are concerned about the state of training and knowledge among job applicants and staff in the ICT sector. A recent Manpower Group report, the 2015 Talent Shortage Survey, found that the top ten hardest jobs to fill includes three that are related to ICT, IT or coding: engineers are the third hardest to fill, technicians come in fourth, and the ninth hardest jobs to fill are IT staff (especially developers and programmers, database administrators, and IT leaders and managers). The report also found that the top two reasons hiring managers are having difficulty filling jobs are lack of available applicants/no applicants (35 per cent) and lack of technical competencies (hard skills – 34 per cent)[21].

Several countries believe breaking barriers between countries and ecosystems can be a successful strategy. In Australia, immigration strategies have attempted to combat that country's lack of manpower, as reported by KPMG[22]. Tech recruiters in the United States have identified the H1B visa as one of the major hurdles to recruiting talent from abroad[23]. In Europe, there are still significant bureaucratic barriers to building international teams, ranging from immigration to fiscal policy[24]. This leads to an unbalanced situation in terms of access to talent. London, for example, pays significantly higher salaries for professionals with digital skills. In southern Europe and other underdeveloped ecosystems, these same professionals are poorly compensated by comparison. Several recruitment agencies are exploiting this, such as TekTalent, which sources Greek talent for Dublin's burgeoning tech scene.

Stockholm is emerging as a global tech hub, with 18% of its workforce active in the tech sector, and the country captured 11% of all European venture capital deals in 2015[25]. This has been attributed to the country's openness to foreign investors, first or second-generation startup founders, and foreign programmers to compensate for the lack of locally available IT skills. According to Stockholm Business, the city's investment promotion agency, 2,500 Indian software developers apply for visas each year to work in the Swedish capital. Openness to international talent is therefore a key enabler for startup growth, when the scarcity of advanced digital skills has become a global problem.

How can ecosystems be linked to create a global talent pool? While there is no clear solution to these challenges, several initiatives are taking an active role in helping to address the problem.

4.4.1.1 CREA summer academies:

The CREA Summer Academy is a European Commission initiative to bring prospective entrepreneurs from across Europe together. Individuals and teams can apply, and if accepted, can develop their ideas during a two-week long training and mentoring programme (with international experts). Every

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19 http://assembleadvisory.com/cross-border-crowdfunding/

20 Mourshed, M, Farrell, D and Barton, D. 2012. *Education to Employment: Designing a System that Works.* McKinsey Center for Government. www.improvingthestudentexperience.com/library/general/EducationToEmployment.pdf

21 ManpowerGroup. Talent Shortage Survey 2015. http://www.manpowergroup.com/wps/wcm/connect/db23c560-08b6-485f-9bf6-f5f38a43c76a/2015_Talent_Shortage_Survey_US-lo_res.pdf?MOD=AJPERES

22 https://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/Documents/plugging-those-vital-skill-gaps.pdf

23 http://recruitingdaily.com/immigration-reform-tech-recruiting/

24 http://startupeuropepartnership.eu/must-haves/

25 http://www.investstockholm.com/news/record-year-for-stockholm-tech-startup-investments/

academy specialises in a different theme (design, sustainability, creativity, etc.), and at the end includes a pitching competition to select the best 2 teams per location. The winners receive virtual mentoring to prepare them to pitch their final result in front of an international jury of investors, corporates and accelerators at the CREA International Business Idea Contest, hosted every year in a different location. Furthermore, CREA's mentoring platform provides a forum that connects all participating ecosystems to benefit from the shared knowledge of the participants and international mentors. In 2015, over 130 participants from more than 12 countries joined the academies. A significant percentage were not related to the hosting universities (68 different universities brought applicants), which facilitated the creation of cross-border teams with diverse skill sets[26].

One of CREA's objectives is to bridge ecosystems, and it has identified that a key barrier to crossing borders is the cost of mobility. CREA is currently developing partnerships with governments and European initiatives such as Erasmus for Young Entrepreneurs to financially support the mobility of teams created in the academies. As an example, one of the winning teams from a recent academy, Musa, received considerable attention from international players. They received interest from investors in London, and offers of free incubation by accelerators in Estonia, Netherlands and Italy. Its growth significantly accelerated due to the programme and the team had to be enlarged with a specific competence: game design. Through CREA's network, a suitable developer was identified in the Netherlands and is now part of the core team, showing, again, how a wider network helps towards finding the right talent.

4.4.1.2 Dublin – the definition of an international hub:

In terms of supply of talent, Dublin has made itself a success story through active engagement with the international community, and making itself more open to business and skilled immigration. To understand the needs of business owner and keep itself abreast of innovative policies and regulation, the Office of the Dublin Commissioner for Startups organises regular breakfasts with international entrepreneurs to understand what the city does well, and how they could improve[27].

According to one founder: "*Ireland is the best place to build a business. The ecosystem is small and friendly, and the people are open and give feedback easily. We had first-hand experience of this when we were at the NDRC (National Digital Research Centre) as part of their Catalyser Program. Another startup in their portfolio had a similar idea to ours. They suggested that we bring the companies together rather than competing. We became a quintessential Dublin-based startup – four co-founders from four parts of the world.*"

4.4.1.3 Estonia - one of the most talent ready countries in the world

Estonia is another ecosystem that, while small, has invested heavily in developing and attracting human capital. Recognising the role that the Skype founders played in reinvesting in their country, Estonia has developed startup supportive policies by encouraging high-level dialogue between startups and government representatives[28]. Recent dialogues have addressed issues related to lack of talent, access to capital markets, e-government and e-residency solutions, and addressing geoblocking. In Estonia, startups can access the Baltic innovation fund which consists of €130m from a mix of sources, including €52m from The European Equity Fund and €60m from EstFund, and which provides startup grants covering 80% of the project, with a maximum of €15k. Startup Estonia with funding of €7m facilitates access to startup visas to attract talent across borders. In 2014 Estonia was recognised as one the most talent ready countries in the world by INSEAD[29].

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[26] CREA Summer Academy 2015 Facts and Figures report

[27] http://www.irishcentral.com/business/startups/i-love-dublin-because-photos

[28] http://www.investinestonia.com/en/about-estonia/news/article/1082-startups-and-the-pm-discussed-startup-visa-and-taxation

[29] Insead, 2014. *Global Talent Competitive Index.* http://knowledge.insead.edu/talent-management/the-worlds-most-talent-ready-countries-2014-3796

4.4.1.4 Startup Weekend

With a community-driven approach, Startup Weekends are organised all over the world under one umbrella format, with an objective of providing linkages between ecosystems. Organisers and participants are encouraged to develop and showcase their local initiatives, discuss achievements and come together for annual events. Startup Weekend represents a "local to global" approach that tries to reap as much benefit as possible though its decentralised approach[30].

Startup Weekend events are intended to be a learning experience on how to form a startup, and include a 54 hour intensive bootcamp where participants are encouraged to form teams, discuss and present ideas to on another. This provides an opportunity for young talent to reveal itself – the competition is friendly but fierce.

4.5 Other examples of internationalisation support

The role of incubators and accelerators is paramount, in particular in developing countries. They offer access to training and funding, usually by linking startups to business angels, venture capitalists and, to a lesser extent, banks. This is one of the functions of iHub in Kenya and the CoCreation Hub in Nigeria. The ICTA in Sri Lanka plays a similar role, although it is a public institution, with a programme to support the launch of 1000 startups in five years. The World Bank's Infodev programme has been supporting the establishment of such organizations since the mid-2000s by providing support to incubators. Infodev has set up a network of mLabs and mHubs throughout emerging economies and developing countries[31].

Other internationalisation initiatives around the world include Tech City UK, which was set up in 2010, and supports the growth of digital businesses in London and other cities across the country. Their work is driven by capacity building programmes such as the Digital Business Academy, which is open to UK residents and had 14,000 registered users in mid-2015[32], and Future Fifty, a later-stage accelerator. Tech City UK brings the tech community together with policy makers to engage in "policing convening", i.e. for advocacy purposes[33], and also focuses on promoting investment in the UK tech sector, in particular through a programme called HQUK, jointly implemented with the UK trade and investment promotion agency UKTI[34].

Another example is TEKES, the Finnish funding agency for innovation, which helps startups speed up their development in a context where 30% of university graduates dream of "joining or launching a startup". In 2015 alone the agency provided about €140m in startup support. TEKES funding comes in tranches with "milestones, coaching and challenging", covering 50% to 75% of the project cost, which means founders need to compliment it with alternative sources of funding. Internationalisation services include a Market Access Programme (mainly for the United States, China and Southeast Asia), participation in European Research and Innovation programmes (e.g.: Horizon 2020), and the Vigo business accelerator programme for high-growth potential startups[35].

Betahaus, initially a co-working space, has grown through its successful community management practises. Its most recognisable internationalisation initiative is BETAPITCH, a startup pitching competition taking place in 10 cities, with a final event in Berlin. Betahaus is also supporting other organisations internationalise within its spaces. Portugal Ventures, for examples, is hosted in Berlin by Betahaus[36].

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30 http://www.techstars.com/startup-weekend/
31 http://www.infodev.org/digital-entrepreneurship
32 http://www.wired.co.uk/article/tech-city-uk-ceo-gerard-grech-qa-wired
33 http://www.techcityuk.com/about-us/
34http://www.wired.co.uk/article/tech-city-uk-ceo-gerard-grech-qa-wired
35 https://www.tekes.fi/en/programmes-and-services/grow-and-go-global/
36 http://www.portugalglobal.pt/PT/PortugalNews/Paginas/NewDetail.aspx?newId=%7B50710475-24E8-48D8-8325-F73452486252%7D

National, regional and international events are essential for building linkages within and between tech startup ecosystems. Many such events exist, and may be funded by private actors, public actors or a combination of the two. Events often focus on a particular industry vertical or audience type, and choosing the right event is essential for ensuring that businesses can connect with stakeholders relevant to their work or needs. A sample of events is included below:

4.5.1.1 Web Summit

Part of the rising movement of increasingly large and international startup events, Web Summit is an example of the on-going search for cross-border opportunities. The event is a mainstay of the European tech startup scene, and has grown from a few hundred of members of the Dublin tech community in 2009, to over 40 thousand people from 165 countries in 2016.

The event includes a mix of activities, from panel sessions, workshops, pitching, and an exhibition, and attracts notable speakers from world-renowned tech companies (e.g. Microsoft, Google, Apple, Uber, LinkedIn), investment funds (e.g. Baseline Ventures, United Ventures) accelerators (e.g. 500 Startups, Y Combinator), celebrities, and public sector representatives (e.g. Government Ministers, IGOs etc.).

Web Summit has a strong focus on networking and deal-flow, and seeks to provide a focal point for international business through partnerships, investment deals and procurement. The event facilitates this through social network-enabled apps for matchmaking, private and public networking activities throughout the day and night, and satellite activities organised by partners. Startups can participate in the "ALPHA" competition where, if selected, they receive a free exhibition stand, three tickets, access to investors, mentors, capacity building sessions and a range of other perks.

4.5.1.2 Startup Europe Comes to Silicon Valley (SEC2SV)

This event connects the dots between EU and Silicon Valley stakeholders, SEC2SV was created and organized by Mind the Bridge, and co-organized with EIT Digital. In 2015 the event sparked a crucial conversation between EU policy makers (Commissioners, Prime Ministers), top EU scale up companies, large corporations from both continents, and leading Silicon Valley stakeholders.

A European Innovation Day followed by a week of meetings provides an opportunity to stimulate networking and business opportunities, as well as improve the understanding in Silicon Valley of the increasingly dynamic European startup ecosystem. The goal is to create an honest and direct policy and business dialogue, which benefits startups from both continents to scale up beyond their borders and help create economically impactful and long lasting ecosystems where innovation can flourish.

The event also gives Silicon Valley investors the opportunity to tap into a significant EU market and gain exposure to a new generation of EU startups that may have a disruptive impact on traditional sectors. The 2015 edition had 500+ attendees, 62 speakers, and demo area showcasing 33 exciting, prospective companies[37].

4.5.1.3 ITU Telecom World

Hosted annually, the ITU Telecom World[38] event provides an international platform for emerging economies to showcase their high-growth potential tech startups and MSMEs. The event consists of an exhibition, forum and networking component, and brings together an audience of high-level policy makers from the ICT sector (Ministers and regulators), large multi-national companies, and increasingly, stakeholders from tech MSME and startup ecosystems around the world.

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[37] http://startupeuropepartnership.eu/sec2sv-numbers-and-results/
[38] http://telecomworld.itu.int/

With a specific focus on ICT, participants can engage in technical topics ranging from next generation networks (e.g. 5G), IoT, trust and security. The event has recently recognized the importance of tech startup and MSME participation, and is facilitating dialogues to help ICT policy makers and large corporates improve their collaboration with these stakeholders. This is helping to build an understanding of the unique constraints faced by tech MSMEs in search of scale-up opportunities, and is unlocking new business opportunities for these companies. The ITU Telecom World Awards each year recognizes the best Global MSME exhibiting at the event, and provides the credibility and recognition needed for recipients to expand into new markets.

4.6 Recommendations to overcome internationalisation challenges

Based on the afore mentioned findings, as well empirical research in developing countries, five recommendations can be made with the purpose of supporting the development of startups and a favourable ecosystem, particularly adapted to low-income countries:

1. Simplify the entrepreneurship environment:
   - Implement the recommendations of the World Bank Doing Business report[39], reduce cost and time to register a company.
   - Simplify the liquidation and transfer of ownership of companies.
2. Stimulate the financial foundations for entrepreneurship:
   - Facilitate the operation of business angels and venture capital.
   - Give guarantees in terms of taxation and repatriation of benefits.
   - Work with regional economic commissions to make transnational private funds easier to operate.
3. Simplify and encourage Foreign Direct Investment (FDI) and the flow of human resources:
   - Follow the example of Sweden and Estonia mentioned above.
4. Make public IT procurement accessible to local firms:
   - Simplify the rules in coordination with the private sector and learn from the experience made by others.
5. Engage women and tap into the other half of your countries' entrepreneurship potential.

– Only 8.3% of US VC deals benefited women-led tech startups in 2014.

Jorge Anta
Salamanca

Jorge Anta participated at the Startup Weekend in Salamanca and not only won the contest but also met a company that has recently hired him (Wembley Studios)! As part of the prize of the SW, Jorge and his team were invited to participate in the Berlin Hackathon this past June.

Startup Weekend SALAMANCA

spacehack The Refugee Journey

[39] www.doingbusiness.org/reports

4.7 Observations

This chapter has sought to highlight the importance of linking ecosystems, especially for the effective transfer of financial and human capital. It has further attempted to showcase options available to policy-makers and the international development community to build and take advantage of these linkages. One of the main observations from the body of evidence gathered is that many of the opportunities lie in bridging the human factor in organisations: creating connections, fostering dialogue and bringing individuals together.

Successful interventions may therefore be summarized under three categories.

Hub development: create a community of relevant actors that each support an aspect of the ecosystem, and encourage regular interaction and close linkages between these stakeholders. Geographic proximity between actors is often essential to creating the community needed for a successful tech startup ecosystem.

Local to global: activities organised under the umbrella of a larger initiative serve as a decentralised approach to motivate local ecosystems by providing a global purpose, prize or other incentives (e.g.: Startup Europe Week[40], Seedstars World[41], etc.)

Events: regional and international events can help bring ecosystems together, showcasing the best examples and facilitating interaction on a wider scale (e.g.: Startup Europe Comes to Silicon Valley[42], Web Summit[43], ITU Telecom World[44] etc.).

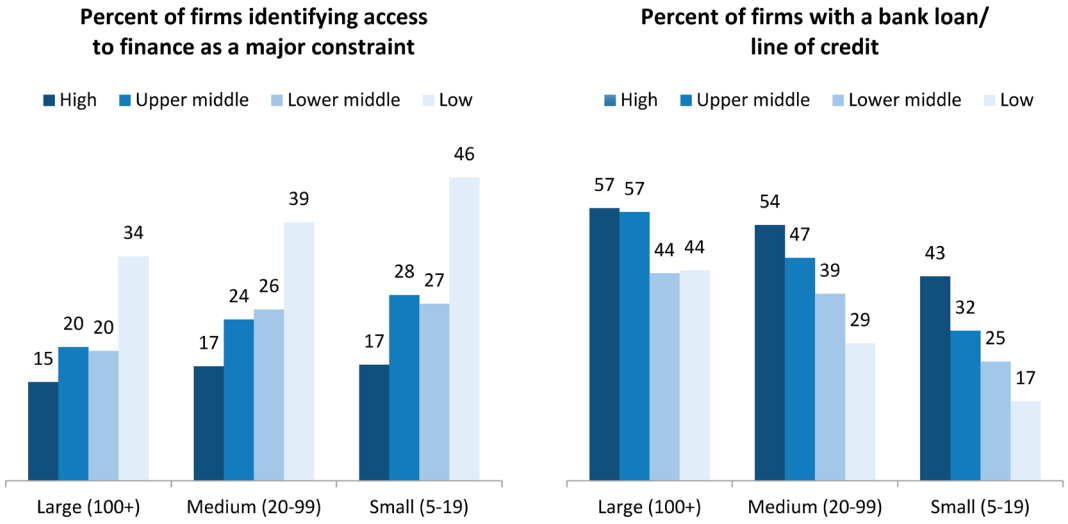
[40] http://startupeuropeweek.eu/
[41] https://www.seedstarsworld.com/
[42] http://sec2sv.com/
[43] https://websummit.net/
[44] http://telecomworld.itu.int/

5 Mobilizing financial capital in emerging markets: myths, risks and realities.

5.1 Introduction

Access to finance is often a major obstacle for MSMEs. The smaller the enterprise and the less wealthy the country it is located in, the bigger the constraint (Figure 5.0.1, left). Similarly, the likelihood of an enterprise having a bank loan declines with size and level of development (Figure 5.0.1, right). Tech MSMEs face a particular challenge obtaining credit from banks since they often have no physical collateral and their business models are risky. Even if they could obtain bank loans, startups may not necessarily want one given their high failure rate. Instead, other mechanisms are being employed to provide funding to tech MSMEs. These are explored in more detail in this chapter.

Figure 5.0.1: MSMEs access to finance and bank lending



Note: Based on latest available survey (2005-2015) for 147 countries.

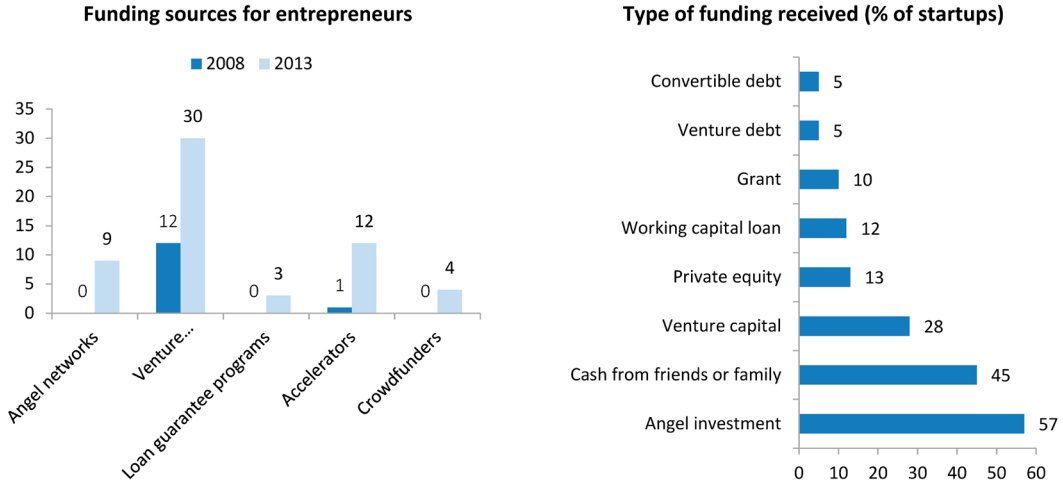
Source: Adapted from World Bank Enterprise Surveys.

5.2 Stages of funding

There is a range of other options to fill the bank-lending void for tech startups. These include the founders themselves, family and friends, competitions and angel investors as well as more formal private equity vehicles such as accelerators, venture capital and some crowd-based platforms. Recognizing the challenge that many tech MSMEs face in obtaining bank lending, some governments have also introduced special loan guarantee programs and business development grants.

Several of these funding mechanisms are relatively new to the developing world. A survey from MENA found several forms of financing emerging in the region since 2008 including angel networks, crowdfunding, and special loan programs while others such as venture capital and accelerators have grown rapidly (Figure 5.0.2, left). In terms of the types of funding used by startups in the region, angel investment was the main source followed by cash from friends or family (Figure 5.0.2, right). Just over a quarter had received venture capital and another 13% private equity while 12% had received a bank loan.

Figure 5.0.2: Startup funding sources and sources of funding, MENA



Note: The left chart is based on replies from tech ecosystem supporters in the region. The right chart is based on replies from 254 entrepreneurs carried out in 2012.

Source: Adapted from Wamda Research Lab.

Angel funding often comes from successful entrepreneurs that understand the risks and are willing to help startups get off the ground. The amounts are usually modest but depending on the type of angel, can be significant. For example Georges Harik, one of Google's first employees, has made significant personal investments in dozens of startups around the world[1].

Startup competitions can be an important source of seed funding, and as prizes increase, even early stage growth funding. Fenox, a Silicon Valley based venture capital firm recently launched the Startup World Cup where the winning startup will receive a US$1 million investment prize[2]. Awards can be part of a startup's resume helping it to leverage a higher-level funding. At the same time, there is a danger of rewards syndrome with some startups continually entering competitions without ever really launching their product.

It is useful to understand the stages of startup growth and the type of funding associated with each stage. Steve Blank's investment readiness level (IRL) is a commonly used methodology for gauging the stage of a startup company[3]. Blank identifies nine specific levels a company needs to achieve to increase its probability of being funded. In general, when an entrepreneur first gets an idea, money is needed to develop it further and develop a business plan. This seed stage is typically funded by entrepreneurs themselves, friends, family or angel investors. As the idea moves from concept to a more advanced stage, additional levels of funding are needed. This can come from product earnings, offering equity to an accelerator to further refine the idea, or if sufficiently robust and convincing, from the so-called Series A first round of venture capital. If the startup product has a growing market with large demand and often regional and international aspirations, expansion can be financed with product income if sufficient or if not, further higher levels of venture capital funding (Series B, C, D...). Eventually the startup either remains self-funding, or exits by listing on a public stock exchange or being acquired (in which case it can pay back its investors) or it fails (and the investors take a loss).

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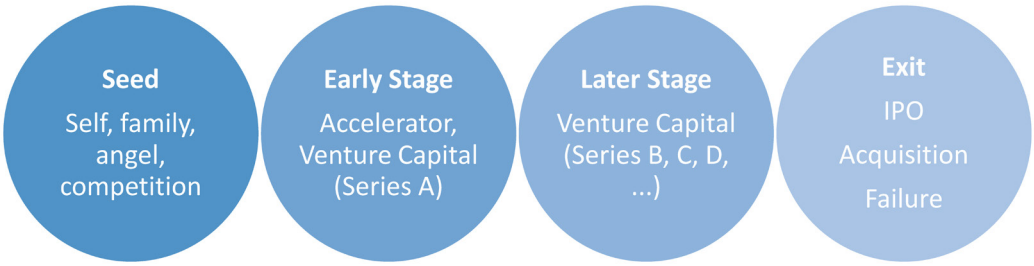
1 https://www.crunchbase.com/person/georges-harik#/entity

2 Lora Kolodny. 2016. "To drum up deals internationally, Fenox VC launches Startup World Cup with $1 million prize." *TechCrunch,* 21 June. https://techcrunch.com/2016/06/21/to-drum-up-deals-internationally-fenox-vc-launches-startup-world-cup-with-1-million-prize/

3 https://steveblank.com/category/investment-readiness-level/

Figure 5.0.3: Tech MSME investment phases



Source: Authors.

5.3 Types of funding

This section outlines funding specially targeted at tech MSMEs: accelerators, venture capital and crowdfunding. Though this type of funding receives a lot of publicity, only a relatively small number of startups benefit from it. Here other types of funding are relevant such as corporate private equity investment (discussed in Chapter two) and bootstrapping operations from product earnings.

5.3.1 Accelerators

The accelerator model is often considered to have started with the formation of YCombinator, a programme established by computer scientists and digital entrepreneurs in 2005 to provide seed funding and advice to young tech startups. Since then, the model has been expanded into other sectors (including non-digital areas, such as biotech), but many accelerators still retain a focus on digital technologies.

Like incubators, accelerators provide training, mentoring and networking opportunities for startups. The main difference is that accelerators typically provide a more structured, time-limited, cohort-based approach, and may also invest in the companies they nurture; this arguably means that they have a greater stake in seeing them achieve profitability. Such accelerators may therefore be funded by, or otherwise collaborate with, venture capital funds. For startups, an accelerator is like a university[4] but instead of paying tuition, they give up some equity, sort of like a delayed student loan. Admission criteria for startups are generally highly selective and demand generally far exceeds supply[5].

Table 5.0.1: Accelerators by region, 2015

	# Accelerators	Startups	Investment (US$ m)
Latin America	62	1,333	$32
North America	111	2,968	$90
Europe	113	2,574	$41
Middle East	47	666	$12

[4] "a proven way to quickly grow a startup by learning from experts, finding great mentorship and connecting to a powerful network. They provide resources that reduce the cost of starting a company and the early capital a team needs to get their venture off the ground or to achieve key early milestones. They have become the new business school." See: http://gust.com/latam-accelerator-report-2015

	# Accelerators	Startups	Investment (US$ m)
Asia	54	1,295	$17
TOTAL	**387**	**8,836**	**$192**

Source: http://gust.com/latam-accelerator-report-2015/

According to one source, there were just under 400 accelerators around the world in 2015 (excluding Sub-Saharan Africa which was not covered). They accelerated almost 9,000 startups, investing just under US$200 million in exchange for equity. North America and Europe account for almost 60% of all accelerators and 68% of investment.

Accelerators vary in geographical focus from purely local entities to regional franchises to global hubs attracting startups from all over the world. Some accelerators also have an industry focus such as health, fintech or hardware. Flat 6 Labs (alluding to a type of car engine) is an example of a regional accelerator, operating in five cities in MENA[6]. There are particular advantages in regional accelerators particularly where there are common linguistic and cultural affinities and venture funds operating across neighbouring countries. Flat 6 provides startups with seed funding of between US$10,000-20,000 in exchange for 10-20% equity. Its owner Sawari Ventures, is an Egyptian venture capital fund and in other cities Flat 6 works with different investors for funding the startups. At the end of the three to four months acceleration period, Flat6Labs holds a Demo Day event, where startups are given the opportunity to showcase their products to potential investors with the hopes of receiving follow-on funding. Over 90 startups have participated in the program of which over half have gone on to receive additional funding.

500 Startups, a global accelerator with three locations (two in California and one in Mexico) not only provides seed capital for companies it accelerates but also invests in other startups. It has invested over US$250 million in a portfolio of over 1,500 startups in more than 60 countries,[7] making it one of the largest startup investors in the world measured by the number of companies. 500 Startups claims its acceleration program is more difficult to get in than a leading university accepting only 200 startups a year from 5,000 applications. It invests between US$25,000-250,000 usually in companies that have a functioning product with at least some users or revenue. Some overseas startups accelerating at its California facilities stay on due to the greater opportunities in the Silicon Valley area[8].

Of note is the equity free accelerator Startup Chile. In an effort to attract top entrepreneurs to Chile, the government launched the program in 2010. It handles immigration formalities offering a one-year visa and provides entrepreneurs with US$40,000 funding in addition to speedy business incorporation, office space, training and mentoring. Around one hundred startups from around the world are chosen for the six-month program. More than 1,200 startups from 72 countries have graduated as of mid-2015, raising over US$100 million and creating more than 1,500 jobs[9]. However, it has been a challenge to keep graduates in Chile due to a lack of local venture capital with around 70% leaving after the program,[10] with many moving to the United States. This triggered a new initiative providing around US$ 100,000 funding to three graduates following completion of a three-month program providing they incorporate and remain in Chile.

The extent to which accelerators actually help create successful firms, versus simply selecting them, is still a matter of discussion which research programmes such as the Global Accelerator Learning Initiative are seeking to understand. There are also unresolved questions about what kinds of

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6 Cairo, Jeddah, Abu Dhabi, Beirut and Tunis. See: http://www.flat6labs.com

7 http://500.co/press/

8 http://ww2.kqed.org/news/2015/02/21/incubating-a-new-wave-of-immigrants-in-silicon-valley

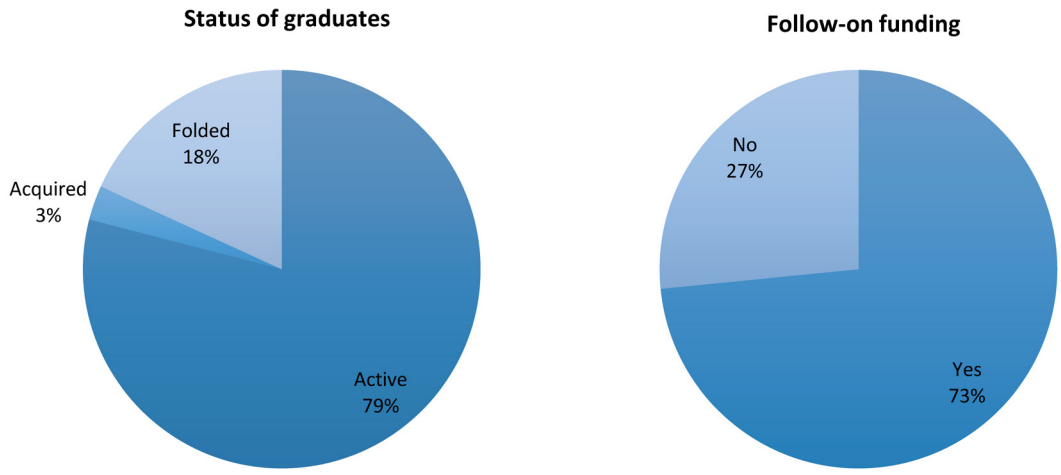
9 Karsten, Jack, and Darrell West. 2015. "Start-Up Chile: A 'start-up for Start-Ups' in Chilecon Valley." *The Brookings Institution TechTank*, August 19. http://www.brookings.edu/blogs/techtank/posts/2015/08/19-startup-chile-chilecon-valley.

10 http://www.latercera.com/noticia/negocios/lt-emprende/2015/12/3131-661756-9-la-lucha-de-startup-chile-por-retener-el-talento-en-el-pais.shtml

interventions are most effective for what kinds of firm. At present, there is some evidence that accelerator programmes can indeed increase the longevity and fund-raising prospects of firms, and emerging evidence about the kinds of characteristics or activities that add value.

Most studies agree that one of the success factors of accelerators is how well their graduates have been mentored and networked to obtain post-acceleration funding. Startupbootcamp, founded in Copenhagen in 2010, provides useful metrics on this. The accelerator is the largest in Europe and one of three biggest in the world, and operates programs in a number of cities. Its three-month program provides participants €15,000 in exchange for 6-8% equity. It has accelerated 325 companies since it launched. Of the companies that graduated from its program, 79% are still active, 3% were acquired and only 18% have folded (Figure 5.0.4, left). Almost three quarters (73%) of Startupbootcamp's alumni received follow on funding (Figure 5.0.4, right) with an average amount of €662,000. Eight of the companies that went through Startupbootcamp's accelerator have been acquired. The sale of a calendar application called Sunrise to Microsoft in February 2015 for US$100 million[11] would have resulted in a pay out of US$7 million to Startupbootcamp more than covering all of the investment it has made in all other startups since inception.

Figure 5.0.4: Startupbootcamp metrics (2010-March 2016)



Source: http://www.startupbootcamp.org/stats/

Given the importance of accelerators for helping innovators to obtain financing, performance comparisons would be useful. Researchers in the United States have ranked that country's accelerators on a range of metrics including the valuation of participating startups, the amount of funding raised, survival rates and ratings provided by program graduates[12]. The top ones are classified as platinum, gold or silver. It might be useful to apply this globally to enhance accelerator benchmarking and provide useful information for startups. This is particularly relevant given a trend towards accelerator franchises and globalization.

There is a dearth of acceleration opportunities in smaller developing nations and certain regions. For example, sub Saharan Africa has hardly any accelerators and some that were in operation had to stop because they ran out of investment capital. This highlights the need for accelerators with deep pockets since it can take a while before startups exit, and points to the challenges of finding a route to exits in lower income countries where there is a lack of buyouts or opportunities for stock market listings. Lower access to ICTs in these nations also means the market is smaller and online payment solutions, which would allow startups to make money, are not always available or widespread. Similarly, there

11 https://techcrunch.com/2015/02/11/microsoft-confirms-sunrise-acquisition-adds-depth-to-it-mobile-productivity-offerings/

12 Mark Marich. 2016. "Study Ranks U.S. Seed Accelerators." *Policy Dialogue on Entrepreneurship*, 11 April. http://www.kauffman.org/blogs/policy-dialogue/2016/april/study-ranks-us-seed-accelerators

is a lack of access to other critical infrastructure, delivery networks and quality control mechanisms. As a result, some promising tech entrepreneurs seeking acceleration move to locations that are more favourable[13].

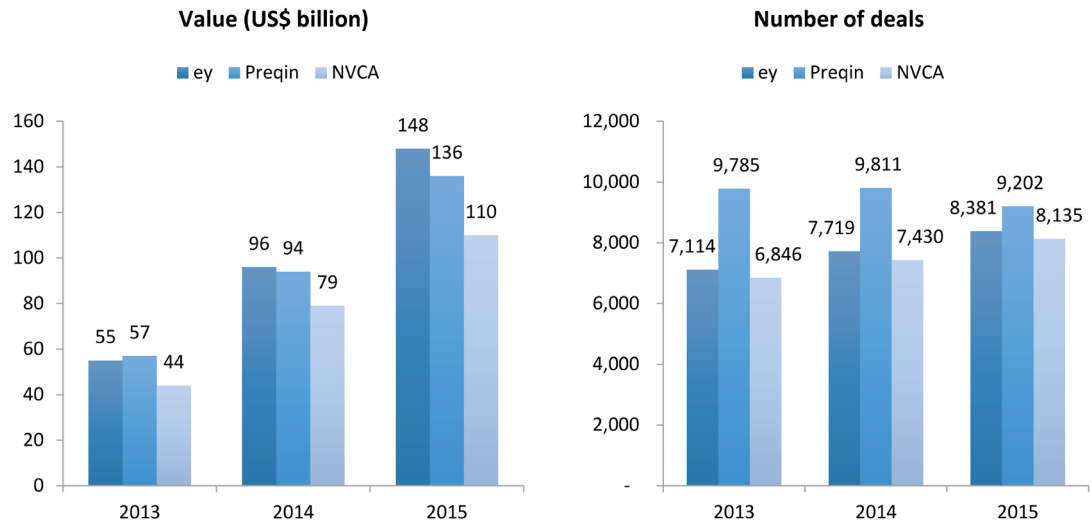
5.3.2 Venture capital

Venture capital is a subset of private equity aimed at riskier investments typical of tech startups. It can provide significant amounts of funding for MSMEs with innovative ideas but risky business models and limited recourse to traditional financing. Young startups can benefit since venture capital is also available for early stages.

Global venture capital statistics can be deceptive particularly since there are no official international definitions. Instead, private equity or venture capital associations and analysts compiling the statistics differ in methodologies and the line is sometimes blurred between private equity financing (which includes debt and lending to established companies) and venture capital. While non-venture capital private equity is sometimes invested in the ICT sector, it is typically for infrastructure such as cell phone tower companies or for network operators rather than tech based startups. Venture capital also covers many industries and not just investments in tech MSMEs.

Given these methodological issues, there are differences among the estimates regarding venture capital investments. Reports from three analyst organizations following global venture capital flows agree it has increased rapidly the last few years[14]. Global venture capital investment estimates ranged between US$110- US$148 billion in 2015 (Figure 5.0.5). The number of deals differs with two of three analyst reports finding they have consistently risen since 2013 while another reports a drop between 2014 and 2015. Estimates for the number of global venture capital deal ranged between 8,135 and 9,202 in 2015 (Figure 5.0.5, right).

Figure 5.0.5: Global venture capital investment



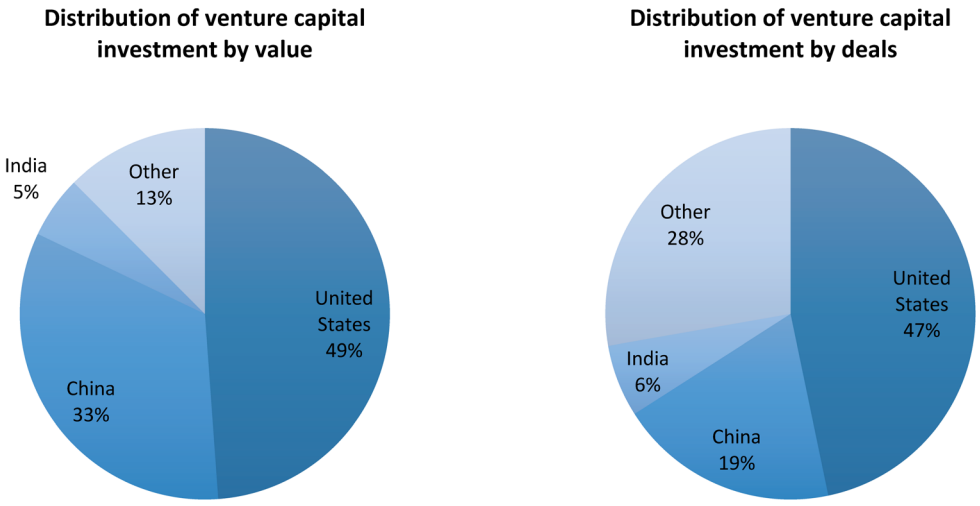
Source: Adapted from EY, Preqin and NVCA.

[13] Tom Jackson. 2016. "Global startup accelerators turn their attention to Africa." *Disrupt Africa*, 8 March. http://disrupt-africa.com/2016/03/global-startup-accelerators-turn-their-attention-to-africa/

[14] See: EY. 2016. *Back to Reality: EY Global Venture Capital Trends 2015*. http://www.ey.com/Publication/vwLUAssets/ey-global-venture-capital-trends-2015/$FILE/ey-global-venture-capital-trends-2015.pdf;
National Venture Capital Association (NVCA). 2016. *Yearbook 2016*. http://nvca.org/pressreleases/2016-nvca-yearbook-captures-busy-year-for-venture-capital-activity/; and
Preqin. 2016. *In Focus: Venture Capital*. https://www.preqin.com/docs/reports/Preqin-In-Focus-Venture-Capital-May-2016.pdf.

Venture capital investment is highly concentrated. The United States alone accounted for almost half of the value of all venture capital investment in 2015. Together with China and India, companies in those three countries received 87% of all venture capital in 2015 (Figure 5.0.6, left). Their share of the number of deals was less but still significant accounting for 72% (Figure 5.0.6, right).

Figure 5.0.6: Distribution of venture capital investment by amount and number of deals, 2015



Source: Adapted from EY.

Identifying venture capital investments in tech enabled MSMEs is complicated due to the different classifications employed. Venture capital data reported for United States defines Internet-related deals as:

> *"A discrete classification assigned to a company whose business model is fundamentally dependent on the Internet, regardless of the company's primary industry category*[15]*."*

Other analysts do not use this classification making it impossible to clearly identify global internet-related venture capital flows. A breakdown of Unites States industry data by internet-related and non-internet related illustrates the intricacy of the classification since even some ICT sector investment is not considered internet-related (Table 5-2). On the other hand, a majority of investment in non-ICT sectors such as Consumer Products and Services, Financial Services, Media and Entertainment and Retailing/Distribution is counted as internet-related. In total 68% of US venture capital investment went to Internet related firms in 2015 or US$40 billion. In terms of industries related to the ICT sector, venture capital investment was US$ 31 billion or 51% of the total and the number of ICT sector deals was 2,648 or 54% of the total.

Table 5.0.2: Internet-related venture capital investment (US$ million), United States, 2015

Industry	Internet Related	Non-Internet Related	Total	% Internet Related
Biotechnology	0	7,603	7,603	0%
Business Products and Services	82	531	613	13%
Computers and Peripherals	337	401	738	46%
Consumer Products and Services	3,458	1,369	4,827	72%
Electronics/Instrumentation	-	392	392	0%

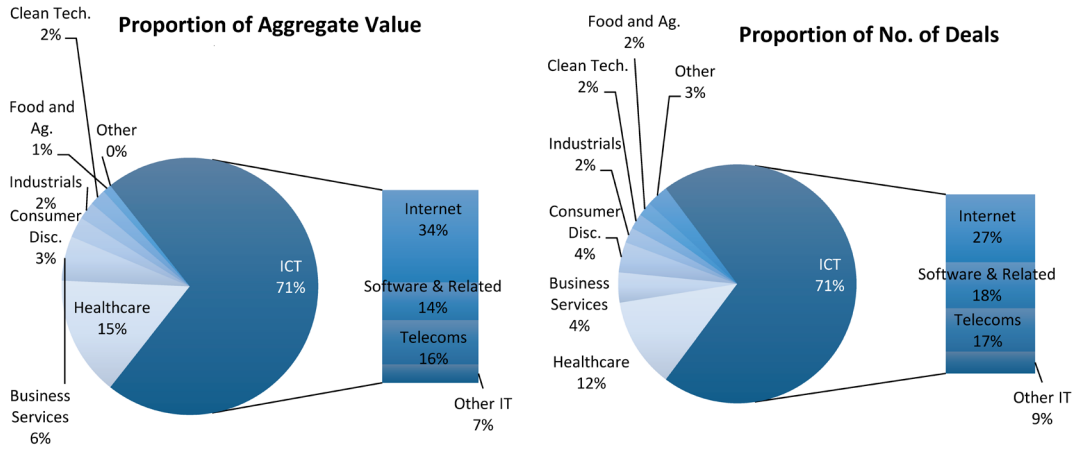
[15] https://www.pwcmoneytree.com/Definitions/Definitions

Industry	Internet Related	Non-Internet Related	Total	% Internet Related
Financial Services	2,621	558	3,179	82%
Healthcare Services	289	554	844	34%
Industrial/Energy	28	3,150	3,177	1%
IT Services	3,821	42	3,863	99%
Media and Entertainment	4,354	396	4,749	92%
Medical Devices and Equipment	-	2,748	2,748	0%
Networking and Equipment	282	11	293	96%
Other	-	68	68	0%
Retailing/Distribution	1,001	22	1,023	98%
Semiconductors	-	739	739	0%
Software	23,401	97	23,498	100%
Telecommunications	565	148	712	79%
Total	40,238	18,827	59,065	68%

Source: NCVA.

Data on internet-related venture capital investment is not available for other countries and regions. Instead, one source provides a breakdown by ICT-related industries, pegging the share of ICT-related venture capital investments at US$95 billion in 2015 or 70% of the total (Figure 5.0.7, left). The number of deals is almost the same proportion or 71% covering 6,518 ICT-related venture capital transactions (Figure 5.0.7, right).

Figure 5.0.7: Global venture capital investment by sector, 2015



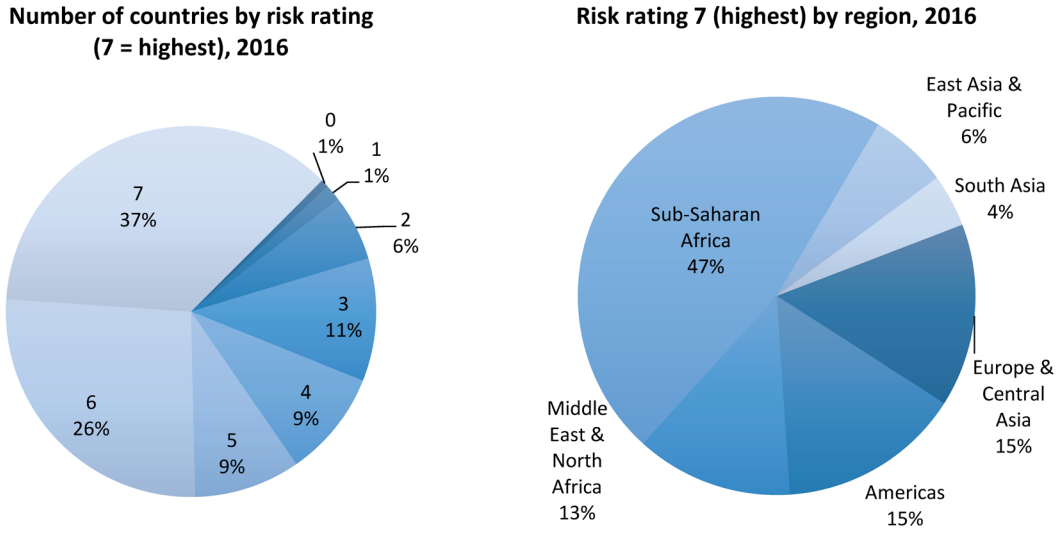
Source: Adapted from Preqin.

Venture capital data from developing regions illustrate the same rising trends though on a much smaller scale. According to the Latin American Private Equity and Venture Capital Association (LACVA), the amount of investment and number of deals has been growing in that region. Investments are up from US$143 million in 2011 to US$594 million in 2015[16]. Information technology accounts for the largest share receiving 82% of all investment between 2011-2015.

Venture capital investments in the Middle East and North Africa totalled US$123 million in 2015 with the number of transactions trebling from the previous year to 122[17]. Information technology accounted for over half the investment.

Venture capital information on Sub-Saharan Africa is sketchier. According to the African Private Equity and Venture Capital Association, the information technology sector accounted for just 49 private equity transactions between 2010-2015 (6% of the total) and only US$216 million in value (1% of the total over the same period)[18]. Given that the data include both private equity and venture capital as well as North Africa, venture capital investments made to Sub-Saharan African tech startups is significantly less than the already low aggregated amount. An online survey estimates the amount of venture capital for African tech companies at just US$26 million in 2015[19]. On the other hand, there has been significant funding for clean tech startups in the region, specifically those using solar solutions for tackling the lack of grid electricity in rural areas. A couple of East African solar startups have raised over US$ 100 million in funding from clean tech venture capital funds and companies as well as social investors[20]. These are products with significant demand in the region and where low Internet access is not a barrier since payments are made over mobile money networks.

Figure 5.0.8: Country risk



Note: High-income OECD members are not classified.

Source: Adapted from OECD.

16 Latin America Private Equity & Venture Capital Association (LAVCA). 2016. *Latin America Venture Capital Five-Year Trends*. http://lavca.org/wp-content/uploads/2016/04/UPDATED-FINAL2-LAVCA-Latin-America-Venture-Capital-5-Year-Trends-04.27.16.pdf

17 MENA Private Equity Association (MENAPEA). 2016. *10th Annual MENA Private Equity and Venture Capital Report.* http://menapea.com/2015AnnualReport/10th_MENAPEA_AnnualReport_2015_Rev15.pdf

18 African Private Equity & Venture Capital Association (AVCA). 2016. *Annual African Private Equity Data Tracker.* http://www.avca-africa.org/media/1376/avca-annual-african-private-equity-data-tracker-2016.pdf

19 VC4A. *2015 Venture Finance in Africa report*. http://www.aspeninstitute.org/sites/default/files/content/docs/resources/Summary%20VC4Africa%202015%20Report%20-%20Venture%20Finance%20in%20Africa.pdf

20 See https://www.crunchbase.com/organization/off-grid-electric#/entity and https://www.crunchbase.com/organization/m-kopa#/entity

Venture capital is becoming increasingly global; in 2015, 8% of venture capital flows into Europe came from outside the region[21] while 40% of Japanese venture capital flowed to overseas startups[22]. However there is a *double* risk in venture capital investment in developing regions. Apart from the inherent risk of investing in unproven startups, there is the further gamble of investing in economically risky countries. The OECD ranks countries according to their level of risk using values from 0-7 with 7 the riskiest[23]. In 2016, 37% of countries were deemed to be in the highest risk category and a further 26% in the next riskiest (Figure 5.0.8, left). Almost half the highest risk countries were in Sub-Saharan Africa (Figure 5.0.8, right).

In addition to country risk, other factors make countries uninviting for venture capital investment. The Venture Capital and Private Equity Country Attractiveness Index encapsulates these factors into six categories for its ranking of 125 countries (Table 5.3)[24]. Key inhibitors of venture capital include onerous business registration and bankruptcy procedures as well as undeveloped corporate sectors or stock markets reducing exit options.

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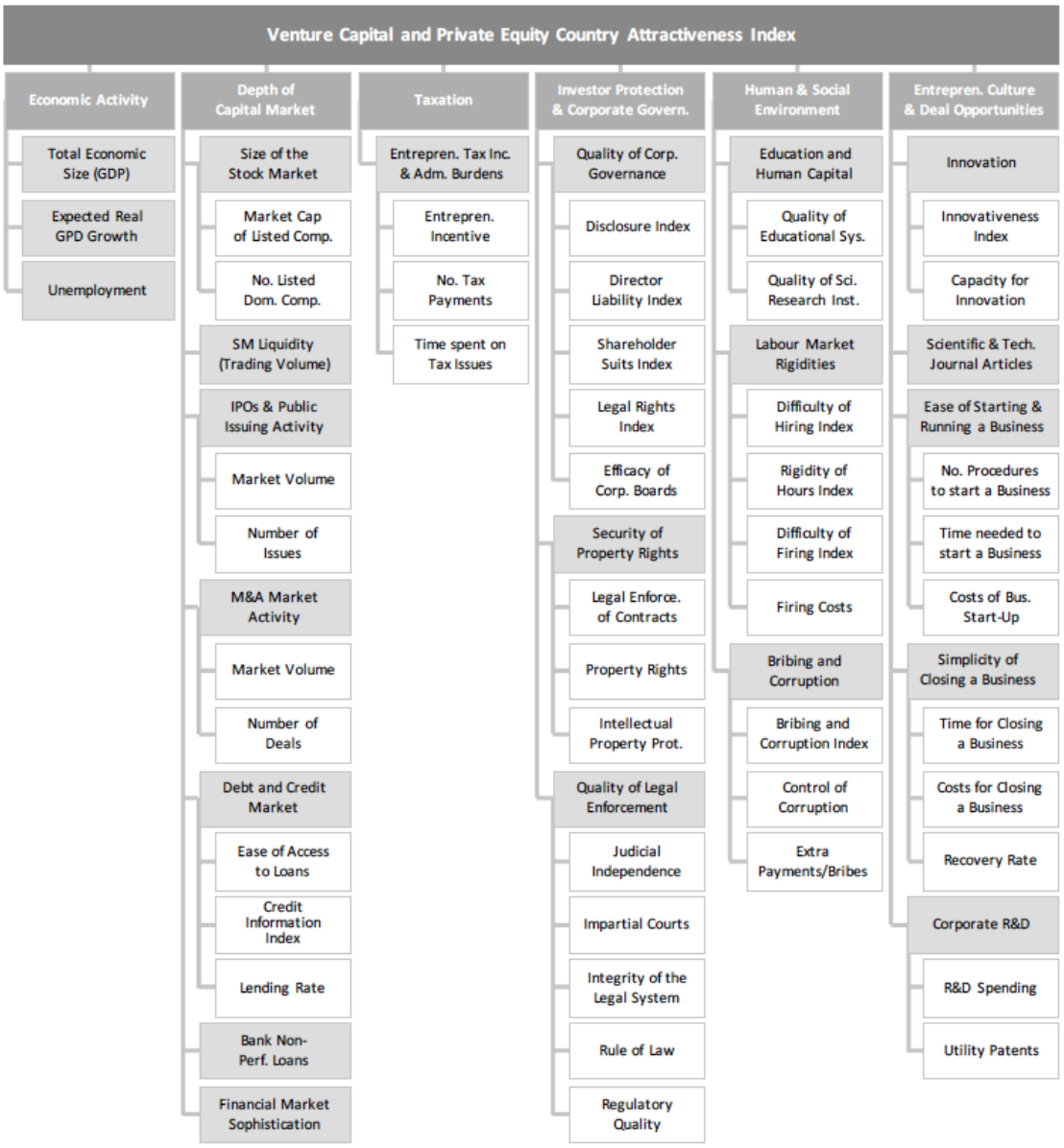
21 Invest Europe. 2016. 2015 *European Private Equity Activity*. http://www.investeurope.eu/research/activity-data/annual-activity-statistics/.

22 Venture Enterprise Center, Japan (VEC). 2016. “VEC Venture News- Latest Quarterly Trend.” http://www.vec2.jp/2016/05/20/20160520_en/.

23 See "Country Risk Classification" at: http://www.oecd.org/trade/xcred/crc.htm

24 Groh, Alexander, Heinrich Liechtenstein, Karsten Lieser, and Markus Biesinger. 2016. “The Venture Capital & Private Equity Country Attractiveness Index.” http://blog.iese.edu/vcpeindex/.

Table 5.0.3: Venture Capital and Private Equity Country Attractiveness Index



Source: Groh et al., 2016.

Some analysts argue that the limited venture capital in Sub-Saharan Africa is not strictly because of a lack of money but due to cumbersome procedures unsuited for this type of investment.

> *"I am not saying that we don't need more investor money for African startups but I believe we need to change the way investments are made and make the process easier, faster and more standardized before we can even handle more money. Right now the bottleneck is not the amount of money, but the process with which it is invested. The best way to get there, is educating investors, governments, corporates and entrepreneurs. Let's fix this first before calling for more money we can't even invest[25]".*

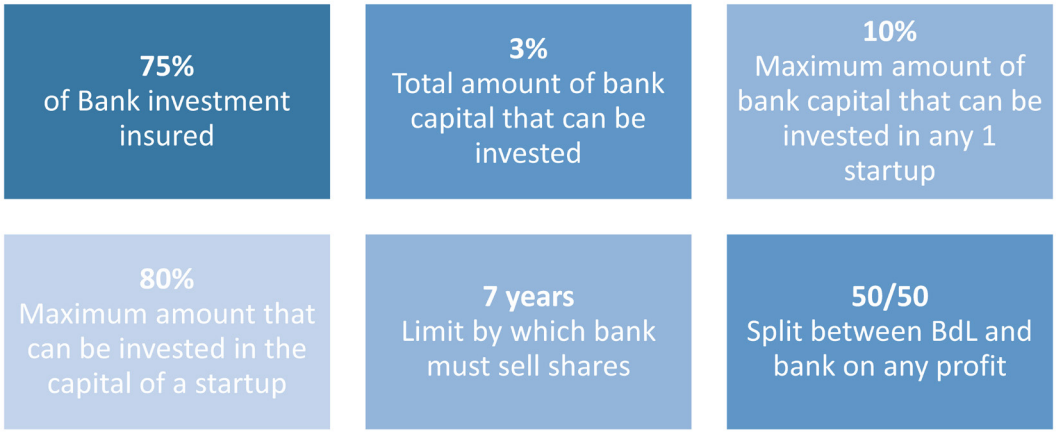
Barriers include non-standardized legal frameworks and associated contracts, term sheets and agreements that need to be created from scratch. Government regulations and tax laws are often vague about repatriation. The lack of venture capital funds means there is little competition dragging

[25] Seedstars. 2016. "The Rising Startup Ecosystems." https://issuu.com/seedstarsworld/docs/seedstars_booklet_-_the_rising_star.

out investment and lowering valuations. Traditional investments in the minerals industry or real estate are better understood and seem to be safer bets even though the returns are much lower than investment in a successful tech startup.

Some governments and bi-lateral and multi-lateral development agencies are taking steps to facilitate venture capital availability through new banking rules, tax incentives and increased funding. In Lebanon, the central bank's (Banque du Liban) Intermediate Circular no. 331 of August 2013 incentivizes banks to invest in Lebanese startups with up to 75 percent of the investment guaranteed (Figure 5.0.9)[26]. The ruling potentially makes available around US$ 400 million assuming all banks invested three percent of their capital, the maximum amount allowed. Some banks have already been making investments in startups. This has triggered new venture capital funds in the country that already exceed US$170 million for potential startup investment by mid-2015[27].

Figure 5.0.9: BDL Circular 331, 22 August 2013



Source: Adapted from Banque du Liban (BDL).

Governments are trying to overcome venture capital gaps through their own investment. Singapore's National Research Foundation (NRF) has provided funding through its Early Stage Venture Fund (ESVF)[28]. Launched in 2008, the ESVF provides matching funding of up to S$10 (US$7.3) million to funds managed by local professionals that invest in early-stage Singaporean tech startups. NRF has invested S$140 (US$ 102) million to date, which, with matching funds, doubles to S$280 million. Several of the startups that have received investment have been acquired or received additional later stage funding. Singapore's experience provides valuable lessons about government venture capital investment: 1) stimulate competition among VC funds by partnering with several 2) not overinvesting in a few startups, 3) minimize government influence by working with professional venture capital funds, and 4) only invest in local companies.

Multilateral and bilateral development partners are also increasing efforts to boost venture capital in low- and middle-income economies. The International Finance Corporation (IFC), the World Bank's private sector investment arm has become increasingly active in venture capital investments providing money for specific funds as well as investing on its own account. It has invested US$ 259 million in its active portfolio of 24 companies and US$261 million in 14 regional, national and global venture

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26 Banque Du Liban. "Intermediate Circular No 331 addressed to Banks and Financial Institutions." August 22, 2013. http://www.bdl.gov.lb/circulars/intermediary/5/37/0/ Intermediate-Circulars.html

27 Michael Minges, Victor Mulas and Elene Allende Letona. 2016. "Tech Startup Ecosystem: The Case of Lebanon." *Lebanon Economic Monitor*, May. http://documents.worldbank.org/curated/en/652591468179100109/pdf/105995-WP-The-World-Bank-LEM-Spring-2016-PUBLIC-DISCLOSURE-DATE-JULY-1-low-res.pdf

28 "NRF Announces Award Of Venture Capital Funds To Four Large Local Enterprises Under Its Early Stage Venture Fund Scheme." *Press Release*, 17 May 2016. http://www.nrf.gov.sg/Data/PressRelease/Files/201605171313591610-ESVFIII%20Press%20Release.pdf

capital funds, around three percent of its total investment portfolio[29]. It plans to double its venture capital investment in the coming years and branch out from its previous focus on clean tech and Ed tech[30]. IFC also launched TechEmege a matchmaking platform to connect innovative entrepreneurs with large companies.

In 2015, CDC Group, the United Kingdom's development finance agency, invested €20 (US$ 22) million in Daraz, a Pakistani e-commerce site[31]. CDC co-invested with Asia Pacific Internet Group for a total of €50 (US$55) million, Pakistan's second largest venture capital deal in 2015[32].

Investors in social entrepreneurship such as UNICEF launched a US$ 9 million Innovation Fund to invest in startups with products that benefit youth[33]. The United Kingdom's Department for International Development (DFID) launched the Global Innovation Fund (GIF) in 2014 to provide grants, loans and equity of £30,000 (US$66,000) to £10 (US$ 15) million for social innovations aimed at reducing poverty. GIF is supported by the United States Agency for International Development, the Omidyar Network, the Swedish International Development Cooperation Agency and the Australian Department for Foreign Affairs and Trade, which have collectively pledged over US$200 million. Its first investments to six startups were announced in February 2016[34].

As noted in chapter two, corporates are also venture capital investors. To some extent, large firms are more willing to take the risk of investing in emerging markets and unlike pure venture capital firms, consider strategic benefits in addition to financial returns[35]. According to one report, corporate venture capital totalled US$ $28 billion of funding across 1,301 deals in 2015[36]. It should be noted that corporate venture capital investments are sometimes fuzzy as it is often not clear whether investees are treated as subsidiaries.

5.3.3 Crowdfunding

Crowdfunding refers to using online platforms for individuals to pool money together to support a cause, product or company. There are limited official statistics on crowdfunding in Figure 5.0.10 emerging and frontier markets. The World Bank has estimated that crowdfunding in developing countries will reach US$96 billion by 2025[37]. Figure 5.0.10

Crowdfunding can be a misleading term, since it refers to a very wide range of different offerings and this can cause misrepresentations in the context of “investment” in tech MSMEs. Peer-to-peer **lending** accounts for the majority of crowdfunding at 73% percent (, right). Typically, peer-to-peer lending is only suitable for individuals and companies with a stable revenue stream as this ensures there are sufficient funds to repay the interest charged and there is a lower chance of default. **Equity-based** crowdfunding has grown rapidly over the past few years and accounted for US$2.6 billion of

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29 International Finance Corporation (IFC). 2015. *IFC Venture Capital*. http://www.ifc.org/wps/wcm/connect/eae4cf0043da33eeb002b8869243d457/IFC+VC+Pitchbook+April27.pdf?MOD=AJPERES

30 "IFC Aims to Double Venture Capital Portfolio to $1 Billion to Spur Innovation in Emerging Markets." *Press Release*, 23 June 2016. http://ifcextapps.ifc.org/IFCExt/Pressroom/IFCPressRoom.nsf/0/92FD3F355030204085257FDB0083912A

31 "New €20m CDC investment helps expansion of online marketplace in Pakistan, Bangladesh and Myanmar." *News*, 23 September 2015. http://www.cdcgroup.com/Media/News/New-20m-CDC-investment-helps-expansion-of-online-marketplace-in-Pakistan-Bangladesh-and-Myanmar/

32 Rehan Ahmed. 2015. "22 Pakistani Startups that raised investment in 2015." *TechJuice*, 8 December. https://www.techjuice.pk/19-pakistani-startups-that-raised-investment-in-2015/

33 See "UNICEF Innovation Fund" at: http://www.unicefinnovationfund.org/resources/#resources-page

34 Molly Anders. 2016. "Global Innovation Fund's first investments shed light on mission." *DEVEX IMPACT*, 19 February. https://www.devex.com/news/global-innovation-fund-s-first-investments-shed-light-on-mission-87755

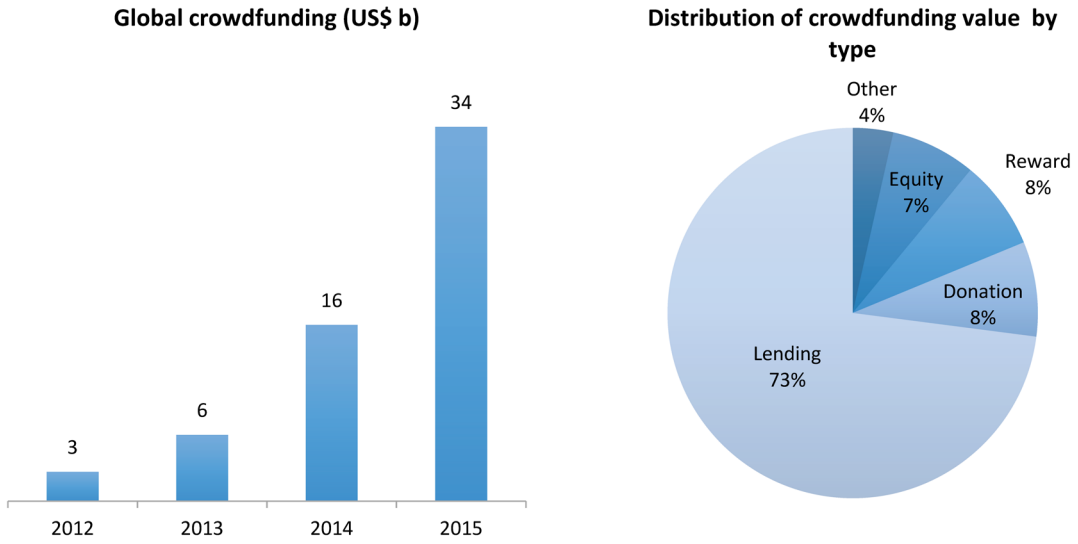
35 See "Corporate Venture Capital (CVC)" at: http://www.kauffman.org/microsites/state-of-the-field/topics/finance/equity/corporate-venture-capital

36 See CB Insights, "2015 Global Corporate Venture Capital Report" at: https://www.cbinsights.com/research-global-cvc-2015

37 Best, Jason, Richard Swart, Sherwood Neiss, Anthony Lambkin, and Sam Raymond. 2013. *Crowdfunding’s Potential for the Developing World*. The World Bank. http://documents.worldbank.org/curated/en/409841468327411701/Crowdfundings-potential-for-the-developing-world;jsessionid=TvrUWeyvJR-D9f6eSBV679RW.

funding in 2015. However this type of crowdfunding has far to go to overcome the lack of venture capital in developing regions. Over half of crowdfunding was raised in the United States in 2015 and almost a third in Asia (mainly in China) with just over US$100 million going to Latin America or Africa (0.3% of the total). **Donation** crowdfunding is aimed at charitable causes; while this might appeal to social entrepreneurs, it is not a scalable funding route for the majority of startups. **Reward** based crowdfunding refers to contributions in exchange for some kind of product, prize or service. Although it can be useful for validating the interest in a new business, startups incur the cost of providing and dispatching the reward.

Figure 5.0.10: Crowdfunding by value and distribution, 2015



Note: Other refers to royalty (i.e., revenue sharing) and hybrid crowd funding types.
Source: Adapted from Massolution.

Crowdfunding raises issues of trust and there have been cases of fraud[38]. There have been two regulatory approaches to crowdfunding, either a light touch where crowdfunding is subject to general securities regime or a heavier touch where special crowdfunding legislation has been enacted. The International Organization of Securities Commissions (IOSCO) carried out research about the status of crowdfunding in 23 of its member countries finding that around half had some kind of special crowdfunding legislation[39]. Though IOSCO did not propose any guidelines due to the newness of crowdfunding, it highlighted the need to balance the needs of startups with protecting investors. Additional risks related to crowdfunding include the higher likelihood of failure with startups; possibility of fraud, money laundering and terrorist financing; failure of the platform; absence of secondary market to sell or liquate holdings; and lack of transparency. IOSCO noted measures taken by countries regulating crowdfunding such as licensing requirements; requiring information disclosure; limiting size of investments by any one individual; and having a third-party custodian for holding the assets. Given that crowdfunding uses online portals, there are cross-border aspects whereby even if countries have enacted crowdfunding legislation they can be bypassed by investing on overseas sites.

Will Tindall, co-Founder of Emerging Crowd, explained;

> *"Typically financial regulators in developed markets now have specific guidance on investment crowdfunding. This isn't the case in frontier and emerging markets, despite governments of these countries realising the potential of crowdfunding to drive local economic ecosystems.*

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38 Wildau, Gabriel. 2016. "China Internet Finance Crackdown Targets Fly-by-Night Operators." *Financial Times*, April 21. http://www.ft.com/cms/s/0/661e7540-0786-11e6-96e5-f85cb08b0730.html#axzz4FWHFzSHr.

39 International Organization of Securities Commissions (IOSCO). 2015. *Crowdfunding 2015 Survey Responses Report*. https://www.iosco.org/library/pubdocs/pdf/IOSCOPD520.pdf.

"Before we are able to consider a new opportunity, we have to ensure we have the power and authority to carry out the fundraising. We also need to make sure that we understand the local private company law, that there aren't restrictions on foreign ownership of private companies, that capital can be freely repatriated and our fundraising agreement are valid and enforceable. This is before we begin the extensive financial, commercial and legal due diligence that we need to conduct on the actual operating company."

Examples of tech startups from developing countries using crowdfunding platforms are shown in the table below. Amounts raised are in the seed to early stage. As mentioned, equity crowdfunding is currently not a source of significant funding for tech startups in developing countries.

Table 5.0.4: Crowd funding examples

Startup (Country)	Crowd funding platform	Type of crowd funding	Date	Amount raised (US$)	Note
BRCK (Kenya)	Kickstarter	Reward	July 2013	176,000	BRCK makes a battery-powered Wi-Fi unit hot spotted from mobile networks.
WeziWezi (Jordan)	Eureeca	Equity	April 2015	242,957	Arabic social media platform. Sold 6.25% equity to 35 backers<?>.

The World Bank has examined crowdfunding across Africa. It estimates that the value was around US $70 million in 2015 of which more than half was generated by peer-to-peer lending platforms[40]. Most of this lending goes towards consumer-based businesses rather than technology companies.

Nikweli, a Tanzanian startup with a mobile phone job-matching platform, needed capital to register the company, update their website and for marketing. Instead of grant funding where the application process is extensive, Nikweli decided to use the Kickstarter platform. It ran a one-month donation campaign with rewards for high contributions and surpassed its goal, raising CAD$6,366 (US$ 5,761) in August 2014[41].

One drawback with equity crowdfunding is that tech MSMEs do not benefit from the business mentoring that large institutional investors typically provide through venture capital investment. In the United States, equity crowdfunding had been limited to wealthy investors on the assumption that they could better absorb losses from risky investments. That requirement was recently reduced allowing retail investors to participate in equity crowdfunding. Traditional venture capital funds are also entering the space, blurring the lines between crowdfunding and venture capital. One model sees experienced institutional investors leading a syndicate of retail investors who invest on the same terms as the more experienced institutional investors.

5.3.4 Other

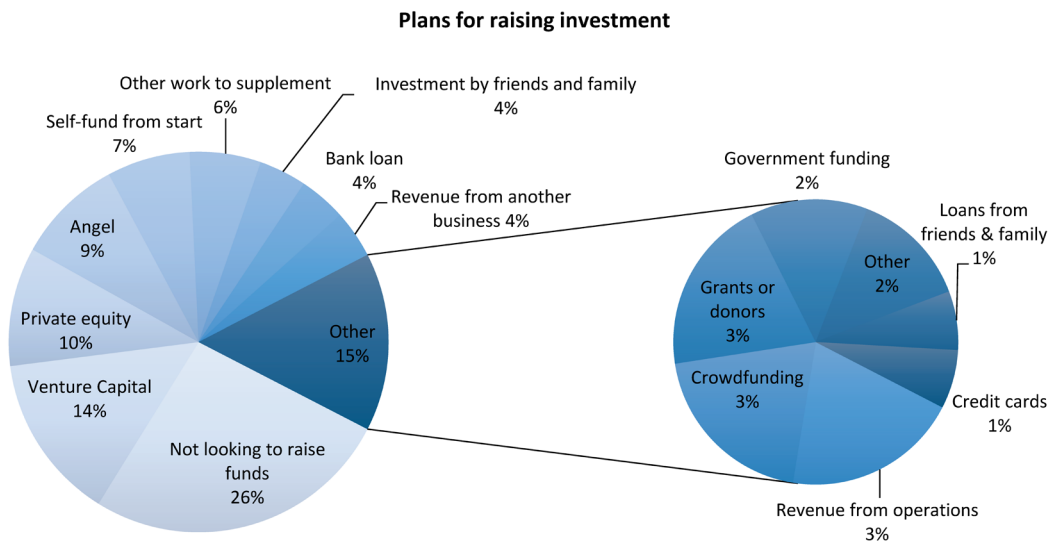
Access to finance is a pressing concern of many MSMEs, particularly those in developing countries. Though venture capital attracts headlines and seems an indispensable part of the tech ecosystem, the reality is that most startups will not receive it. According to one ex-venture capitalist, over 99% of startups in the United States will not receive venture capital investment and therefore should seek other

[40] World Bank. 2015. *Crowdfunding in Emerging Markets: Lessons from East African Startups*.
[41] https://www.kickstarter.com/projects/1846256049/nikweli-getting-youth-hired-in-tanzania/description

ways of financing their ideas[42]. One reassuring fact is that 75% of tech startups that managed to exit in 2015 did not receive institutional funding (i.e., venture capital, private equity, growth equity, etc.)[43].

The funding horizon needs to be expanded in think about other funding options for tech MSMEs. Though new forms of financing have emerged, there is still a long way to go for these to have a real impact on tech MSMEs. A survey asking South African entrepreneurs on how they intended to raise capital, listed sixteen different categories (Figure 5.0.11)[44]. Over a quarter of respondents replied that they are not looking to raise capital, Just 14% were considering venture capital, 10% private equity, 9% angel funding and 3% crowdfunding. Around forty percent were looking towards other options.

Figure 5.0.11: Investment plans of South African entrepreneurs, 2015



Source: Adapted from Ventureburn.

5.4 Observations

- Access to bank lending is one the biggest constraints faced by MSMEs, particularly in developing countries. Tech MSMEs face an even bigger problem since they rarely have assets to be pledged as collateral and their business models are inherently risky.
- A number of new financing mechanisms have surfaced to support tech startups at various stages of their evolution. In addition to self-funding, and money from family and friends, angel investors—often serial entrepreneurs—have stepped in to provide seed funding at the early startup stage. Competitions can also be an important source of seed financing.
- Accelerators, facilities specific to the tech startup ecosystem, provide seed funding in exchange for equity as well as workspace, mentoring and exposure to potential follow-on investors. Although accelerators can be a valuable ally, the best are often difficult to get into and not every startup needs acceleration. Accelerators also need to have exits in order to recycle their

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42 Rao, Dileep. 2013. "Why 99.95% Of Entrepreneurs Should Stop Wasting Time Seeking Venture Capital." *Forbes*, July 22. http://www.forbes.com/sites/dileeprao/2013/07/22/why-99-95-of-entrepreneurs-should-stop-wasting-time-seeking-venture-capital/.

43 CB Insights. 2016. *The 2015 Global Tech Exits Report*. https://www.cbinsights.com/reports/Global-Tech-Exits-2015.pdf?utm_campaign=Campaign_+Q315+Global+Tech+Exits&utm_source=hs_automation&utm_medium=email&utm_content=26512876&_hsenc=p2ANqtz-_RBvmE8qKhDiaduLlS6zPVRcR1eaqbQ2dh9PygMqThUCXJwLKFRnsppfN5fB8LRbdkVUM4FTxJ6JEJvCH3opmOapWTcQ&_hsmi=26512876

44 Ventureburn. 2015. *Startup Survey*. http://www.slideshare.net/BurnMedia/ventureburn-startup-survey-results-2015-06-22-49690768

investment in to new startups. This can be a challenge in developing markets, which already face a shortage of accelerators. The lack of acceleration opportunities and the need for follow-on financing is driving some of the most promising entrepreneurs to regional or global hubs where these are more readily available. Successful accelerators are those that are more than just a warehouse facility, and work hard to build successful startups.

- The majority of venture capital is concentrated in a few countries. Perceived high country risk and underdeveloped financial and business environments, exacerbate a shortage of venture capital in developing regions. In some countries, such as Lebanon and Singapore, governments have developed initiatives to stimulate venture capital in order to enhance the tech ecosystem and grow entrepreneurship, innovation and jobs.
- Crowdfunding has grown in popularity, although equity crowdfunding, which is arguably of most relevance for tech MSMEs, remains small, particularly in developing regions. Regulators and governments in frontier and emerging markets are still grappling with the appropriate levels of protection required for investors (e.g., minimizing fraud) whilst trying to encourage the additional funding channels that crowdfunding offers.

6 Enabling tech MSMEs

This chapter explores important elements of the tech MSME ecosystem not covered in other chapters. This includes traditional innovation measurement and tech MSMEs, fostering an enabling business and financial environment, and promoting a culture of entrepreneurship.

6.1 Innovation Environment

One of the challenges in investigating the innovation environment for tech MSMEs is that most studies are based on top down theories of innovation. This model sees innovation output reflected by patents, trademarks, and scientific journal citations and driven by National Innovation Strategies with emphasis on large scale R&D. While some founders of innovative tech MSMEs have emerged from this environment, many have not, even in developed nations: Hewett Packard[1] and Apple[2] started in garages while Facebook[3] and Google[4] began life on college campuses. The difference between top-down R&D based innovation and the generation of bottom-up ideas is particularly relevant in emerging economies:

> *At the aggregate level and in comparison with data from developed economies, innovation in developing countries is more incremental than radical and takes place in an informal setting more often than it does in formal R&D laboratories*[5]*.*

Innovation in developing countries is often "under the radar" of traditional indicators such as patents and R&D[6]. Almost 80% of firms surveyed in Ghana reported introducing some form of innovation between 2011 and 2013[7]. Their biggest external constraints to innovation were markets dominated by large enterprises and institutional inflexibility regarding regulations and standards. As the 2015 Global Innovation Index report notes, governments need to encourage disruptive innovation that challenges traditional industries:

> *"To succeed in innovation, nations need to do more than merely enable some value-added innovation to supplement what is already going on in other, leading economies. They need to enable disruptive innovation, which is often generated by new market entrants, especially those emerging in their own economies."*

Perhaps because of the emphasis on top-down rather than bottom-up innovation, grass roots innovation is taking place largely unfettered in developing countries. In Africa, thousands of entrepreneurial innovators have clustered in almost 100 tech communities across the continent (Figure 6.0.1). A laissez–faire attitude to bottom up innovation has created the space for communities of entrepreneurs to experiment that likely would not have evolved so easily if there was direct government involvement in the ecosystem itself. One example of this light touch is the rapid development of mobile money in Kenya because the Central Bank deemed it not to be a banking service subject to regulation[8].

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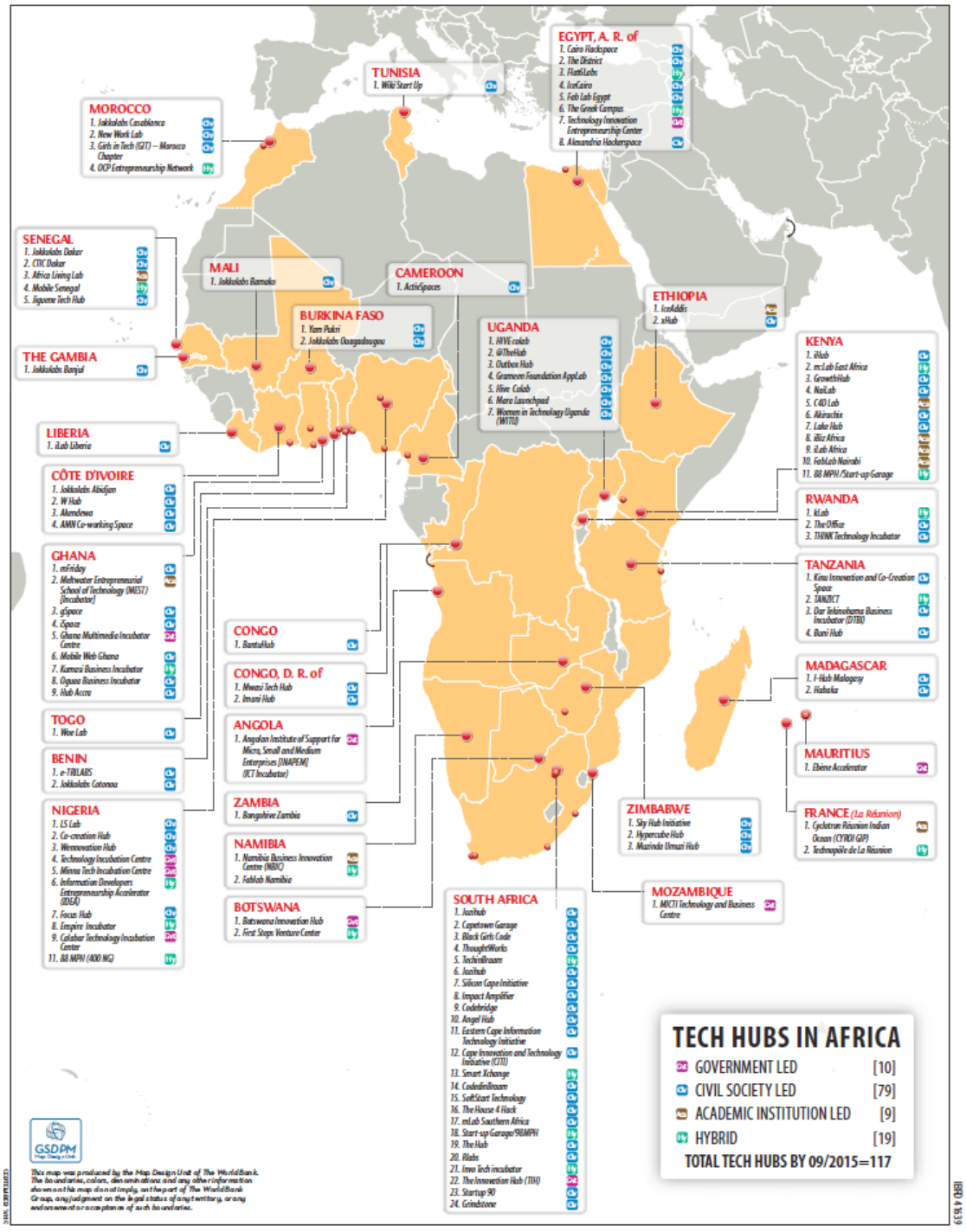
1 The garage is cited as the birthplace of Silicon Valley. See: http://ohp.parks.ca.gov/ListedResources/Detail/976
2 http://www.theguardian.com/technology/2011/oct/06/steve-jobs-timeline-apple
3 As chronicled in the movie "The Social Network". See: http://www.thesocialnetwork-movie.com
4 http://www.steegle.com/about/google-101-facts/1-11-how-it-all-began
5 Cornell University, INSEAD, and WIPO. 2015. *The Global Innovation Index 2015: Effective Innovation Policies for Development.* https://www.globalinnovationindex.org/gii-2015-report#.
6 https://www.wider.unu.edu/sites/default/files/Events/PDF/Zanello.pdf
7 http://r4d.dfid.gov.uk/pdf/outputs/ESRC_DFID/61071_DILIC_Report_2.pdf
8 http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/09/enablingmobilemoneytransfer92.pdf

Figure 6.0.1: Tech hubs in Africa



Source: http://blogs.worldbank.org/ic4d/tech-hubs-across-africa-which-will-be-legacy-makers

Traditional top-down innovation models might sometimes hinder innovation. Intellectual Property (IP) rights are typically viewed as a critical ingredient for promoting innovation. However, to some stakeholders involved in the tech ecosystem, IP protection has become a huge business backed by armies of overzealous lawyers. In the United States around one in three startups receives a patent demand imposing human and economic costs. These primarily emanate from law firms whose core activity is licensing and litigating patents. Almost three quarters of venture capitalists surveyed felt that patent demands are negative for startups and the startup community with one noting:

"When companies spend money trying to protect their intellectual property position, they are not expanding; and when companies spend time thinking about patent demands, they are not inventing[9]*."*

One organization suggests three policies to strike a balance between patent protection while not discouraging innovative activity: 1) Encourage follow-on innovation to add value to pioneering inventions by simplifying patent research; 2) discouraging ambiguous or broad patents; and 3) raising fees for maintaining patents that are not used[10].

6.2 Business environment

Governments cannot directly generate innovation across the economy but they can help to nurture it. Too often, governments want to assist the tech ecosystem through direct involvement such as constructing tech parks or providing funding. A cheaper and more impactful way of enabling the tech ecosystem is through reform of processes that would allow entrepreneurs to quickly and cheaply register in order to implement their business model. Other pro-tech ecosystem steps within the domain of government include ensuring appropriate digital laws and promoting the depth, accessibility and popularity of capital markets.

An area of particular relevance to startups is registering their business. If they are going to provide products and hope to obtain financing, startups need to be registered. The registration environment is particularly onerous in some developing regions and countries. While it takes a one half day online procedure, requires no paid in capital and costs just NZ$ 160 (US$112) to register a business in New Zealand, the process of starting a business is much more painful for startups in other regions and countries (Table 6.1). Take Latin America and the Caribbean where it takes over eight procedures and almost a month on average to register a company, or Sub-Saharan Africa where it costs a startup on average almost half of per capita income to register and almost another half of income for the required paid in capital. Processes, time and costs need to be drastically reduced to be relevant for the typical tech startup situation.

Table 6.0.1: Starting a Business, 2016

	Procedures (number)	Time (days)	Cost (% of income per capita)	Paid-in min. capital (% of income per capita)
New Zealand	1.0	0.5	0.3	0
East Asia & Pacific	7.0	25.9	23	9.8
Europe & Central Asia	4.7	10.0	4.8	3.8
Latin America & Caribbean	8.3	29.4	31	2.8
Middle East & North Africa	8.2	18.8	25.8	37.7
OECD high income	4.7	8.3	3.2	9.6
South Asia	7.9	15.7	14	0.2
Sub-Saharan Africa	8.0	26.8	53.4	45.1

Source: Doing Business.

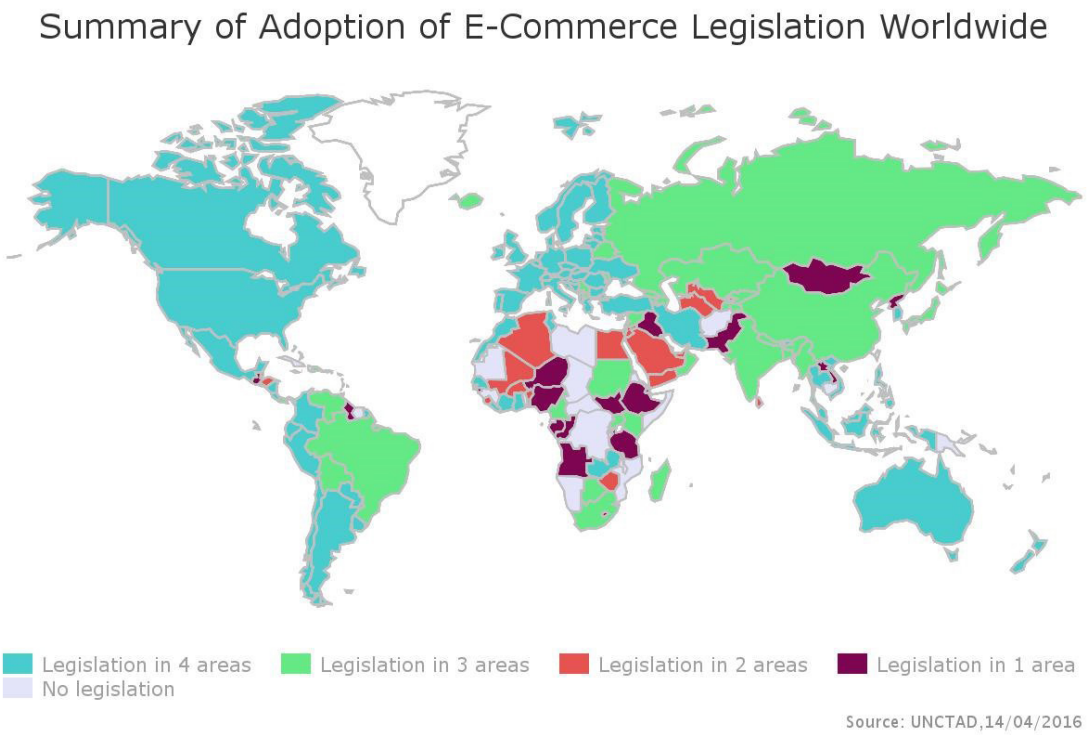
9 Feldman, Robin. 2013. "Patent Demands & Startup Companies: The View from the Venture Capital Community." *SSRN Scholarly Paper* ID 2346338. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=2346338.

10 Wiens, Jason, and Chris Jackson. 2015. "How Intellectual Property Can Help or Hinder Innovation." Entrepreneurship Policy Digest, April 7. http://www.kauffman.org/what-we-do/resources/entrepreneurship-policy-digest/how-intellectual-property-can-help-or-hinde-innovation.

Steps to improve the business registration environment include eliminating minimum capital requirements and providing online one-stop shops[11]. Some countries have set up one-stop business registration that streamlines procedures saving time and money. These services can be enhanced to suit the specific needs of tech startups in areas like trademarks, e-commerce and ability to receive venture capital so that a startup is ready to do business from day one.

Another area where governments can grow the startup tech ecosystem is through legislation enabling relevant areas such as e-commerce and online and mobile payments. Basic legislation is not sufficient if it continues to hinder the ecosystem through restrictions and other barriers. One example is mobile money where possession of an underlying bank account is sometimes a restriction. Online confidence among consumers needs to be enhanced so that they feel comfortable using tech startup products. This includes appropriate data and privacy protection legislation. The United Nations Conference on Trade and Development (UNCTAD) has captured information on four key pieces of legislation that enable and enhance confidence in online business (electronic transactions; consumer protection; privacy and data protection; and cybercrime). There is a significant gap across the world in adoption of the four key laws (Figure 6.0.2).

Figure 6.0.2: Adoption of E-Commerce Legislation Worldwide



Note: The four legislations refer to electronic transactions, consumer protection, privacy and data protection and cybercrime.
Source: UNCTAD.

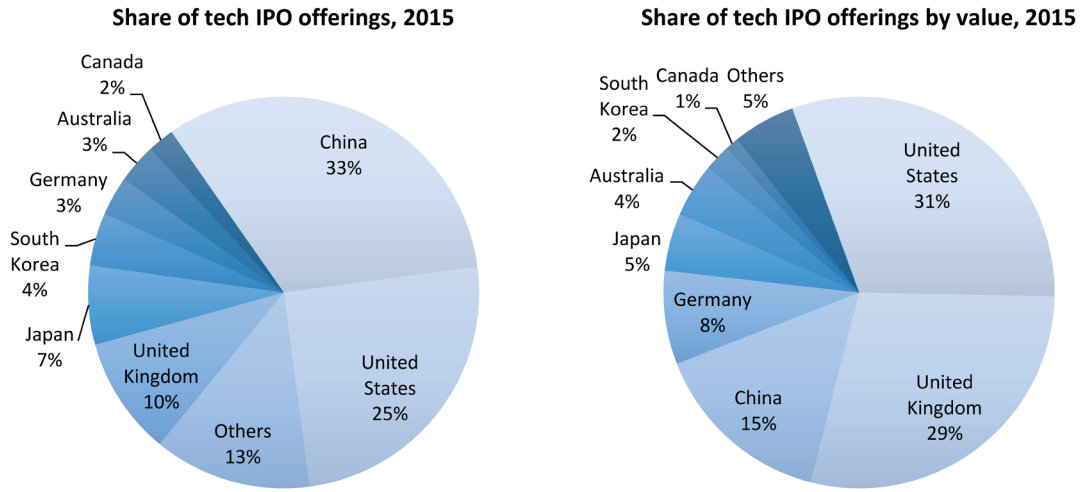
Increasing the depth of financial markets is another area for governments to support. This would provide another exit route for startups, which in developing countries is typically through acquisitions due to underdeveloped stock markets. There is a risk that nations might lose their best entrepreneurs without more diversity of exit options.

According to one source, there were 92 tech initial public offerings (IPO) around the world in 2015 generating US$ 27 billion (Figure 6.0.3). Even more than venture capital, IPOs are highly concentrated among just 15 high-income countries. Locations for IPOs need to be diversified to enhance exit options for tech MSMEs, recycle venture capital and ensure the sustainability of the tech startup ecosystem.

[11] http://www.doingbusiness.org/data/exploretopics/starting-a-business/good-practices

It is somewhat surprising that financial centres in emerging regions have not capitalized on the need for more diversity in the IPO market.

Figure 6.0.3: Tech IPOs



Note: Others (and number of deals) are: Sweden (4), Taiwan (2), Israel (2) and Poland, Ireland, Denmark, and Italy with one offering each. Tech includes Internet Software and Services, Software, Computer Storage and Peripherals, Communications Equipment, Semiconductors, Electronic and IT Consulting and Services.
Source: PwC, Global Technology IPO Review Full-year and Q4 2015.

Capital markets, particularly domestic stock markets in developing countries, need to be deepened to become viable for public offerings. While stock markets have grown globally since 2010, there have been notable declines in certain regions (Table 6.2). For example, market capitalization and share values declined in Europe and Central Asia, Latin America and the Caribbean and South Asia. This is also true in lower middle-income countries. Data for low-income countries and the Sub-Saharan Africa region is not available, suggesting shortcomings with reporting mechanisms.

Table 6.0.2: Stock market indicators

	Market capitalization (% of GDP)		Value of shares traded (% of GDP)		Listed domestic companies (per one million people)	
	2010	2015	2010	2015	2010	2015
World	87	99	113	170	7	6
East Asia & Pacific	97	103	113	242	6	7
Europe & Central Asia	57	53	57	47	15	9
Latin America & Caribbean	61	34	25	15	3	2
Middle East & North Africa	52	58	20	29	5	5
North America	117	137	226	218	23	23
South Asia	84	71	54	33	4	4
Sub-Saharan Africa	..	..	31	..	..	..
Low income	..	..	..	..	..	..

	Market capitalization (% of GDP)		Value of shares traded (% of GDP)		Listed domestic companies (per one million people)	
Lower middle income	62	53	31	20	3	3
Upper middle income	67	65	78	233	4	3
High income	97	119	133	158	24	23

Note: .. not available.

Source: World Bank, World Development Indicators.

There is precedence for initial public offerings in developing countries that would provide an exit route for tech MSMEs. Despite the lack of regional data on stock market activities, Kenya in East Africa provides an example where mobile operator Safaricom offered 25% equity to the public in 2008 in a heavily oversubscribed offering[12]. Safaricom had 623,876 shareholders in March 2015 with 64% holding less than 1,000 shares[13]. Another example from West Africa is the public offering of the Senegalese telecom operator Sonatel in 1997. Some 18% of its shares were listed on the West Africa Regional Stock Exchange and Central Securities Depository (BRVM) with around 9,000 Senegalese purchasing shares or 1 in 1,000 people[14].

There are other initiatives governments can undertake to enhance funding options for startups such as liberalizing the banking environment for venture capital investment (the case of the Central Bank of Lebanon is discussed in the previous chapter). They can also facilitate and clarify procedures for repatriation and other factors affecting investment in startups.

Other areas where governments can assist range from subsidized co-working spaces to favourable visa and tax policies to flexible zoning for startup neighbourhoods. The public sector can also provide market opportunities such as procurement for tech goods and services as well as open data platforms for startups to add value to.

6.3 Entrepreneurship culture

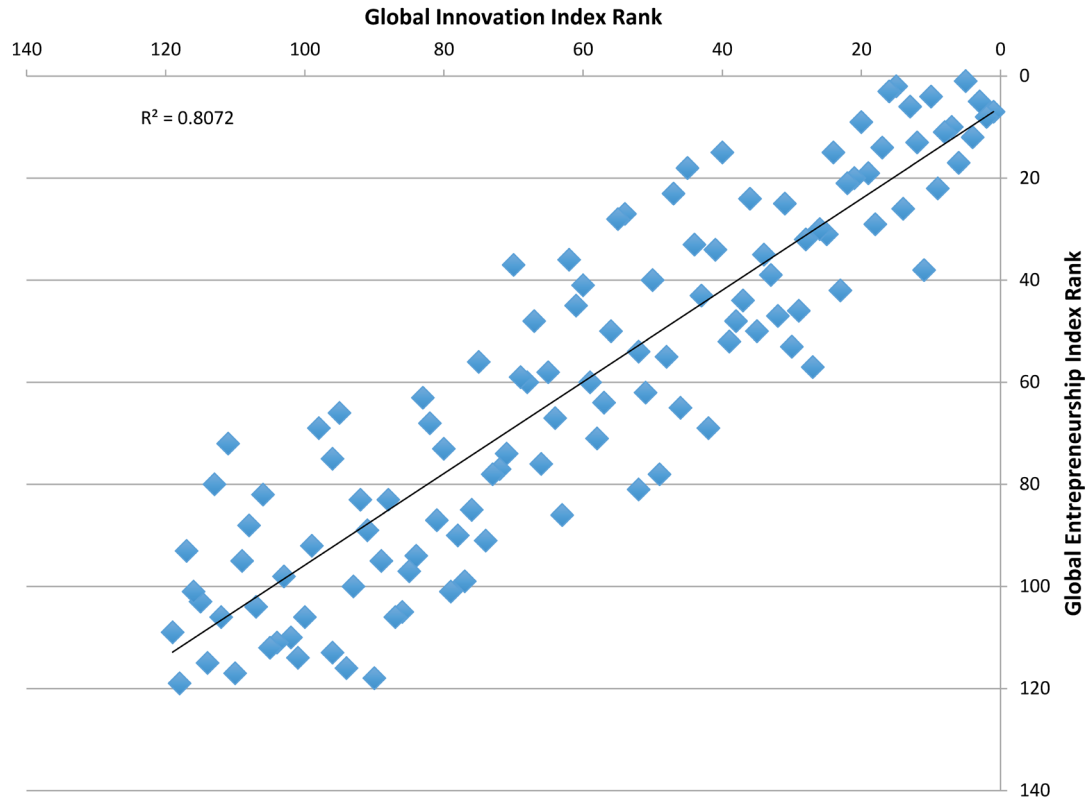
Bottom up innovation is arguably harder to nurture than entrepreneurship. At the same time, invention can happen anywhere and is not heavily tied to cultural and societal contexts. Factors such as risk taking are often linked with innovation when they might be more associated with entrepreneurship. Bottom-up innovation is also more difficult to define than entrepreneurship, which can be statistically measured by indictors such as the number of new small businesses created. Nevertheless, the two are often interlinked. The figure below shows the association between country ranks in the Global Innovation Index and the Global Entrepreneurship Index. There is a notable correlation (R2=0.80) though it would be presumptuous to suggest that one drives the other. You can be an entrepreneur without being innovative; indeed, many tech startups apply existing ideas to different contextual circumstances such as a ride sharing or e-commerce applications. At the same time, one can be innovative without necessarily being an entrepreneur such as a person that invented something but is unwilling to commercialize it.

12 http://www.reuters.com/article/kenya-safaricom-idUSL3007123920080530

13 Safaricom Limited. 2015. *Annual Report*. http://www.safaricom.co.ke/images/Downloads/Resources_Downloads/annual_report_2015.pdf

14 http://www.sonatel.sn/privatisations-et-entree-en-bourse/

Figure 6.0.4: Relationship between innovation and entrepreneurship indexes



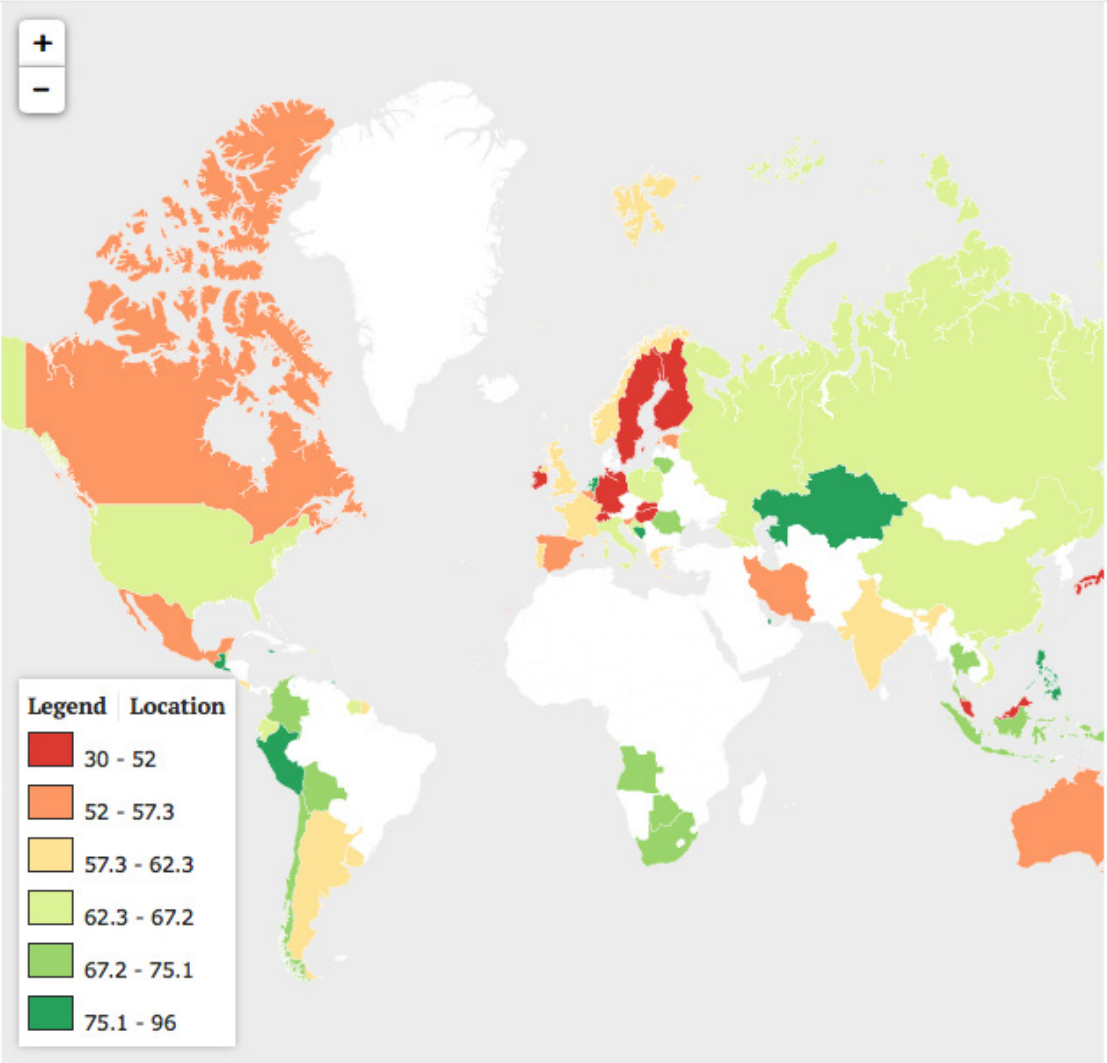
Source: Adapted from GII and GEI.

Cultural factors influence a society's acceptance of risk taking and attitude to running small businesses. These vary widely around the world. According to a 2014 nationally representative survey conducted for the Global Entrepreneurship Monitor, 95% of respondents in Guatemala said that entrepreneurship was a desirable career choice compared to just 30% in Japan (Figure 6.0.5). Attitudes vary within regions such as the Nordics where only 41% of Finns view entrepreneurship as a desirable career choice, 17 percentage points less compared to Norwegians or South East Asia where just over half of Singaporeans replied yes to the question compared to almost three quarters of Thais. According to one Singaporean entrepreneur:

> *"My parents' generation believes that only government positions, lawyers, doctors or jobs in large Western or Japanese MNCs are good and worth striving for. Entrepreneurship does not fall in that category*[15]*."*

[15] http://techsg.io/upload/files/research/1453173164742.pdf

Figure 6.0.5: Entrepreneurship as a desirable career choice (% of respondents), 2014

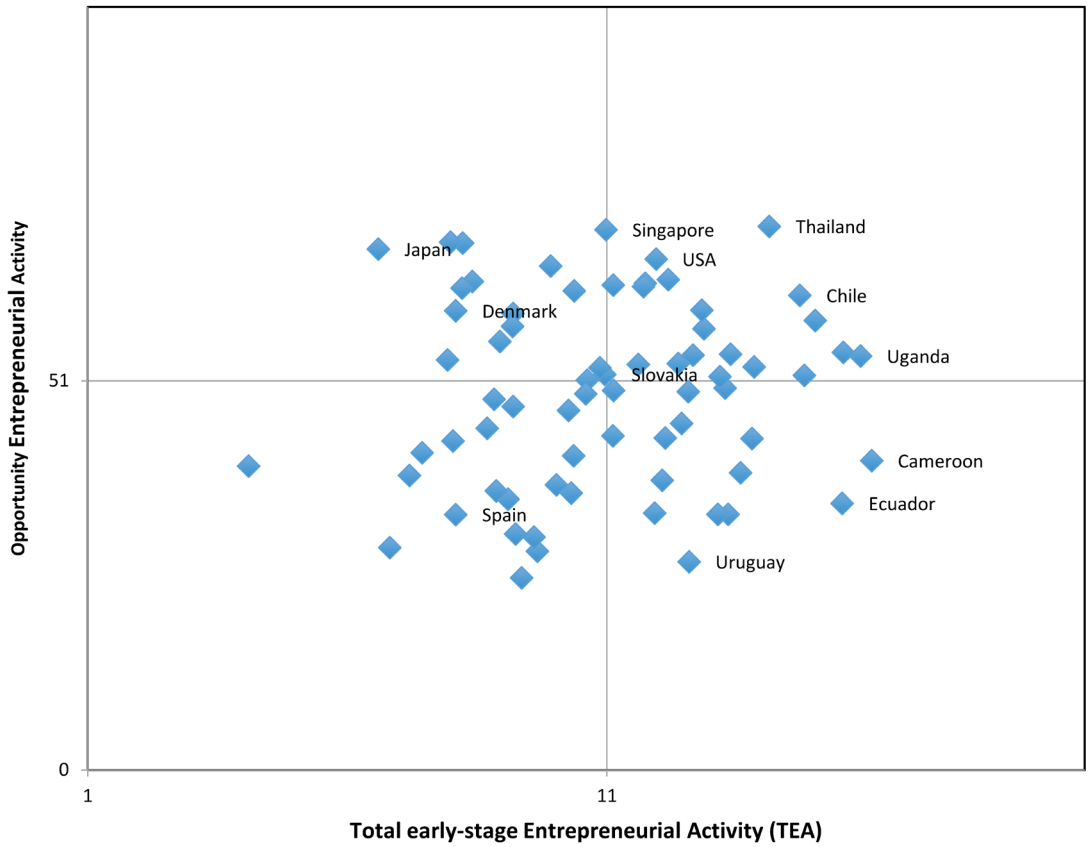


Source: Global Entrepreneurship Monitor.

It is interesting to contrast the total early-stage entrepreneurial activity (TEA) rate with the so-called opportunity entrepreneurial activity rate. The former represents the proportion of adults who are new entrepreneurs while the latter measures the proportion of new entrepreneurs who are driven by opportunity rather than it being the only option for work. This last measure is related to the motivation of many tech startups. The figure below shows the relationship, which is not strongly correlated. In other words, a high TEA does not necessarily predict a high opportunity level of entrepreneurship. Four different types of situations can be mapped: 1) countries with a low TEA but high level of opportunity entrepreneurship, 2) countries with a high TEA and high level of opportunity entrepreneurship, 3) countries with a low TEA and low level of opportunity entrepreneurship and 4) countries with a high TEA but low level of opportunity entrepreneurship.

The findings are similar to observations made earlier about entrepreneurship as a career choice. Similarly, actual levels of entrepreneurship varies among countries and within regions. Cameroon has the highest TEA rate among countries surveyed but a lower rate of opportunity entrepreneurship than Uganda. While Ecuador and Uruguay have relatively high TEA levels, the proportion of opportunity entrepreneurs is much lower than Chile. Denmark and Spain have the same TEA level but new entrepreneurs are much more likely to be driven by opportunity in the former than the latter. And even though entrepreneurship is only viewed as a desirable career choice by half of Singaporeans, some 71% of all new entrepreneurs are opportunity driven.

Figure 6.0.6: Relationship between TEA and opportunity entrepreneurial activity, 2014



Note: Based on 70 countries responding to the Global Entrepreneurship Monitor survey. TEA refers to percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business. Opportunity entrepreneurial activity refers to percentage of those involved in TEA who (I) claim to be driven by opportunity as opposed to finding no other option for work; and (ii) who indicate the main driver for being involved in this opportunity is being independent or increasing their income, rather than just maintaining their income The median for the TEA is 11 and 51 for opportunity entrepreneurial activity.
Source: Global Entrepreneurship Monitor

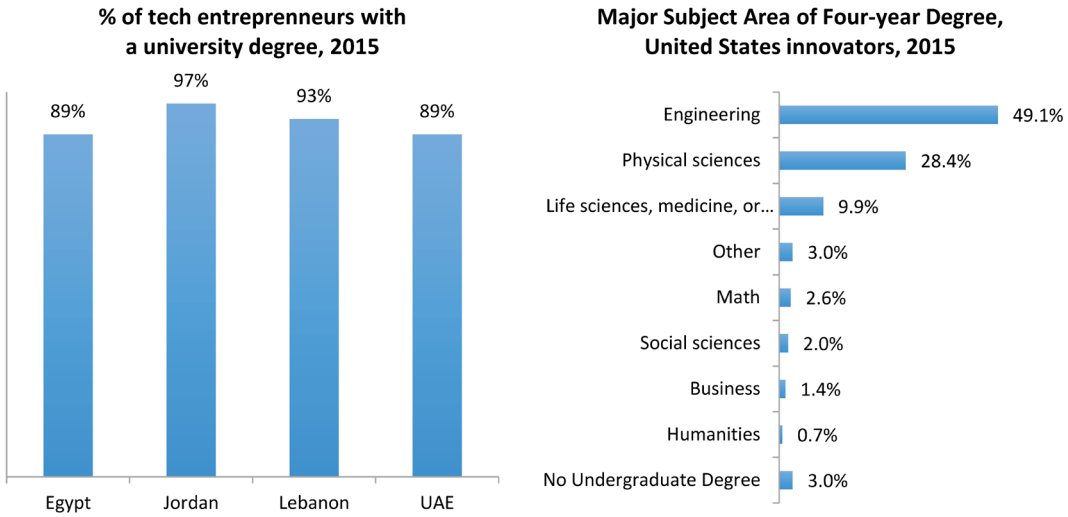
In the United States, where the TEA level is just above the median, two thirds of new entrepreneurs are opportunity driven. One study on entrepreneurship in the United States found that opportunity entrepreneurship is highest among college graduates[16]. Likewise, a study on tech startups in the MENA region found that the majority of founders were college-educated (Figure 6.0.7, left). Given the demographics relating startup founders to college education, universities are a promising location for promoting entrepreneurship as a viable career path. A growing number of universities have entrepreneurship programs. However, it is not clear if programs are as essential as widespread sensitivity among all students since a degree in entrepreneurship is not a requirement for being an entrepreneur. One study found that over 90% of undergraduate degrees among innovators in the United States were STEM-related fields (Figure 6.0.7, right)[17]. It is important for universities to shape

[16] Fairlie, Robert, Arnobio Morelix, E.J. Reedy, and Joshua Russell. 2015. *Kauffman Index of Startup Activity: National Trends.* Ewing Marion Kauffman Foundation. http://www.kauffman.org/microsites/kauffman-index/reports/startup-activity.

[17] Innovators were selected from people who won national awards for their inventions, people who filed international patents for their innovative ideas in three technology areas (information technology, life sciences, and materials sciences), and innovators who filed patents for large advanced-technology companies. In total, 6,418 innovators were contacted, and 923 provided viable responses. See: Nager, Adams, David Hart, Stephen Ezell, and Robert Atkinson. 2016. *The Demographics of Innovation in the United States*. Washington D.C.: Information Technology and Innovation Foundation (ITIF). https://itif.org/publications/2016/02/24/demographics-innovation-united-states.

attitudes so that becoming an entrepreneur is viewed as viable a career alternative to working for big companies or government.

Figure 6.0.7: Entrepreneurs, innovators and higher education



Source: Adapted from Wamda and ITIF.

A number of universities have launched incubators and accelerator programs aimed at mentoring startups. One organization ranks university incubators analysing over 300 incubation programs in around 70 countries. While university entrepreneurial centres or incubators and accelerators help augment the tech ecosystem, another powerful driver are close geographical links between universities and tech startups. This is evidenced by startups clustering around centres of higher education and is noticeable in places where universities anchor the tech entrepreneur community. Take Boston's Kendall Square, which sprung up around the Massachusetts Institute of Technology (MIT) and is referred to as the city's Tech Ground Zero. MIT is no stranger to entrepreneurship and innovation. It is top ranked among universities around the world for successful technology innovation ecosystems[18] and a 2009 study estimated that the revenues generated by the 25,800 active companies founded by MIT alumni were equivalent to the 11th largest economy in the world[19]. Kendall's tech scene evolved from MIT graduates who launched their startups close by; in 1999, one of the world's largest incubators was launched and by 2008, it was hosting 170 startups[20]. Larger IT firms who wanted to be near the talent joined them. MIT, owner of a significant amount of land in the neighbourhood and with its own dedicated real estate team, redeveloped the area around the square, adding offices and labs to accommodate the growing demand for space. Today there are over 150 IT, biotech and clean energy companies in the neighbourhood[21], more per square mile than anywhere else in the world[22].

18 Ruth Graham. 2013. *Technology Innovation Ecosystem Benchmarking Study: Key findings from Phase 1*. http://www.rhgraham.org/RHG/Recent_projects_files/Benchamrking%20study%20-%20Phase%201%20summary%20.pdf

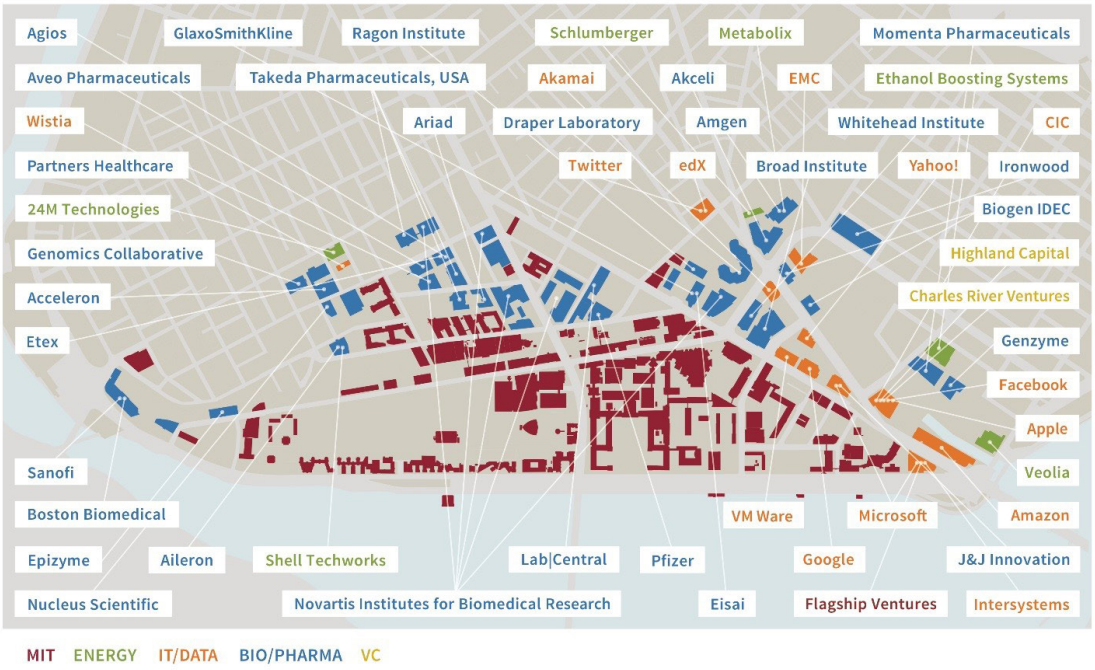
19 Edward B. Roberts and Charles Eesley. 2009. *Entrepreneurial Impact: The Role of MIT*. http://www.kauffman.org/~/media/kauffman_org/research%20reports%20and%20covers/2009/02/mit_impact_brief_021709.pdf

20 Weisman, Robert. 2008. "The Idea Factory." *Boston Globe Sunday Magazine*, August 10. http://www.boston.com/bostonglobe/magazine/articles/2008/08/10/the_idea_factory/?page=3

21 Subbaraman, Nidhi. 2010. "The Evolution of Cambridge." *MIT Technology Review*, December 21. http://www.technologyreview.com/article/422108/the-evolution-of-cambridge/.

22 Cambridge Community Development Department. 2013. *Kendall Square Final Report*. http://www.cambridgema.gov/cdd/projects/~/media/3bce5eeff387426aaad2dad89acadbe7.ashx

Figure 6.0.8: MIT cluster map



Source: https://www.kendallsq.org/directory/

6.4 Measuring Results

New initiatives promoting ICT-enabled entrepreneurship and innovation should be built on rigorous evidence with regard to the effectiveness of these interventions. The practice of more rigorous monitoring and results measurement – which considers attribution up to the level of impact on enterprise incomes and jobs – is one of the key recent trends in the delivery of SME policies. As with most other development interventions, SME policies and related programmes are under increasing pressure to provide credible measurement of the results achieved. Not only are governments and donor agencies keen for their taxpayers to see concrete results from their investments, but practitioners are also interested in finding out more about whether and why their interventions are (or are not) having an impact.

Inspired by the work of the Poverty Action Lab,[23] one important movement towards more rigorous results has been to conduct experimental or quasi-experimental evaluation designs which help to estimate statistical counterfactuals. In other words, the aim is to reconstruct what would have happened without the intervention, usually through using a control group. The SME initiative at Innovations for Poverty Action alone lists 40 ongoing projects that assess the effects of different pro-SME interventions[24]. Initiatives on promoting ICT-enabled entrepreneurship and innovation are still largely absent and it is recommended to go for impact assessments of these programs wherever possible.

Another new and relevant initiative in promoting more credible internal results measurement has been introduced by the Donor Committee on Enterprise Development (DCED) through its Results Measurement Standard[25]. The standard is a framework which helps practitioners to:

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23 See: http://www.povertyactionlab.org.

24 See: http://www.poverty-action.org/sme.

25 DCED: *DCED Standard for Results Measurement*, http://www.enterprise-development.org/page/measuring-and-reporting-results.

clearly articulate their intervention hypothesis, using results chains to complement logical frameworks; and

systematically set and monitor indicators which show whether changes are occurring and, as far as possible, to establish whether there is a causal connection between them.

The DCED secretariat also coordinates an audit service, where programmes can choose to have their monitoring system assessed externally and objectively. This is intended to enhance the credibility of reported results, and to obtain recognition from donors and development agencies that a project is engaged in high-quality results measurement.

Results measurement in line with the DCED standard does not provide the same level of statistical rigour in addressing attribution as experimental impact assessments. However, with its emphasis on balancing the practical considerations of the available time, resources and expertise with an acceptable level of rigour, and its focus on plausible – rather than scientific – attribution, the standard is arguably more relevant and applicable to a much wider range of SME interventions.

6.5 Observations

- There is a difference between traditional top down innovation policy versus the largely bottom up innovation enabled by tech startups. Both are needed, but in the context of tech startups some top down principles could be inhibiting. Bottom up innovation thrives in the absence of onerous regulations or heavy government intervention.
- In contrast to formal direct intervention in the tech ecosystem (software parks, investment funding, etc.)--which often have mixed results--there is much governments can do to indirectly benefit the tech ecosystem in areas such as G2B business administrative processes and increasing the depth of capital markets. It is likely that these indirect measures will be more impactful than direct ones.
- Cultural attitudes towards entrepreneurship and rates of entrepreneurship vary tremendously around the world. Risks need to be more widely accepted and entrepreneurship needs to be more firmly rooted as a viable career path. In the context of tech entrepreneurs, universities are a logical place to promote this since so many founders are college educated. Universities can be leveraged as entrepreneur culture promoting centers and anchors for tech startup communities.
- Measuring the impact of SME interventions is critical to ensuring that programmes are having the desired results, and so that donor funding is channeled into effective interventions. A number of frameworks to help development practitioners assess their work are already available.

7 ICT-Enabled Innovation and Applications for Sustainable Development

7.1 Introduction

An article published in the Fall 2016 edition of the *Stanford Social Innovation Review*[1] examines the prospects and pitfalls of innovation for social impact. The article observes that "efforts by social enterprises to develop novel interventions receive a great deal of attention. Yet these organizations often stumble when it comes to turning innovation into impact. As a result, they fail to achieve their full potential[2]." The authors go on to offer "a guide to diagnosing and preventing several 'pathologies' that underlie this failure," and argue that organizations seeking to apply innovation for impact are asking the wrong questions about the enterprise--seeking to find "a magic innovation formula" that simply doesn't exist. The authors conclude: "Instead of focusing on how innovation succeeds what are the factors that undermine the impact potential of an innovation effort[3]?"

This chapter builds on those insights with a specific focus on ICT-enabled innovation and applications for Sustainable Development. In examining the factors that undermine the impact potential of ICT-enabled innovations for sustainable development, a framework is offered to guide entrepreneurs, organizations, and governments in more effectively leveraging innovative technological solutions to drive development outcomes.

7.2 Innovation for Impact in the Context of the Sustainable Development Goals

In September of 2015, the 193 countries of the United Nations adopted the Sustainable Development Goals (SDGs), an ambitious set of global goals designed to achieve sustainable development for everyone, everywhere, by the year 2030. The foundational document for the SDGs contains 17 goals that are designed to shape global efforts for development for the next 15 years[4]. Not surprisingly, innovation and technology feature heavily throughout the 2030 Agenda—not only as direct objectives themselves[5] but as a core strategy for achieving all 17 Goals.

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1 Seelos, C. and Mair, J. "When Innovation Goes Wrong," Fall 2016. *Stanford Social Innovation Review*. http://ssir.org/articles/entry/when_innovation_goes_wrong

2 Ibid.

3 Ibid.

4 United Nations General Assembly, 2015. *Transforming our world: the 2030 Agenda for Sustainable Development.* https://sustainabledevelopment.un.org/post2015/transformingourworld

5 Goal 9 of the SDG's is to Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Source: United Nations Development Programme (UNDP)[6]

To drive the use of technology and innovation for sustainable development, member states agreed on the formation of a Technology Facilitation Mechanism at the July 2015 Third International Conference on Financing for Development[7] in Addis Ababa[8]. The establishment of this Mechanism signals a global commitment to the use of technology in attaining the SDGs. The Science, Technology and Innovation for the Sustainable Development Goals (STI Forum) website summarizes this engagement: "The SDGs are designed to be transformative, and change the way in which we develop our world. Innovation and technology are key to implementing the SDGs, and essential to the ambition of achieving the SDGs in the next 15 years[9]."

By design, the Mechanism is intended to respond to the widely recognized challenge facing Governments and partners around the world in leveraging ICT for development, namely that of "*identifying promising technologies, mobilizing investment and maturing these technologies in order to bring them to scale.*" Encouragingly, the Mechanism also offers targeted opportunities for entrepreneurs to engage in developing and scaling ICT-enabled solutions for sustainable development through its annual *Call to Action* initiative. The first Call to Action under the Technology Facilitation Mechanism was initiated by the United Nations in collaboration with the Global Innovation Exchange in April 2016 "to elicit concrete scientific and technological innovations to achieve the 17 SDGs." *Of the 270 applications submitted, 12 innovations were selected for further investment and showcasing. Perhaps most important, this Call to Action ignited "an extraordinary community of global innovators... who are already making the difference to those most in need around the world."*

7.2.1 *Common aim, distinct roles*

One of the most important early outcomes of the positioning of technology and innovation as central to the SDGs is the catalysing effect this has had on mobilizing a diverse range of actors to take

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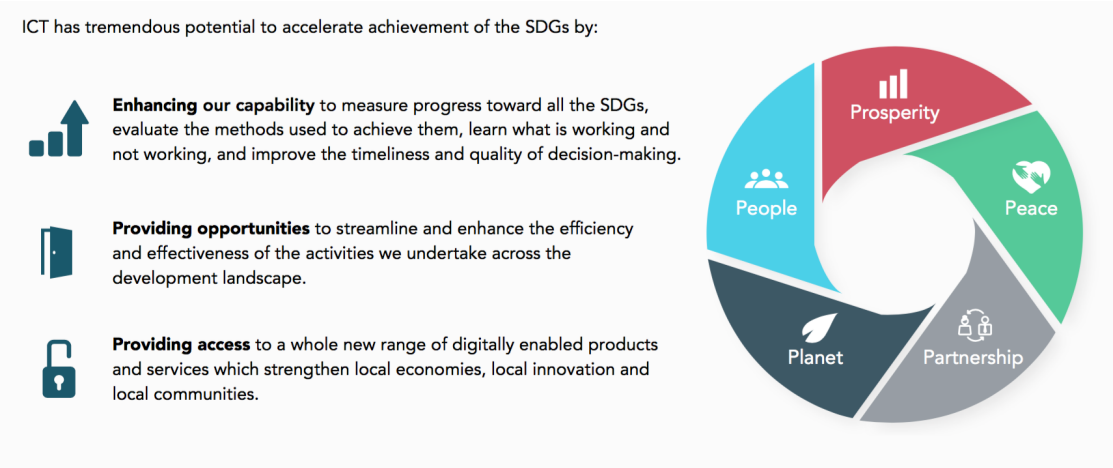
6 http://www.undp.org/content/undp/en/home/sdgoverview/post-2015-development-agenda/

7 For more information, visit: http://www.un.org/esa/ffd/ffd3/

8 Paragraph 123 of the Addis Ababa Action Agenda and Paragraph 70 of the Post-2015 Development Agenda Outcome Document called for establishing a technology facilitation mechanism, launched at the UN Summit for the adoption of the Post-2015 Development Agenda in order to support the sustainable development goals. The mechanism comprises of: a United Nations inter-agency task team on science, technology and innovation for the sustainable development goals; a collaborative annual multi-stakeholder forum on science, technology and innovation (STI) for the sustainable development goals; an online platform as a gateway for information on existing STI initiatives, mechanisms and programs. For more information, visit: https://sustainabledevelopment.un.org/TFM

9 STI Forum / Technology Facilitation Mechanism website: http://stisolutions4sdgs.globalinnovationexchange.org/un-forum-sti-about

action. United around a common aim, major players from academia and the public and private sector have been able to more coherently identify and embrace their respective roles in the 21st century ecosystem for sustainable development—one where technology plays a central and often driving role.



Source: SDG ICT Playbook | From Innovation to Impact. Nethope, 2015.

In an effort to help actors from across this spectrum productively engage around leveraging ICTs for the SDGs, a consortium of partners produced the "SDG ICT Playbook: From Innovation to Impact"[10]. As described at the outset of the document, "this playbook demonstrates how ICT can support and accelerate progress toward the SDGs. It assists organizations within each development sector in planning their use of ICT to enhance and strengthen the contributions they make to a better future for all people." After a thorough examination of the SDGs, specific sector needs, emerging ICT solutions, key underlying technologies, challenges to leveraging these technologies, and potential methods and partnerships for overcoming these challenges, the Playbook offers a Call to Action to leverage ICT solutions for sustainable development. "To realize that potential," the Playbook concludes, "leaders within governments, businesses and civil society organizations must be bold and look for every opportunity to foster local innovation, to assist local institutions in becoming part of the digital economy, and to expand local community and citizen access to ICT solutions and the benefits they provide[11]."

7.3 A Framework for ICT-Enabled Innovation for Impact: Principles for Digital Development

The 2030 Agenda presents a bold vision for ICT-enabled Innovation for Impact—one that actors from a diverse range of backgrounds and areas of expertise are now rallying around. With more organizations and entrepreneurs working to leverage technology for sustainable development than ever before, we need a common framework to inform and guide this exploration. The "Principles for Digital Development" offer such a framework, and represent an opportunity for all actors engaging around ICT-enabled innovation for sustainable development to collaborate and co-create solutions in a responsible, scalable, and impactful way[12].

The Principles for Digital Development are living guidelines that can help development practitioners integrate established best practices into technology-enabled programs. They are written by and for international development donors, multilateral organizations, and implementing partners, and they are freely available for use by all. The Principles are intended to serve as guidance rather than edict, and to be updated and refined over time.

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10 Nethope. 2015. *SDG ICT Playbook: from Innovation to Impact*. http://solutionscenter.nethope.org/toolkit/view/sdg-ict-playbook-from-innovation-to-impact

11 Ibid, page 61.

12 To learn more about the Principles, visit the website here: http://digitalprinciples.org/

To appreciate the potential of the Principles in practice, we must first establish a clear understanding of each Principle as related to *common pitfalls* in ICT-enabled innovation initiatives. The most compelling analysis of this link between the individual Principles and common challenges facing digital development projects is found in a recent publication entitled "From Principle to Practice: Implementing the Principles for Digital Development"[13]. The exposition of the nine Principles below draws directly from the "Principles in Focus" section of this publication[14].

1. Design with the User: Too often in the field of international development digital tools are created, or digitally supported projects and systems are designed, without sufficient input from the stakeholders whose engagement and ownership are critical to long-term success. This is true of many development interventions, whether or not they involve a digital component; but digitally–supported projects may surface the impacts of this flaw in more readily visible ways. Projects designed without sufficient user engagement can fail due to simple usability issues as opposed to flawed project or system design. This principle provides recommendations to avoid this common pitfall.
2. Understand the Ecosystem: To increase the relevance and sustainability of technology-supported international development and reduce duplication of effort, this principle provides recommendations about how to ensure projects and programs are built, managed, and owned with consideration given to the local ecosystem.
3. Design for Scale: International development projects often fail to move beyond the pilot stage, or to reach anticipated scale, due to design flaws that limit the ability to scale. In some cases, scale is not a necessary criterion for success. In others, careful consideration of the necessary inputs can help projects reach their full potential. This principle provides considerations for how to design a project for maximum impact.
4. Build for Sustainability: Development projects sometimes fail to factor in the physical, human, and financial resources that will be necessary for long-term sustainability. This principle outlines considerations that can support a digital development solution or system's longevity for the intended duration.
5. Be Data Driven: Too often, international development projects fail to fully leverage data to support project planning and decision making. The consequences of not sufficiently making data-driven decisions are not well understood, but can include diluted impact and unintended outcomes. This principle provides tips to identify the sources of, and incorporate data into, project design and decision-making.
6. Use Open Data, Open Standards, Open Source, and Open Innovation: Too often in international development, scarce public resources are spent investing in code, tools, and innovations that are either locked away behind expensive licenses, and/or are invested in the creation of unique, sector-specific solutions. This principle provides a framework to consider an "open" approach to digital development.
7. Reuse and Improve: As the use of information and communications technologies in international development has matured, so too has the foundation of methods, standards, software, platforms, and other tools. Despite this rich base of technologies available for use, too often scarce development resources are spent building new tools when instead existing resources could be adapted and improved. This principle suggests how to avoid reinventing the wheel.
8. Address Privacy and Security: Information is power, as the old adage goes, and this is certainly true in the context of technology-enabled global development interventions. How information is collected, stored, analysed, shared, and used has serious implications for both the populations

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13 Waugaman, Adele. From Principle to Practice: Implementing the Principles for Digital Development. Washington, DC: The Principles for Digital Development Working Group, January 2016. Available for download here: http://digitalprinciples.org/wp-content/uploads/2016/02/mSTAR-Principles_Report-v6.pdf

14 For each Principle, the authors have adapted the explanatory text from the *Principles to Practice* publication under the heading "Why It Is Needed" as articulated for each Principle in the "Principles in Focus" portion of the document.

about whom data are being transmitted, and the organizations transmitting the data. Yet as the digital development field evolved, privacy and security were often not considered sufficiently, if at all. As the field of digital development matures—including through independent projects getting pulled together into larger systems, and digital programs progressing from housing hundreds to thousands of records—the international development field needs to more conscientiously address these concerns. This principle provides a framework for considering how to protect user privacy and the security of data, devices, and tools.

9. Be Collaborative: The saying: "If you want to go fast, go alone. If you want to go far, go together" is attributed to an African proverb, but could easily be a mantra for technology-enabled development projects. This principle suggests strategies for leveraging and contributing to a broader commons of resource, action, and knowledge to extend the impact of development interventions.

As explained earlier in this chapter, the Principles for Digital Development draw on years of experience applying technology in development. By learning from failure, partners have refined the principles as a framework to help actors from across public and private sector to avoid the pitfalls that are all too common in applications of technology in the social sector.

A selection of case studies that expose the potential of these Principles in practice is presented in Annex 1, with the aim of inspiring action and engagement around ICT-enabled innovation for sustainable development.

7.4 Toward a Business Model for Principle-Based, Open Innovation

Seeing the potential of Innovation and ICTs for sustainable development and the strength of the Principles for Digital Development as a framework for success in this space, the question remains: is there a business model for principle-based, open innovation?

Many have argued that the ICT4D 'ecosystem' is too heavily dependent on international organizations and donor agencies, and that this undermines the efforts of entrepreneurs to thrive in this space. In exploring the 'Build for Sustainability' principle in *From Principles to Practice,* Waugaman argues that this close link to donor organizations and time-bound project cycles often leads projects to "wither away, in many cases ripping away any benefit end users may have derived" after the lead organization's formal engagement ends. Referencing a 2011 blog post by Ushahidi co-founder Erik Hersman, Waugaman goes on to observe that this trend "may undermine the very market forces that could otherwise intervene to meet development needs[15]."

Meanwhile, in the private sector, technology firms that have made strides through disruptive innovation dominate the Fortune 500. These firms have defined and redefined industries, culture and society through innovation. With this new wave of enterprise is a new wave of creating value for the business and its customers. Tech giants including Microsoft, Google and Amazon employ a SaaS model (Software as a Service)[16] which has proven effective for both proprietary and open source technology.

What, then, can development actors do to stimulate rather than stymy these market forces and foster a more dynamic, diverse, and sustainable ecosystem for innovation and ICTs? In this final section[17], we outline some of the strategies that can be used to create value and generate revenue for open source hardware, software, and content.

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15 Waugaman, 2016: pg. 35.

16 A software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. It is sometimes referred to as "on-demand software" SaaS is typically accessed by users using a thin client via a web browser. (wiki)

17 The duration of this section draws extensively on a recent study conducted by UNICEF Ventures around the feasibility and viability of Open Source business models. Full reference forthcoming. Organizations wishing to engage in this discussion and provide additional insights and feedback can do so here: http://www.unicefstories.org/

Defining Open Source

"Open-source software development is a production model that exploits the distributed intelligence of participants in Internet communities. This model is efficient because of two related reason: it avoids the inefficiencies of a strong intellectual property regime and it implements, concurrently, design and testing of software modules. Because open source works in a distributed environment, it presents an opportunity for developing countries to participate in frontier innovation."

B. Kogut and A. Metiu, Oxford Review of Economic Policy

7.4.1 A Case for Open Source

Open source refers to the principles and methodology of open source software (OSS) and open source hardware (OSH) that are continuously improved, modified and redistributed:

- **Open source software** enables the original source code to be made freely available to the public and may be modified and redistributed. For software, it means the original source code is publicly accessible for people to view the code, copy it, learn from it, modify it, or share it[18].
- **Open-source hardware** refers to *tangible objects* such as machinery and other devices whose designs are available and can be modified, changed or distributed, however, the copyright for the intellectual property (IP) in this business model is controlled by the original developer.

By providing the source code freely available to the public, some firms build broad communities of developers who innovate and develop a product together with users. Using this strategy, many companies have been successful at introducing their products globally because they have an existing user base, generate revenues and increase their economic outcomes.

7.4.2 Software as a Service

Since the pioneering of the software industry, technology companies have used an enterprise sales model to sell and distribute their technology. The traditional approach was a company sells a license for a single download or use. Upgrades are prompted by the company when they happen to release one and are sold as an additional product. The product is created to fit a particular use case accompanied with heavy restrictions on how it can be used and shared.

Software companies are increasingly offering alternative business models that foster rapid innovation. In a SaaS model, the company hosts the hardware and/or software on its infrastructure and delivers it via the Internet. They support all the underlying computing software and provide key services such as application hosting, frequent version upgrades and other features that offer additional infrastructure. Products that use a SaaS model include Gmail, Google Docs, Box, Dropbox, SAP and Office 365.

[18] Source: https://opensource.com/resources/what-open-source

Benefits of a SaaS Model:

1. **Scalable:** it gives the customer the option to access more or fewer services or features on-demand.
2. Automatic **updates**: the customer will not have to hire additional staff to update their software.
3. **Accessibility**: users can access a product from multiple devices.

7.4.3 Revenue Streams for Open Source Solutions

While an open source business cannot charge a licensing fee, there are many different and dynamic ways in which a company can earn revenue and ensure a feasible, profitable and sustainable business model using a SaaS approach.

Three of the most promising revenue models for Open Source solutions are:

1. **Consulting services:** a business can offer consulting services to enhance the existing source code, use it for a different use case, or modify it to solve a specific problem. For hardware companies, businesses can consult to create customized products that align with a client's requests. For open source businesses, whose core product is content, sharing content allows the creator to showcase their work. In most sectors that involve content sharing, your portfolio creates opportunities/demand for commissioned work. Revenue can be earned from commissioned work that results from a showcase of your work.
2. **Additional or 'fringe' services:** Companies can charge for additional services such as hosting the platform, for maintenance of the open source code or for additional features. The company could charge for additional features such as adding the client's company logo to the dashboard or for additional log-in accounts similar to a freemium model to ensure it is unique to the client.
3. **Sale of additional proprietary products:** Companies can sell additional closed source products that build on the core open source product. A common revenue stream for open source hardware companies is to charge a fee on the manufacturing cost of their open source designs. Here, anyone can download and modify the design and the company earns revenue once the product is made. For hardware companies, some companies may sell the inputs required to manufacture their design.

7.4.4 The Open Source Opportunity for Entrepreneurs

Beyond the non-financial benefits of Open Source, such as knowledge sharing, adaptability, and security[19], there are significant financial or investment-related benefits for entrepreneurs to consider:

- **Investors are providing capital for open source businesses:** A number of investors are drawn to investing in networks and technologies with rapid adoption. Union Square Ventures, a thesis-based venture capital fund, places value on investing in businesses with a larger network effect. One of their investments is MongoDB, now valued at $1.6 billion. Founded in 2009, its database has since been adopted as backend software by websites and services including Craigslist, eBay and Foursquare.
- **Open source businesses are successfully exiting:** Open source business have a clear exit strategy. Large companies including Dropbox have acquired open source

[19] UNICEF offers additional insight on these non-financial benefits in its recent publication on Open Source Business Models.

technologies and hired the team of developers who created the original source code to improve and grow the technology, creating opportunities for the open source founders. For example, Dropbox released the Zulip chat app under an open source Apache Foundation license. Zulip is a group chat application optimized for software development teams. Dropbox acquired it in 2014, and worked with the original Zulip developers to improve the product, and then launched it as an open source product. Zulip being open source has allowed it to be integrated with many platforms and products. For Dropbox, there is value in offering additional features and improving the user experience for their customers.

- **Large software clients are increasingly looking to purchase open source software and acquire the teams behind it**: Some of the world's tech giants are now embracing open source technologies. According to Fortune Magazine, Apple is increasingly looking past large software enterprise technology companies like VMare, EMC and Oracle for smaller, unknown open source companies. These technologies are popular among web companies because they're built to be fast, efficient and often address a particular set of problems. Web companies prefer open source technology because of their ability to contribute, modify and ensure it keeps up with the demand for performance, scale, security and other factors that are a priority for web companies – this is not feasible with proprietary technology.
- **Open source licenses open a significant client base from government and international organizations:** Companies that open source their products have the opportunity to work with public institutions including some of the United Nations agencies and government agencies who prefer to use open source technology for the procurement of products and services, for operational use and when selecting external partners and beneficiaries to receive funding. Having an open source technology creates opportunities for funding through venture capital, challenges and grants that will only invest in open source solutions. Open source is one of the Principles for Innovation and Technology in Development. It has been endorsed by over 300 organizations. Recently, the French government, through SGMAP[20], launched a pilot to explore various open source-based alternatives for building its own cloud computing infrastructure[21]. On August 8 2016, the US President's Executive Office issued an executive order requiring that US federal agencies publish at least 20 percent of their newly-made custom software as open source over the next three years. This requirement is part of a pilot established by the Federal Source Code Policy.

Today, innovation plays an integral role in creating social impact and when open source companies work with these agencies, they too became an important part of driving social change.

7.5 Observations

SECTION TEXT

Efforts by social enterprises to develop novel solutions to complex development challenges receive a great deal of attention, but these organizations often struggle to convert innovation into impact.

An important early outcome of the positioning of technology and innovation as central to the UN's Sustainable Development Goals (SDGs) is the catalysing effect this has had on mobilizing a diverse range of actors to take action, and there is now a common vision shared by members of the international development community focussed on innovation for social impact.

Several frameworks have subsequently been developed to guide entrepreneurship in this direction:

-The ICT SDG Playbook – assists organizations in planning their use of ICT to enhance and strengthen development work, and draws attention of policy-makers to crucial issues.

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[20] Secrétariat Général pour la Modernisation de l'Action publique

[21] Source: https://joinup.ec.europa.eu/community/osor/news/france-pilots-open-source-based-cloud-services

-The Principals for Digital Development – provides an opportunity for all actors engaging around ICT-enabled innovation for sustainable development to collaborate and co-create solutions in a responsible, scalable, and impactful way. They are living guidelines that can help development practitioners integrate established best practices into technology-enabled programs.

With innovation continuing to shape our economies, societies, and cultures, it is becoming easier to build business models for social businesses.

Open source represents an exciting prospective model, and many companies have been successful at introducing their open source products globally because of the existing user base, which helps generates revenue and increases the firm's economic outcomes. Funding is becoming increasingly available to open source businesses, and the model is helping them identify new revenue streams from, for example, consulting and software-as-a-service (SaaS). Open source represents an exciting opportunity for burgeoning entrepreneurs to have a demonstrated social impact.

Through creative, demand-driven, principled innovation, entrepreneurs, Governments, and development partners stand to more effectively and sustainably leverage technology for development—and, in so doing, have meaningful, lasting social impact at scale.

8 Observations and recommendations for key stakeholders

There is growing evidence that MSMEs are a major engine of growth and job creation. Many fast growing MSMEs are either part of the ICT sector or heavily dependent on online applications or services. A major factor is that ICT has reduced the cost of innovation and market access, which allows small tech businesses to compete with established industries.

Given the importance of ICT networks for enabling the tech startup ecosystem, developing countries need to adopt strategies to boost broadband speeds and enhance access. Though mobile is approaching ubiquity, there are still gaps particularly among the poor. This should be remedied particularly since low-income segments stand to benefit from social entrepreneurship and startup services using mobile money. In addition to broadband and mobile networks, startups need other critical Internet infrastructure such as data centres, traffic exchange points and hosting. Countries should enhance strategies for building facilities to grow their startup ecosystems.

ICT companies are important sources of inspiration and support for the tech startup ecosystem. Countries should encourage national ICT firms to be involved through funding, app marketplaces, ecosystem support, etc. Close relationships should be fostered between ICT companies and the startup community through hubs, networking events and competitions. Limited ICT sector support for ecosystems discourages startups and risks their migrating to other countries where ecosystems are more attractive.

Many tech startups use models that are dependent on online payments. Countries should remove barriers to online payment systems and electronic transactions.

Although it is not possible to precisely measure the contribution of ICT and ICT-enabled startups and MSMEs to the economy due to data and classification limitations, available data infers that as successful startups scale, their economic contribution is significant, particularly through the value added of wage payments. Further, a growing body of evidence is finding that young and small firms contribute a disproportionate share of employment. Studies that look at the more specific case of young firms in the ICT sector equally find employment gains.

Startup and MSME tech products generate revenue for the ICT sector through increased usage of network services. This makes it beneficial for ICT operators to build out high quality networks to maximize this potential as well as supporting the use of online payments.

The tech startup ecosystem also contributes to diversification and innovation of national ICT sectors. This is particularly important for making ICT more sustainable in countries by balancing ICT-enabled, export led growth with the development of robust domestic ICT infrastructure, applications and services. Rapidly rising mobile and Internet use over the last decade has created a tipping point for greater local access to content and services, and startups are stepping in fill this void. Social entrepreneurs are leveraging ICTs to develop services in areas such as financial inclusion and clean technology that are also starting to positively affect developing countries. A related development is the rise of freelancers, independent software contractors who work for themselves rather than a company. Their ranks are swelling in some developing nations.

Connections and networks are vital for tech startups and MSMEs. Successful ecosystems are effective at linking human and financial capital within and between themselves, and some community building initiatives are necessary to encourage regular interaction and close linkages between stakeholders in an ecosystem. Geographic proximity can help improve this aspect. Successful ecosystems support the movement of firms from “local to global”, and provide an environment that helps them scale up and down easily. Such environments also provide ease of movement of human and financial capital across borders. Events and activities provide a physical location to bring ecosystem stakeholders together at city, national and international levels, and are an opportunity to increase connections and linkages.

Access to bank lending is one the biggest constraints faced by MSMEs, particularly in developing countries. Tech MSMEs face an even bigger problem since they rarely have assets to be pledged as collateral and their business models are inherently risky. Though venture capital attracts headlines and seems an indispensable part of the tech ecosystem, the reality is that most startups will not receive it. The majority of venture capital is concentrated in a few countries. High country risk and financial and business environments not suitable for this type of financing exacerbate a shortage of venture capital in developing regions. Barriers such as limited Internet access in developing countries also constrains VC investment since the market for tech startup products will be small.

A number of new financing mechanisms have surfaced to support tech startups at various stages of their evolution. In addition to self-funding, and money from family and friends, angel investors--often serial entrepreneurs--have stepped in to provide seed funding at the early startup stage. Competitions can also be an important source of seed financing. Accelerators, facilities specific to the tech startup ecosystem, provide seed funding in exchange for equity as well as workspace, mentoring and exposure to potential follow-on investors. Though accelerators can be a valuable ally, the best are often difficult to get into and not every startup needs acceleration. Accelerators also need to have exits in order to recycle their investment in new startups. This can be a challenge in developing markets, which already face a shortage of accelerators. The lack of acceleration opportunities and need for follow-on financing is driving some of the most promising entrepreneurs to regional or global hubs where these are more readily available.

Crowdfunding has grown in popularity through equity crowdfunding, which is arguably of most relevance for tech MSMEs. However, this funding stream remains small in developing regions. Countries are still searching for the proper mix between crowdfunding regulations and the need of startups for capital. Some analysts see equity crowdfunding merging into a subset of venture capital where online contributions made by individual investors are managed by professional venture capitalists.

The majority of tech startups that are eventually bought or make a public listing do not receive institutional funding (i.e., venture capital, private equity, growth equity, etc.). Therefore, the horizon needs to be expanded in thinking about funding options for tech MSMEs. Though new forms of financing have emerged, there are many more options available. A survey asking South African entrepreneurs what type of investment they planned to raise, listed sixteen different categories. Over a quarter of respondents replied that they are not looking to raise funds, the top response. Just 14% were looking to venture capital, 10% to private equity, 9% to angel funding and 3% to crowdfunding. Around forty percent were looking towards other options.

The establishment of the UN's Sustainable Development Goals has necessitated the need for a common vision to effectively leverage ICT for sustainable development. The ICT SDG Playbook and Principals for digital development provide such a framework, and are essential guidelines which aspiring social enterprises should apply. It is also becoming easier to identify a business model for social business, with open source representing an exciting opportunity for firms from emerging economies to leverage their products and services.

Traditional innovation policy, the business environment and cultural attitudes towards entrepreneurship all affect tech MSMEs. There is a difference between traditional top down innovation policy versus the largely bottom up innovation enabled by tech startups. Both are needed, but in the context of tech startups, some top down principles could be inhibiting. Bottom up innovation thrives in the absence of onerous regulations or heavy government intervention. In contrast, to formal direct intervention in the tech ecosystem (software parks, investment funding, etc.) that often have mixed results, there is much governments can do to indirectly benefit the tech ecosystem in areas such as government to business (G2B) administrative processes and increasing the depth of capital markets. Cultural attitudes towards entrepreneurship and rates of entrepreneurship vary tremendously around the world. Risks need to be more widely accepted and entrepreneurship needs to be more firmly rooted as a viable career path. In the context of tech entrepreneurs, universities are a logical place to promote this

since so many founders are college educated. Universities can be leveraged as entrepreneur culture promoting centres and anchors for tech startup communities.

8.1 Annexes

8.2 Annex 1: Principles in Practice: Case Studies of Innovation and ICT Applications for Sustainable Development

To understand the potential of the Digital Principles in driving innovation and ICT applications for sustainable development, Annex 1 presents a selection of case studies that examine the potential of putting the principles into practice--and, in one example, the risks of failing to do so. Three of these case studies are drawn directly from the Digital Principles website, which includes a dedicated section for case studies[1] of organizations, governments, and entrepreneurs applying the principles in practice.

8.2.1 Case Study 1 | mHero: Digital Development Done Right

* *Original version of this case study prepared by IntraHealth International*[2]

IntraHealth International and UNICEF launched the mHero platform in late 2014 in the midst of the Ebola outbreak in West Africa. Originally designed to help Ministries of Health connect with frontline health workers via SMS messages to collect and share information helpful for a rapid response to Ebola, mHero is now a tool embraced by Ministries of Health to support two-way communication for a variety of health services.

mHero is different than many other mHealth applications in that it is not an application designed to address a single programmatic purpose. Rather, mHero provides infrastructure that is adaptable to a Ministry's needs and leverages information the Ministry is already managing on health workers. Deploying mHero is not about deploying a particular software platform; it is about people and processes–the organizational development needed to govern and manage such a powerful tool.

mHero is also not a wholly new technology, but rather a system that embraces various open source health information systems such as iHRIS–IntraHealth's human resources information system–RapidPro–UNICEF's two-way interactive messaging system–and DHIS2 to facilitate communication to health workers. Behind those communications, mHero's technology allows system integration and information sharing by leveraging components of OpenHIE, a set of technologies that allows data systems to speak to each other using open international standards for data exchange.

From its inception, the organizations supporting mHero have aligned the development and deployment alongside each of the nine Principles of Digital Development. Here, we illustrate how mHero was created and continues to evolve to ensure that digital development is done right:

– *Design with the User:* With support from UNICEF and USAID, mHero's small-scale pilot project took place in Liberia in November 2014. However, before a single SMS message was sent, IntraHealth and UNICEF worked closely with Ministry of Health (MOH) officials to ensure every aspect of the system was designed to meet their needs. This included using the technologies the Ministry was already implementing (iHRIS, DHIS 2, and RapidPro) and creating a series of questions developed into SMS texts that sought information the MOH identified as a priority early in the response. Today, mHero is used in a variety of ways (such as the MOH's mental health unit using mHero to speak directly with clinicians treating depression), and IntraHealth continues to collaborate with the Ministry of Health to adapt, pivot and adjust its implementation to meet the needs of the different users.

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1 For additional case studies and related information, readers can visit the "Case Studies" portion of the Digital Principles site here: http://digitalprinciples.org/category/resources/resources-casestudies/

2 This case study is drawn from a submission by IntraHealth International in July 2016, available here: http://digitalprinciples.org/mhero-and-the-principles-for-digital-development-development-done-right/

- *Understand the Ecosystem:* There are a several ways that IntraHealth ensures that mHero is aligned with like-minded technologists in the health information system (HIS) ecosystem to communicate technology enhancements and build consensus for data exchange standards. By adopting the OpenHIE architecture, we allow for the various components of mHero to be swapped out. If a particular MOH does not use iHRIS to manage their health workforce, they can simply adopt the data exchange standards in the mHero Workflow and enjoy the same benefits. Currently, connections with communications platforms such as CommCare and ODKCollect are under development, giving a Ministry the choice to use the tools they are comfortable as part of their mHero implementations.

  Understanding the ecosystem requires appropriate avenues for sharing and engaging with stakeholders. We use many of these communication tools including Google Groups, GitHub, Wikis, Skype channels, Slack and participate in Hackathons.

- *Design for Scale:* Interoperability–the ability of programs to communicate, exchange data and use that data with one another–is the backbone of mHero. This approach ensures that no matter which health worker information system or SMS tool is used in a country, as long as it meets the technology standards, the interoperability layer of OpenHIE can be harnessed to link these components together to instantiate mHero. This systemic approach does not limit a MOH to use any one health information or communication system such as iHRIS or RapidPro; rather mHero provides a roadmap for the MOH to bring these things together.

  At the heart of mHero is an Interlinked Health Worker Registry, which brings together facility data and health worker data from all the various sources within in a country–from the MOH itself, from the professional councils, from a Master Facility List. As mHero leverages these existing national scale data systems, mHero lets the MOH connect with the entire health workforce.

- *Build for Sustainability:* IntraHealth's support for mHero during the Liberia pilot moved at the pace of the MOH. We committed to ensure that the MOH owned the system, determined the direction mHero would grow, and guided its use. Rather than establishing mHero as an IntraHealth project, the partners built the capacity of the MOH staff to own the entire process. This included providing tools such as templates for standard operating procedures and use case prioritization processes. But ultimately it has been the MOH to utilize these resources and iterate them based on their needs. This has been a success as the MOH has adapted mHero including it recently in the Liberia ICT Strategy and Plan. Building capacity for ownership has been a recipe for success that is being replicated in other mHero implementation countries

- *Be Data Driven:* mHero is about the communication between MOH and health workers, and that data collected from those communications is the crux of what makes mHero a useful tool. Through mHero implementation, IntraHealth assists the MOH to determine what data they need so that SMS seek to address those needs. This data may be a one-time survey or a routine data collection; it can target a small cohort of health workers or all health workers in a cadre. A key part of this process is for the MOH determine the best way to use that data to respond to health workers' needs. Building a culture of data demand and use is an ongoing and integral part of the mHero platform.

- *Use Open Data, Open Source, Open Innovation:* mHero embraces open innovation–sharing ideas, resources and knowledge with HIS experts. Open source programs are those whose source code is made available for use or modification as users or other developers see fit. This type of software is usually developed as a public collaboration and made freely available. Open source is a requirement for the technologies operating through mHero. Systems like iHRIS ensure that MOH will avoid software and licensure fees. Our work ensures that we continuously engage with the HIS ecosystem such as OpenHIE to ensure that standards are understood and used through mHero. For example, a new standard mACM and a reference implementation of the standard emNUTT, was unveiled and tested to expand mHero's reach to a variety of target lists including health providers, patients and health facilities by connecting with Facility Registries, Client Registries and Health Worker Registries.

- *Reuse and Improve:* On the backend, mHero's modular approach–integrating different systems, linking them with DHIS 2 and other HIS–allows for flexibility that is essential for the future of useful information systems. Sharing specific workflows and country implementation tools allows for users on the front end–those MOH stakeholders involved in the day-to-day running of mHero–to save time and focus on information needs from health workers. This also promotes shared learning experiences and lessons learned of implementation practices from country to country.
- *Address Privacy and Security:* mHero's data exchange ensures that privacy and security of health worker and MOH data is addressed. Leveraging the OpenHIE's architectural model of an interoperability layer (in this case the OpenHIM), a component which adds a security later providing access control, and audit log as well as a data router and transformer to ensure systems communicate effectively. In building capacity at MOH to use mHero, we include this important discussion of privacy and security to help stakeholders understand not just that data is secure but how the system works to ensure data privacy and security is addressed.
- *Be Collaborative:* mHero embraces the spirit of stakeholder collaboration, including national governments, experts in the ICT4D community and donors to plan how best to foster robust communications with health workers. The partnership for mHero extends far and wide to facilitate a meaningful conversation and collaboration to ensure successful operationalization and implementation in country, and continuously adapt the technology behind the platform to meet technology standards and changes. To ensure dissemination, the mHero website shares a plethora of information about mHero including a robust toolkit for implementers.

mHero does not just embrace the 9 Principles for Digital Development–it only works because every day it adheres to these principles. Implementation of mHero has the potential to impact health systems improvement and save lives, modelling a responsible and effective approach to principle-based digital initiatives for sustainable development.

8.2.2 Case Study 2 | Pre-Election Observation and Quick Count in Nigeria

** Original case study prepared by Transition monitoring Group (TMG), Nigeria*[3]

In the months leading up to the March 28, 2015 presidential poll in Nigeria, observers predicted violence as the likely outcome of the election. There was broad concern that a failed election in Nigeria would destabilize the entire West Africa region. Nevertheless, Nigeria held an historic and closely contested election, which peacefully transferred power from one political party to another for the first time since independence.

Against this backdrop, the NDItech team provided technical assistance to the Transition Monitoring Group (TMG) to conduct a quick count during the 2015 elections and to carry out systematic pre-election observation for five months leading up to the polls. Using a parallel vote tabulation methodology, election observers were sent to a representative random sample of polling units to monitor the process and report on vote totals to independently verify results and build citizen confidence in the process.

To do this, the NDItech team deployed the Elections DemTool, a custom-built data management platform, to aggregate, manage, and analyse structured data collected through text messages and phone calls from thousands of trained observers across 774 local government areas (LGAs) across the country. With automated data analysis, election experts were able to quickly spot trends and flag potential problems while maintaining direct communication with the network of observers in the field.

[3] This case study is drawn from a submission by _____ January 2016, available here: http://digitalprinciples.org/tmgs-pre-election-observation-and-quick-count-case-study/

In addition, TMG utilized DKAN for internal data warehousing and visual analysis. DKAN is a platform designed to make data readily accessible and understandable to nearly any audience by generating responsive, interactive data visualizations. By archiving their data sets, TMG was able to generate charts and graphs that were automatically shareable online and dynamically updated as new information was received. With the addition of shapefiles, maps were automatically generated, which allowed TMG to look for geographic trends in political participation and election administration processes.

In developing and delivering these solutions, TMG and NDItech applied a number of the Digital Principles to ensure an effective approach in leveraging technology for governance in the context of the elections in Nigeria. Here are the key ways in which these solutions apply selected Digital Principles--and provide a ready-to-use, principle-based approach to election monitoring that other organizations can adapt and deploy in the future:

- *Be Data Driven:* Comprehensive and systematic analysis of observer reports allow an organization to accurately assess electoral outcomes. Organizational leaders use this information to evaluate the overall quality of election-day processes and to project and verify official election results based on precise analysis of polling station data. This assessment based on statistically conclusive information can legitimate or challenge the common understanding of the political process.
- *Design for Scale:* Agile election data management processes are built with a "systems" approach that can adapt to a variety of input mechanisms including collecting data by paper, phone, SMS, web form, smartphone form, email or app. In addition, any custom range of questions and data types can be collected.
- *Reuse & Improve:* Since its first deployment in Nigeria in 2011, the Elections DemTool has undergone significant improvements and been reused many times over. Originally built as a custom database that came to be called Apollo, the platform has increased in its processing speed and capacity for receiving data from the remote observers. It also came to allow users to create content entirely from the front end, making it more accessible and user-friendly, and now checks errors in the data automatically, reducing the time and effort required for execution. Elections expanded its input parameters beyond SMS messages to include submissions from the smartphone app ODKCollect.

8.2.2.1 Outcomes and Lessons Learned

The experience of TMG and NDItech proved a considerable success, and yielded a range of concrete outcomes and lessons learned to inform similar work in the future.

- In 2011, the cost for building an election observation system in Nigeria was $70,000 and took six months to implement. In 2015, the site was running in 15 minutes at virtually no cost.
- With the core functionality already taken care of, TMG could invest their time and resources into the more difficult and important work of training observers and organizing a national communication strategy
- Partner organizations often lack capacity for data driven decision-making. This project also required the organization to be data-driven at scale, which proved to be resource intensive. The skills and resources required for data reporting and analysis were especially burdensome.
- In-person trainings remain the common method of preparing observers, and is time intensive.
- TMG's Quick Count analysis generated from the Elections DemTool strongly indicated that turnout was inflated during the collation process in southern Nigeria. This discovery prompted TMG to call on INEC to immediately investigate the inflation of turnout figures during the collation process before local elections this year.
- The Elections DemTool enabled TMG to collect data on over 80 individual question per SMS through coded text messages. This allowed TMG to collect and analyze over 125,000 data points on election day.

8.2.3 Case Study 3 | Digital Principles in Mobile Service Delivery in Somalia

* *Original case study prepared by Souktel*[4]

The Somali Youth Livelihoods Program (SYLP) aimed to link close to 10,000 young Somalis with skills training and work. Funded by USAID, the 3-year project was delivered by EDC, Souktel, and local partners across the Horn of Africa, and used mobile technology extensively—to reach remote communities in a region with few reliable roads.

Somalia's unique characteristics—no central government, an isolated labour market, and poor infrastructure—meant that technology couldn't be "copy/pasted" from somewhere else: It needed to be designed directly with local end users.

Souktel's approach in designing and implementing this initiative illustrates the importance of two key Principles for Digital Development:

- *Design with the User:* Drawing on their own unique experience building tech solutions in the conflict zone of Palestine, Souktel staff traveled to the Horn of Africa to work on-site with Somali peers. The team hired Somali tech counterparts—building a permanent local staff team—and held more than 20 focus groups with end users. They visited field sites to stress-test each mobile solution, and worked directly with the region's leading mobile networks, private businesses and government ministries. Most importantly, they didn't make a one-time, one-week trip: The blended Souktel team of local and expat staff maintained a constant presence in the communities where the technology was being used—listening to users and learning what worked (and what didn't) on a daily basis.
- *Build for Sustainability:* In the project's final year, Souktel worked with EDC to set up a local entity that would manage the mobile platform that Souktel had developed. When the project ended, the new entity charged youth and employers a nominal fee to access mobile content—and it launched with in-built capacity and contacts to seek out private funding. The software itself was also designed to ensure easy hand-over, and uninterrupted service. When the project closed out, the mobile platform carried on.

Five years later, the mobile job-find service counts close to 20,000 users and is managed entirely by an independent Somali team. A mix of user fees, private funding, and mobile network partnerships covers running costs and ensures sustainability. Meanwhile, community users know that the custom service isn't a quick copy of a Kenyan idea—it's a genuine Somali solution.

Through informed decision-making (rather than one-size-fits-all logic), the Digital Principles helped Souktel and its partners ensure that tech and development worked together to achieve a shared goal.

8.2.4 Case Study 4 | Learning from Failure: QOWA Initiative in Iraq

[4] This case study is drawn from a submission by Souktel in June 2015 as part of their endorsement of the Digital Principles. The original text of the case study is available here: http://digitalprinciples.org/designing-with-the-user-building-for-sustainability-how-souktel-has-integrated-the-digital-principles-into-its-mobile-service-delivery-in-somalia/

** Original case study prepared by UNICEF in January 2014*[5]

It is not always easy for people to talk about failures--especially their own. At UNICEF, learning from failure has become a central part of the organization's approach to innovation as a strategy for development and results for children. In the case at hand, though we do not know if doing things differently would have changed the outcome of the QOWA initiative, we chose to document our failures and share our lessons learned publicly in the spirit of continued learning--and, hopefully, avoiding similar pitfalls in the future.

The QOWA[6] initiative was an ambitious innovation in 2007, aiming to provide access to quality education to children affected by the Iraqi conflicts and creating a community of learners and teachers by employing a combination of simple technology solutions. The initiative, planned for implementation in multiple countries in the region, did not fully materialize. This case study offers an anatomy of failure through the lens of a selection of the Principles for Digital Development.

– *Design with the User:* The team of experts that developed the QOWA project commanded deep knowledge and rich experience in the field of education in the region. Unfortunately, that was not enough to build an innovation that worked. Experience shows that project designs, work plans, and other related tools must be developed with end users--or at a minimum through a process that ensures their feedback is reflected. In the case of QOWA, engaging out of school Iraqi children in the countries of focus would have allowed UNICEF and partners to better understand the (lack of) resources, needs, challenges, preferences and habits of end users, and build the project around them.

  Formative research should have included questions around where people access information and how they use it. This is especially important for projects with a technology component like QOWA, where the human factors determine whether a technology will actually work. Obtaining such knowledge would have meant increased budget commitment and more complex logistical arrangement to include end users in the process. Though potentially costly, this critical step can have a direct impact on the success or failure of an initiative--as in the case of QOWA.

  Similarly, in order to allow for meaningful design with the user not just at the outset of an initiative but throughout subsequent iterations, projects should be built incrementally (in the form of rapid prototypes), allowing for iterative user testing and modifications. Any plan or contract with external vendors/partners should incorporate this requirement (which is not easy but certainly possible in most cases).

– *Understand the Ecosystem:* Despite the ability to marshal resources and devise high-level strategies, headquarters (global or regional) sometimes lack information and understanding of ground realities and existing ecosystems at local levels. Such information includes governmental policies, ongoing programs, presence of local practitioners running similar projects, and people's tendencies to accept (or not accept) new technologies and services. Planning without such knowledge can be detrimental, as the QOWA experience illustrates.

  At the time of the QOWA initiative, the Iraqi Ministry of Education (MoE) was running an IT department managing technology application in secondary schools. This portfolio included an e-learning project in the northern parts of Iraq with the support from the Swedish government and Microsoft Corporation. This initiative had similar attributes to QOWA, such as providing access to education through information and communications technology. It however also included a dimension of certification which was considered desirable for children and their families, and which QOWA did not have. Having a great deal of work under its responsibility already, the MoE

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5 This case study is drawn from series of case studies prepared by UNICEF in 2014 and published in three parts:
Part 1: https://blogs.unicef.org/innovation/learning-from-failures-qowa-assessment-part-1/
Part 2: https://blogs.unicef.org/innovation/learning-from-failures-qowa-assessment-part-2/
Part 3: https://blogs.unicef.org/innovation/learning-from-failures-qowa-assessment-part-3/

6 The project was named QOWA based on the Arabic meaning of the word, which is 'strength'.

was not interested in investing in other external projects. Sitting far away from the field where the project was meant to be implemented, the team designing the QOWA initiative lacked sufficient understanding around this, and thus the project plan did not obtain the essential buy-in from the MoE.

From this experience, UNICEF learned that ideas of innovation come from the field--from country offices that understand and interact with local people and cultures on a daily basis. We recognized the need of an organizational structure and environment that facilitate close and dynamic relationships among users, innovators and collaborators locally. These kinds of environments can be found in many of the world's most innovative organizations, and should be encouraged and fostered to ensure responsible and strategic applications of innovation and ICTs in sustainable development programs.

– *Reuse and Improve:* The idea of building a massive, globally interconnected classroom and resource library for teachers and students using low-fi technology in the most resource-scarce and conflict-affected areas was ambitious and unprecedented at the time of the initiative. In this sense, QOWA was ahead of its time in terms of hardware and software, logistics, connectivity, technical capacity, partnership, and most importantly, organizational experience that can only be learned by practice. The team required organizational experience "in building projects which no one has ever done before, which is not experience that we had then but we do now". This entails the ability to mobilize people, information and resources, as innovations are cross-sectoral in nature, and to leverage and build-upon experience and expertise. While this is now something that UNICEF and many other organizations actively pursue, the failure to do so in the design of QOWA provided a major challenge.

The QOWA experience proved formative for UNICEF Innovation in many ways. Since this implementation, UNICEF has been a lead advocate and practitioner of the Digital Principles, and remains deeply committed to promulgating the principles in practice through its work to promote innovation and applications of ICT for children around the world.

Source: From Principle to Practice[7]

[7] Waugaman, Adele. From Principle to Practice: Implementing the Principles for Digital Development, pg. 8.

8.3 Annex 2: SDG 9

GOAL 9 | Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Targets

9.1 | Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

9.2 | Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries

9.3 | Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

9.4 | By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

9.5 | Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

9.a | Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

9.b | Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

9.c | Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Source: https://sustainabledevelopment.un.org/sdg9

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