Local Competence Building and International Venture Capital in Low Income Countries
Exploring Foreign High-Tech Investments in Kenya’s Silicon Savanna *

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Structured Abstract:
Purpose
In this paper, we explore the new phenomenon of international high-tech investments into entrepreneurial ventures at the case of Kenya. Classifying investors and start-ups, and mapping the interaction structure between them, we aim at identifying investment patterns that can contribute to competence building and sustainable development in less developed economies in the global South.

Design/methodology/approach
Classifying investors and start-ups, and mapping the interaction structure between them, we aim at identifying investment patterns that can contribute to competence building and sustainable development in less developed economies in the global South.

Findings
Looking at data from Kenya, we observe that there is a new type of mostly young investors that support innovative ideas in sub-Saharan Africa. Such ideas manifest as social and technological innovations that are often very much different from technology used in the west.

Originality/value
We develop a novel classification of technology investments in low income countries by exploiting the rich information and graph-based structure of the CrunchBase dataset, thereby sheeting light on an up to now under-researched emerging phenomenon.

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1 Introduction

While there exists a rich body of research on micro- and macro- causes and consequences of FDI and foreign aid, as well as an emerging literature on micro-finance and its impact, venture capital investment is a rather new and as of yet unstudied phenomenon in the developing world.

The overall and guiding aim of this study is to identify and characterize new types of (mainly non-aid-character) international finance flows into technology-intensive start-ups that can contribute to competence building and sustainable development in less developed economies in Sub-Saharan Africa (SAA), and more broadly the global South. Many countries in Africa have been – and still are – experiencing extremely poor IT infrastructures. Yet, recent progress within mobile data communication and processing, general modularization and interface standardization, and falling prices have made technology more accessible, while simultaneously making it less dependent on the surrounding infrastructure.

These developments are described by a growing body of literature under the heading of the Digital Entrepreneurship in Africa (e.g. Bramann, 2017, Drouillard et al., 2014) that also identifies the emergence of supportive ecosystems, including the role of the Government, NGOs, Universities, as well as Tech Hubs (Kelly and Firestone, 2016) and finance. This paper focuses on the characteristics of the latter in this novel context. We propose an investment classification inspired by ideas from value chains literature on capacity building and upgrading (cf. Ernst, 2002) and the strand of literature on catching-up (cf. Kim, 1997, Malerba and Nelson, 2011). In addition we relate the present case to the discussion on frugal innovation (Radjou et al., 2015, Rao, 2013, Tiwari and Herstatt, 2012) and Bottom of the Pyramid (BoP) innovation (Bhatti, 2012, Zeschky et al., 2014), which outlines the importance and potentials of integrating local perspective and capacity when developing products and services for the BoP markets as well as for the rapidly growing middle class in less developed regions.

Looking at data from Kenya, we observe that there is a new type of mostly young investors that support innovative ideas in sub-Saharan Africa–technical innovations that are often very much different from technology used in the west, when addressing similar objectives and issues. We evaluate the investments using (primarily) two dimensions: (1) The needs and markets served by the product or service. Is the investment made into an operation that produces for export into advanced markets or is the main focus of the product to address needs in the context of SSA (and potentially other developing countries)? (2) The competence base used for the production of the product or service. The associated question here is: Is the operation mainly drawing on imported foreign competence, only local competence, or a mix of both? We assume that a combination of a mixed competence use and the targeting
of local needs/markets will lead to the best outcomes in terms of learning and upgrading within the firms.

This study is among the first to exploit the rich information and graph-based structure of the CrunchBase dataset, and, to the best of our knowledge, the first to utilize it to explore technology investments in an economically less developed context.

In many cases, the financial investments are accompanied by intensive technical and business support. Besides, some of these investors are actively building up networks and connecting supported companies. This scenario is new for companies and institutions in SSA. Classifying investors and start-ups, and mapping the interaction structure between them, we aim at identifying investment patterns that can contribute to competence building and sustainable development in less developed economies in the global South.

The remainder is structured as follows. In section 2 we review the history and investigate the characteristics and rationales behind capital flows from foreign (mainly advanced western) economies to SSA. We identify a set of dimensions that account for a main part of the variation between these flows over time. Backed up by theoretical considerations, introduced in section 3, we derive a classification of investments that aims at capturing the interplay between investment characteristics, local capacity development as well as problem solving. In section 4, we illustrate these dimensions in an analysis of technology intensive investments in Kenya, and discuss the impact and possible explanations of investor activity and investment patterns in section 5. Finally, section 6 concludes, drawing implications for policy as well as indicating promising avenues for further research in the future.

2 Background: Recent development of investment characteristics in sub-Saharan Africa

At the beginning of this century, investments in most parts of sub-Saharan Africa (SSA) were considered by most western countries as not very attractive on any scale. While not assuming a homogeneous Africa, the lack of basic infrastructure, low levels of education, high political instability, and low purchasing power in many African countries made it highly unlikely for private investors to find profitable investment opportunities (Eifert et al., 2005, Ikejiaku and Mordi, 2010). Exceptions were mainly large multinational enterprises (MNEs) that found ways to extract profits by exploiting low wages for labor intensive work, or to harvest the rich endowment of natural resources. Particularly, Chinese investments have received much attention. The invest-

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1A number of studies on Chinese Activities in Africa have been published in a special issue of the Review of African Political Economy (2008) and a Special Issue of World
ments that we observe in the present case differ in many ways. This section presents a brief overview of the various finance inflows into SSA since the beginning of the 21st century to provide a more detailed understanding of how the recent investments that we observe today are set apart from previous finance inflows.

**Early 21th century: Growing aid inflows**

While not being able to attract substantial private investments and titled as “the hopeless continent” (The Economist, 2000), there was a perception in the western world that most parts of Africa were not able to lift themselves out of poverty and create sustainable economies with the resources at hand. Consequently, the African continent has been the main receiver of global financial aid in the last decades (see. Figure 1).

Figure 1: Aid flows at current US$, data: Worldbank

Dedicated to addressing pressing issues such as extreme poverty and accompanying malnutrition, lack of availability of medical supplies, and inappropriate housing and sanitary conditions, actors like governments, NGOs, foundations, and private philanthropists channeled growing amounts of resources in projects that aim to either directly address the consequences (providing food, medical supply, shelter, etc.) or indirectly their assumed causes.

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(providing basic education etc.). Indeed, during this period many African countries received historically unprecedented inflows of resources with aid characteristics in an order of magnitude that made them a substantial part of national budgets.\(^2\) At this time, there was a general belief that many African countries were dependent on this external resources to cope with its internal problems (cf. Moss et al., 2006) by means of their own resources and solutions.

**Late 2000s: The rise of FDI and MNE activity**

With the beginning of the current decade, Africa’s emergence appears to be a new consensus. Even though still – on average – the poorest continent in the world, steady growth since the beginning of this century resulted in the emergence of an African middle class.\(^3\) While the Economist now calls it “the hopeful continent” (The Economist, 2013), the private sector has started to realize profitable investment opportunities, particularly in the rising ICT hotbeds Kenya and Nigeria. As a consequence, in 2013 private investments surpassed the amount of financial aid received (IMF, 2013).\(^4\)

The first wave of such investments—primarily carried out by MNEs—were market driven, with the intention to exploit accelerating economic growth again by replicating successful business models from advanced economies in the context of developing ones (UNCTAD, 2014). Increasing purchasing power over a critical point rapidly created large markets for relatively advanced products such as, for instance, smartphones.

**Early 2010s: Emerging investor awareness of local capacity**

As the latest development up to now, it can be observed that companies, as well as investors, begin to realize the yet untapped innovation capacities arising from fundamentally different social, institutional, and economic context. The environment is characterized by pressing local needs paired with low purchasing power and underdeveloped infrastructure. But recently access to increasingly affordable ICT and the Internet triggered “out-of-the-box” thinking, which resulted in commercially promising and often scalable

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\(^2\)For instance, the amount of overseas development assistance (ODA) to SSA in 2003 was equivalent to 11.7 percent of the continent’s GNI (excluding Nigeria and South Africa).

\(^3\)In fact, according to the World Bank Country and Lending Group 2016 classification 33 African countries are categorized as “Middle-Income Countries” (MICs).

\(^4\)The recent report IMF (2016) concludes slightly different, identifying “multispeed growth” across the continent. While on average growth has declined abruptly in resource-intensive countries and for commodity exporters, countries that do not belong to this group – roughly half of the countries in SSA – are continuing to benefit from improving business environments and infrastructure improvements.
concepts. Similar developments, coined as catalytic, frugal or Bottom of the Pyramid\(^5\), could already be observed earlier in emerging economies such as India or Taiwan (Radjou et al., 2015). The results often address needs with “good-enough” affordable products, focusing on basic but qualitative functionality, that are easy to use and robust (Zeschky and Widenmayer, 2011). Classical examples of such innovations are the “Tata Nano”, a car available for 2000 USD, or the “Narayana Hrudayalaya Hospital” which offers specialized surgeries at costs affordable even for the poor. Besides offering profit opportunities for global investors, investments in such innovation also create huge potentials for economic development in their country of origin. It has been argued that instead of falling in the trap of social investments ending up maintaining the status quo by creating either non-capacity building or poor performing and economically unsustainable results (Bramann, 2017), such investments help create profitable and scalable innovations aimed at resolving the needs of large underserved segments (Christensen et al., 2006). In addition, production processes are usually geared towards being efficient with the resources and infrastructure at hand, contrasting with western resource-intensive and infrastructure reliant large-scale production.

Also similar to developments we saw earlier in many of today’s emerging economies such as India or Taiwan, the emergence of an ICT sector can be observed (Drouillard et al., 2014). Among others, the privatization of the telecommunication sector in Kenya (cf. Zavatta, 2008) has attracted international investments (Young and Ernest and Young, 2014) in establishing mobile and internet infrastructures, but also spurred domestic entrepreneurial activity (Bramann, 2017). Figure 2 shows the constantly growing number of internet users, particularly in Kenya and Nigeria, which not only suggests increasing tech-competence in the population but also indicates a growing market potential for domestically developed technology-intensive solutions. The wide diffusion of mobile phones and more recently smartphones has generated additional dynamism. In line with this trend is the opening of IBM’s first African research laboratory in the outskirts of Nairobi in November 2013 and the associated investments of 10 million USD. The activity of this laboratory is centered around the smartphone-based applications and business models. Similar strategies can be seen in the activity of other major IT firms. In 2015 Microsoft launched Biz4Africa, an online platform for SMEs in collaboration with Kenyan accelerator hubs that work with cloud-based business solutions. Finally, also Google became present in SSA, funding start-up hubs in Nigeria, Kenya and South Africa (UNCTAD, 2014). While Kenya, Nigeria and South Africa are leading this development, similar can be observed all across Africa. The World Bank undertakes since 2014 a mapping of hubs that support Digital Entrepreneurship and has in its recent round identified 117 hubs across Africa (Kelly and Firestone, 2016). A mapping from July 2016 by the global telecoms industry body GSMA Ecosystem Accelerator suggests that

\(^5\)We are well aware that these notions are not describing the same phenomenon
there were over 300 hubs and similar spaces across 93 cities in 42 countries.

Figure 2: Internet use in percent of population, data: Worldbank

The increasing diffusion of mobile phones and internet coverage offers manifold potential for creative scalable business models only requiring minimal upfront investments in the spirit of silicon valley’s “app economy” (Gathigi and Waititu, 2012). Coincident to this development, new types of investors started to enter the business landscape.

While in the past literally nonexistent, early in this decade growth-oriented tech investors started to get involved in some economies in SSA such as Kenya and Nigeria. The most prominent form of such equity based tech-investors are venture capitalists (VCs), a form of financial intermediaries who combine a blend of technological competence and financial skills to provide both financial and managerial support for entrepreneurs in innovative early stage ventures. Most prominently, the emergence of the venture capital industry is known for its integral contribution to the rise of the Californian high-tech mecca Silicon Valley (Saxenian, 1996). While venture capital was seen as a US-centric phenomenon until the beginning of this century, nowadays venture capital industries and investments became increasingly international (Aizenman and Kendall, 2008, Guler and Guillén, 2005, 2010) and can be found in many advanced but also emerging economies such as Brasil (de Lima Ribeiro and de Carvalho, 2008), Taiwan (Saxenian and Sabel, 2008), India (Dossani and Kenney, 2002), and China (Xiao, 2002). As VCs are willing to bear high firm-, market-, and technology-related risks, they, in return, require high profit opportunities – meaning that eligible businesses have to
be highly scalable and with a potential to address large markets. The report by Zavatta (2008) names 3 Kenyan VC schemes but does not mention international VC capitals whatsoever. That such investments finally arrive in SSA is a positive signal, as it suggests that there exist young companies with innovative products, services or business models which are potentially fit for international or even global markets. This picture fits well with the arising speculations about countries such as Kenya and Nigeria becoming the “new emerging” markets who may follow the development path of the BRICS countries.

Summary

When considering the development of resource inflows into SSA from the beginning of this century, we see considerable changes in their sources as well as their characteristics and underlying rationales. In the late 1990s and early 2000s, resources channeled to low income countries of SSA primarily had foreign aid characteristics and were dedicated to solve short term local problems associated with poverty, such as malnutrition or lack of medical supply. The main concern of actors such as governments, non-governmental organizations (NGOs), or private philanthropists in doing so is the social impact of their investment—which was not expected to provide any direct returns to the investor.

Early profit oriented foreign investment activity was mostly carried out by foreign MNEs and focused on the extraction of natural resources such as oil, gas and metals, or exploiting the high supply and low costs of unskilled labor as for instance found by Barthel et al. (2011) looking at FDI in Ghana. The study finds that while FDI creates jobs, foreign currency inflows and royalties, extensive technology spillovers are not occurring. The resulting products of such activities firstly served international markets, however with increasing domestic purchasing power MNEs gradually started to target domestic markets with their African production facilities.

With the diffusion of ICT and mobile communication, various forms of digital entrepreneurship have mushroomed across Africa, gaining in some cases attention from international VCs. We see this as a strong indication for the innovation potential that lies in young African ventures that may help attending local needs and possibly even develop products and services, suited for the global market.

3 Theoretical considerations

We observe finance flows towards SSA not only steadily increasing in quantity, but also changing in quality. In the following, we draw from insights of
various strands of literature in order to understand the characteristics of and rationales behind different types of finance flows, explaining the observed shift of dominant flows, and deriving potential implications for SSA. Hereby we also focus on the interplay between the investment characteristics, innovative features of ventures and technologies, as well as the knowledge and capacity development dimension.

To capture the first phase of finance flows, which is characterized by investments with aid characteristics aiming primarily for social impact, and since 2000 closely linked to the Millennium Development Goals (MDG), we will briefly review the literature on development aid and innovation.

To understand the implications of the second phase, mostly characterized by FDI and other forms of corporate activity of multinational enterprises (MNE), we draw mostly from literature on global value chains (GVC) as well as global production networks (GPN) and the line of thought on “catching-up”. We do this not to build on this literature but to contrast our observations with it, outlining similarities and differences with regard to local capacity building.

Finally, to capture the latest phase of technology focused investments, we consult literature on the internationalization of venture capital (VC).

Our cases illustrate the emergence of ventures that combine various types of knowledge and capabilities to address market and social needs that are imperative within but not confined to the local context. They show a strong resemblance to features discussed in the literature on frugal innovation (Radjou et al., 2015, Rao, 2013, Tiwari and Herstatt, 2012) and Bottom of the Pyramid innovation BoP (Bhatti, 2012, Zeschky et al., 2014) – noting that these literatures are different but share some communalities. Yet, while cases that relate to these two strands of literature typically correlate local skill and knowledge with smart low-tech solutions and frugal high-tech products are linked with companies from the developed and emerging markets, in our case we face a novel connection of features. We observe, what seems to be an integration of knowledge and skill from different origins, high-tech features, frugality, as well as elements of BOP innovation reasoning. In the following we will draw on both strands of literature to understand the interplay between different kinds of capabilities, product/service features, and market needs.

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6Following various lines of thought on economic complexity (Hidalgo and Hausmann, 2009) and organizational capabilities, we understand the latter notion as an embodiment of knowledge and skill. While these can be transferred or externally acquired, capabilities have to be developed within the organization, whereby absorption of knowledge (Cohen and Levinthal, 1990) plays a crucial role. In addition we also use the notion of competence, which describes a combination of knowledge and skill that is useful in a particular context.
Development Aid and Social Responsible Investments

As stated above, development aid directed toward countries in SSA has been on the rise, particularly since the formulation of the MDGs in 2000 (cf. Figure 1). The OECD’s Aid at a Glance report from 2017 (OECD, 2017) breaks down development aid into various commitment categories including education & health, social infrastructure, economic infrastructure and several more. The “mix” varies across donor countries and receiving regions but generally an emerging shift away from more “traditional” targets such as health and basic education towards innovation and capacity building can be observed. Due to the the scope of these investments it is difficult to say anything conclusive about the effect of these investments on local capacity development. Drawing on parallels to the innovation studies reasoning on learning and capacity building (Ernst, 2002) we assume that development aid can have a positive impact on local capacity of firms whenever aid funded initiative allow the latter can engage in interactive learning (combining foreign with local knowledge and capacity) and contribute to the development and deployment of technology.

3.1 Upgrading: Learning and capability building through global interaction

The global value chain (GVC) and global production network (GPN) explains how firms are engaged in cross-border supplier-buyer relations in different stages of value creating activities in an industry, with emphasis on the context of developing economies and the possibility for these countries to learn and build capabilities in the interaction with global buyers in the GVC (Ernst, 2002, Gereffi, 1999, Humphrey and Schmitz, 2002, Pietrobelli and Rabellotti, 2011). In this literature, the concept of upgrading is central in understanding learning and capability building of local firms in less developed economies. Initially, Gereffi (1999, p.51-52) defined industrial upgrading as “a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital- and skill-intensive economic niches”. In the subsequent empirical studies on upgrading in GVC, scholars used the concept of upgrading in different ways, which led to the fuzziness of the concept. The level of analysis to which the concept is applied is often obscure as the studies discuss upgrading of value chain or cluster in parallel to upgrading of firms. It is also acknowledged that the concept is used in different empirical studies both as a synonym for innovation and as the outcome of an innovation process (Morrison et al., 2008).

Empirical studies focusing on development of less developed economies
through GVC-participation have mostly gathered evidence on upgrading of firms in Asian and Latin American countries. An early seminal work by Gereffi (1999) found that South Korean firms in the apparel industry could upgrade along the value chain and transitioned from OEM (Original equipment manufacturing) to OBM (Original brand manufacturing) through interaction with international leading firms. Gereffi argued that it was possible due to extensive organizational learning and that the leading firms as their buyer had been main sources of material input and knowledge transfer. However, findings from the subsequent empirical studies suggest that capability building of firms in less developed countries are observed in the limited areas such as improvement in products and processes in the stages of value chain that they were originally engaged in (Giuliani et al., 2005, Humphrey and Schmitz, 2002, Navas-Alemán, 2011, Schmitz and Knorringa, 2000). These findings implies that upgrading in its most prevalent form is characterized by “incrementality”, meaning that capability building mostly involves incremental learning and knowledge accumulation. Contrary to “incremental” product and process upgrading, moving up the ladder of value chain towards higher value added functions is found to be much harder to achieve. This suggests that interaction with international leading firms enables learning in certain cases, but this may be restricted to the areas where the developing economies cannot expect to achieve high economic growth. Moreover, in order to manage functional upgrading, the local firms need to have clear strategic intent to overcome potential conflict with international buyers and invest highly on learning opportunities (Lee et al., 2015). Further, it has been argued that such imitation and application of external concepts facilitates the establishment of a domestic knowledge base, which eventually triggers the development of own innovation capabilities (Kim, 1997). This strategy has proven successful in the case of (formerly) emerging economies such as India, China and Korea to catch up with western industrialized nations. Yet, this cases fundamentally differ from most African cases in a way that they where induced by massive investments and forceful policies by a strong government. In the case of Africa, where government budgets as well as regulatory power is often constrained. Here, the application of external knowledge to a large extend took place via FDI investments executed by foreign MNEs. For such externally governed ventures there exists ample evidence (eg. Barthel et al., 2011), that knowledge spillovers and local learning are either nonexistent or very limited.

Aside from the “incrementality” argument, there are several assumptions when looking at GVC interaction and effective capability building. The first one being that the foreign technology that local companies are confronted with is actually superior in general and provides learning potentials in the local context. This is questionable, given that modern products designed for the developed and emerging markets are made to preform in a sophisticated environment both in terms of supportive technological infrastructure and the
application itself.

In addition, despite of the obvious power imbalance between MNEs and companies from developing countries, there is an assumption that local firms will be able to gain knowledge trickling down the value chain. Discussing MNEs engagement in frugal innovation Knorringa et al. (2016) suggest that such interaction can take any from ranging from benevolent co-creation (between MNEs and local firms) to domination by multinationals, exploitation and crowding out of local competence.

**Venture Capital Internationalization and Emerging Economies**

Western venture capital investment activities in sub-Saharan Africa as an emerging phenomenon that started to take place around 2010 have not received much academic attention so far. That such investments finally arrived in countries like Kenya is a positive signal, as it points to the presence of young companies with innovative products, services or business models which are potentially suited for international or even global markets. This picture fits well with the arising speculations about countries such as Kenya and Nigeria becoming the “new emerging” markets to follow the development path of the BRICS countries.

In the following, we briefly elaborate on the venture capital investment model and its possible impact on innovation and economic growth. Then, we survey literature on the ongoing globalization of the venture capital industry and assess its potential to explain the recent investment activity in Kenya.

**The Venture Capital Investment Model and its Impact on Innovation and Economic Growth**

Venture capitalists (VCs) are specialized financial intermediaries who combine their unique blend of technological competence and financial skills to provide both financial and managerial support for entrepreneurs in innovative ventures. Specifically, they provide long-term, unquoted, risk equity finance in form of a minority stake in new firms, where the primary reward is an eventual capital gain due to increased firm valuation. VCs target investments with a high probability of failure but enormous growth potential, so that the few successes overcompensate the losses. To further nurture the invested firm’s value, VCs are actively involved in steering and monitoring its further development, and many of them are present in the firm’s management board.

7Reports such as Zavatta (2008) list some first domestic VC schemes, but they do not mention international VC capitals whatsoever. Recently, Gugu and Mworia (2017) to the best of our knowledge where the first to explore the dynamics of VC investments in SSA
It has been widely acknowledged in the literature, mostly with empirical evidence from developed countries, that VCs promote innovative activities (Kortum and Lerner, 2000, Samila and Sorenson, 2010, 2011). To begin with, their market as well as technological knowledge enables them to select entrepreneurial ventures with high growth potential (Baum and Silverman, 2004). Moreover, by actively supporting the venture’s management, they also contribute to the professionalization of start-ups (Hellmann and Puri, 2002), enable innovative products or services to be rapidly brought to market (Black and Gilson, 1998, Bygrave and Timmons, 1992), and pave the way to the introduction to the stock market (Barry et al., 1990, Maula and Murray, 2002). They also create missing links to other supporting actors such as lawyers, consultants, suppliers et cetera and introduce the entrepreneurs to professional networks (Hellmann and Puri, 2002). Most prominently, the emergence of the VC industry is known for its integral contribution to the rise of the Californian high-tech mecca Silicon Valley (Kenney and Florida, 2000, Saxenian, 1996).

**Venture Capital in Emerging and Low Income Economies**

Throughout the past decade, cross-border VC investments have increased substantially, in terms of numbers of deals and capital invested as well as industry and geographical reach (Aizenman and Kendall, 2008, Chemmanur et al., 2016, Guler and Guillén, 2005, 2010).

While VC was seen as a Western economy phenomenon until the beginning of this century, nowadays venture capital industries and investments became increasingly international, first almost exclusively to be found in advanced economies. Understanding this process to be opportunity driven, the pattern of VC globalization was explained mainly by market attractiveness, an exogenous country-level factor to which VC investments gravitate. In line with this argument, empirical studies have shown that VC investments tend to flow to countries with some key economic features such as high economic growth (Schertler and Tykvová, 2009, 2010), a higher stock of human capital (Kendall and Aizenman, 2012), and less barriers to entrepreneurship (Baygan and Freudenberg, 2000). Guler and Guillén (2005, 2010) emphasize the role of institutional factors explaining cross-border venture capital flows and come to the conclusion that venture capital firms prefer to invest in countries with technological, legal, financial, and political institutions that create innovative opportunities, what they measure by the level of scientific knowledge and technology.8

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8Including all the determinants mentioned here, Groh and Liechtenstein (2011), Groh et al. (2010) developed the “Venture Capital Attractiveness index” as a tool for investors and policy makers. Research along these lines very much reflects the predominant understanding of the first wave of VC globalization.
Yet the tides changed in the middle of the last decade (Ahlstrom and Bruton, 2006), and some emerging and transition economies such as Brazil (de Lima Ribeiro and de Carvalho, 2008), Taiwan (Saxenian and Sabel, 2008), India (Dossani and Kenney, 2002), and China (Xiao, 2002) succeeded to attract substantial amounts of foreign VC investments. Chemmanur et al. (2016) even argue that a large proportion of the latest increase in international VC is explained by investments into emergent markets. For example, they refer to that the share of all VC investments that are cross-border increased from 10% in 1991 to 22.7% in 2008, however the number of venture capital investments by international investors into emerging nations increased from 8.7% of the total venture capital investments in 1991 to 56% in 2008.

As the latest of these developments, the VC industry has expanded its reach to sub-Saharan countries such as Kenya and Nigeria (Gugu and Mworia, 2017). The influx of foreign VC in emergent markets with limited indigenous venture capital has been said to be an important driver of the upsurge of growth-oriented, technology firms in these regions (Meuleman et al., 2017). However, while we are witnessing the emergence of dynamic start-up ecosystems and rapidly growing domestic markets in these countries (Ndemo, 2017), they are also characterized by a high degree of political and market instability (Ernest and Young, 2016), underdeveloped investor and property protection (Peng, 2001), corruption (Johan and Najar, 2010), weak security and basic infrastructure as well as vastly diverging business models, ethics, and practices (Ahlstrom and Bruton, 2006, Dai and Nahata, 2013). As a consequence of the high uncertainty, oversea investments into these countries represent a challenge for western VC investors, requiring them to adjust their routines regarding deal selection (Dai et al., 2012), structure (Khavul and Deeds, 2016), monitoring, and providing managerial support. More broadly, existing funding models are in need to evolve and emerging funding models to forge new frontiers (Drover et al., n.d.). One response to this uncertainty is to syndicate with local partners in the investment target country. This has become a common strategy, which is part of the explanation of a rapid growth in cross-border venture capital syndications (Chemmanur et al., 2016, Liu and Maula, 2016, Meuleman et al., 2017), and can be interpreted as a organizational innovation with in the VC industry in order to adapt to a more complex industry and technology landscape. Here interaction with locals help to overcome transaction costs related to geographical and cultural distance (Tykvová and Schertler, 2008) and utilize synergies which lead to overall higher performance Chemmanur et al. (2016). They can also compensate for unfavorable local conditions (Dai et al., 2012). Such intra-industry networks are nowadays believed to be a major enabling factor for emerging economies to attract foreign investments. Yet, it has also been pointed out

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9Further examples for Venture capital activities in early emerging and transition economies can be found in Poland (Klonowski, 2005), Hungary (Karsai et al., 1997), and Vietnam (Scheela and Van Dinh, 2004)
that the VC industry co-evolves with the domestic high-tech industry, and a certain level of development in both is a necessary condition to attract foreign VC (Avnimelech et al., 2006, Avnimelech and Teubal, 2008).

Summary

The discussion on economic development so far has mainly been centered around the question, how less developed countries are able to “catch-up” with their advanced counterparts via “industrial upgrading” (Ernst, 2002, Gereffi, 1999, Humphrey and Schmitz, 2002, Pietrobelli and Rabellotti, 2011). Here, domestic competence building takes place through the insertion of domestic companies into global value chains of MNEs from the advanced economy, typically at the beginning of the chains with the prospect of executing low value-added activities. Through the exposure to modern production and organization processes of MNEs, local learning takes place, and domestic suppliers eventually expand their capabilities by taking over higher value-added activities. In summary, literature on economic development as a consequence of insertion in GVCs primarily provides us with useful insights how inter-firm knowledge transfer from developed countries might lead to local capacity building.

Indeed, after consulting existing literature on the first two phases of financial flows into SSA in the previous section, knowledge transfer appeared to be mainly unidirectional towards SSA, and consequently the knowledge and capacities utilized in the investment targets primarily originating from advanced (western) economies. This manifests in foreign planned aid projects, likewise foreign planned aid-like infrastructure and social impact investments, as well as foreign orchestrated activities by MNEs. However, it is not clear if this is also the case for the recent third phase of financial flows towards SSA. The VC literature clearly suggests such investments to target knowledge intensive entrepreneurship, which is likely to draw from local competences. This is equally supported by literature on frugal innovation (Radjou et al., 2015, Rao, 2013, Tiwari and Herstatt, 2012) and BoP innovation (Bhatti, 2012, Zeschky et al., 2014), which outline the importance and potentials of integrating local perspective and capacity when developing products and services for the BoP markets as well as for the rapidly growing middle class in less developed regions.

Therefore, to understand the characteristics of this third phase of financial flows and their targets as well as their possible impact on local competence building and economic development, it is imperative to clearly identify which markets the products and services of these targets might serve. As already outlined, many countries within SSA are still characterized by a lack of infrastructure in addition to the underdeveloped political and economic institutions. Furthermore, a substantial share of the population still experi-
ences poverty and the associated constraints of basic needs such as appropriate shelter, nutrition, fresh water, medical supplies and basic education. Consequently it was believed to be conventional wisdom that products and services produced within SSA should primarily aim at satisfying these basic needs. Following this doctrine, foreign aid and other investments with aid-characteristics in the past mainly targeted firms and projects that promised social impact and poverty alleviation measures (OECD, 2017). Consequently, such products and services aiming to guarantee basic needs appear to be either limited to the local context and thereby a narrow geographical market, or more broadly the needs and thereby markets in other LICs. In the second phase, dominated by MNEs this “inward orientation” became less clear cut. While some MNEs used local production facilities to serve SSA markets, for the most part they aimed to extract resources or produce labor intensive products for the world market, targeting the needs of advanced economies. In phase 3, it ex-ante remains inconclusive, which needs and markets the investment targets serve. However, the involvement of international VCs and the economics of these forms of investments indicate that the targets promise high growth potentials to an extend that certainly exceeds any single country market within SSA.

4 Analysis

In this exploitative analysis, we will use the above developed classification to characterize Kenyan start-up companies and their investors. Aggregating the actors in the database in this way allows us to study the interaction patterns between the different types of investors and Kenyan companies by exploring the investment network which we construct from our data.

4.1 Data

CrunchBase (CB) is the open, community-curated database of TechCrunch – currently containing profiles of 650,000 companies, investors, and people around the world – with detailed activity and technology descriptions. According to its own statements CB has 2 million monthly users and around 50,000 active contributors, editing the database in a peer-review type process. In addition to providing well-structured entity profile information, the graph architecture of CB allows us to extract multi-modal networks between all contained entities, such as company-funding round-investor, employer-employee relations or even personal networks. CB provides access to the data over a JSON REST API. For the present study, we constructed a dataset by crawling the graph structure of CB, starting with all listed tech start-up companies in
Kenya (186, of which 23 have documented investments in CB) as well as their listed investors.

For these, we selected all mentioned investors (42) and extracted data on all companies in their portfolios (ca. 230). We also collected data and connections of 2nd level investors, i.e. companies that co-invested with investors from our initial list.

To get a better understanding of these finance flows, we first classified the identified investments in start-ups based on the insights derived from the literature on VC and GVCs, followed by the corresponding investors, and finally we explored the network structure between investors and investments.

Investments

Given the character of CB the sample of investments is naturally biased towards IT and other technology-intensive companies. CB has many features of a social network page and a company’s presence in the worldwide accessible and searchable database indicates a clear outreach-intention by the start-up towards potential investors, customers, and the media. The above mentioned community model of CB guarantees a certain level of data reliability and selection of companies. For all that, we expect the CB listed firms from Kenya to be young, innovative, technology-intensive ventures. In fact, over 75 percent of Kenyan firms that we and that have received funding were founded in 2010 or later.

The complex hybrid nature of organizations renders a clear delineation of the companies rather challenging, particularly if merely departing from structured classifications. CB’s sectoral categories are very detailed and reflect well the extreme dynamics of technological change. Yet, they lack a hierarchical structure as it is known in traditional industrial classification (e.g. NACE). This makes it complicated to aggregate them in order to be able to compare sectoral specialization across firms in different countries. Two interesting and apparent observations from such a comparison are (1) that the most often appearing category selected by financed start-ups in Kenya is “Clean Technology”. When looking at other companies financed by the same investors outside Kenya (and excluding the United States), we find many businesses working with innovative finance solutions and particularly Bitcoin. Also high ranking on the list are the categories (once again) “Clean Technology”, “Mobile” and “Education”.

For all that, these observations do not allow us to draw any conclusions that could help with explaining what particularly makes the Kenyan companies attractive for the international funding that we identify in the database. Relying on the classification framework—presented above—we evaluated the Kenyan companies, using information from the companies’ websites, journalistic texts and online available videos, tweets, and other social media.
Categories were all non-exclusive, meaning that for each company multiple categories could be selected. Table 1 provides an overview of the analyzed company cases and our classifications.

In terms of “addressed needs”, we find that in 19 of the 23 cases, companies target problems that are typical for low income countries, emanating from insufficient infrastructure and unreliable institutions. In 6 of these cases, we found however that the products developed by the companies could be transferred, adapted and used in developed countries, offering a leaner and smarter solution than the technologies in place.

BRCK emerged around 2013 as a spin-off project of the makers Ushahidi—which in itself is another Kenyan IT-success story—as a “backup generator for the Internet”. A Kickstarter campaign in May 2013 raised over 170,000 USD and was pledged by over 1000 backers. On their blog, they wrote in December 2014: “As a Kenyan company based in Nairobi, we know first-hand the challenges of dealing with power cuts. So we built a router that stays online when the lights go out.” BRCK is essentially a self-powered WiFi router designed to deal not only with power cuts but generally to provide internet connectivity in extreme conditions. The device connects to the internet by Ethernet cable, bridging other WiFi signals, or accessing 3G or 4G mobile data connections once a data-activated SIM card is plugged in. The device is power efficient and can be charged by connecting it to anything from a standard power outlet to a solar panel or even a car battery. While it is suited for rough outdoor conditions, solutions like BRCK are becoming essential for young upstarts in Nairobi that are challenged by intermittent electricity and Internet breakdowns. While developed countries are not suffering from these problems, BRCK can still be used in special situations such as vacation houses in remote areas without internet connection, outdoor/trekking, or at (sporting) events organized outside, which could benefit from a common WiFi connection. As of today, BRCK has the highest number of investors of all companies in our sample.

Some of the companies are targeting problems that are exclusively characteristic for developing economies. These companies are coming up with innovative solutions for problems within the agriculture sector but also to overcome problems imposed by the lack of basic infrastructure—for instance, energy and sanitation.

Futurepump was started in 2011 with the idea to provide a sustainable and affordable pump to small-holder farmers around the world. Its product, The Sunflower, is a robust and portable solar irrigation pump that is aimed at seasonal vegetable farmers and provides an alternative to traditional petrol or diesel pumps. On its website Futurepump emphasizes that actually the potential mar-
<table>
<thead>
<tr>
<th>Company</th>
<th>City</th>
<th>Year Founded</th>
<th>Needs Developing</th>
<th>Needs Advanced/Global</th>
<th>Social Focus</th>
<th>Local Competence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>iProcure</td>
<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Logistics and distribution platform</td>
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<td>SafariDesk</td>
<td>Nairobi</td>
<td>2012</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Hotel management software</td>
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<td>Angani</td>
<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Cloud computing provider</td>
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<td>Naivasha</td>
<td>2011</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Sustainable slum sanitation systems</td>
</tr>
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<td>Futurepump</td>
<td>Nairobi</td>
<td>2011</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Solar water pump for smallholder farmers</td>
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<td>Nairobi</td>
<td>1982</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Social housing</td>
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<td>Nairobi</td>
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<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Bus booking app</td>
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<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Innovative agriculture delivery models</td>
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<td>Nairobi</td>
<td>2012</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Organic fertilizers</td>
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<td>Nairobi</td>
<td>2007</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Affordable private schooling system for BoP</td>
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<td>Academies</td>
<td>Nairobi</td>
<td>2008</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Affordable entertainment and connectivity</td>
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<td>Africa’s Talking</td>
<td>Nairobi</td>
<td>2010</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Advanced SMS based services</td>
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<td>Civicon</td>
<td>Mombasa</td>
<td>1975</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Infrastructure construction</td>
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<td>Lipisha</td>
<td>Nairobi</td>
<td>2009</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Corporate mobile payment platform</td>
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<td>M-Farm</td>
<td>Nairobi</td>
<td>2010</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Smallholder farming mobile information system</td>
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<tr>
<td>Virtual City</td>
<td>Kajumboni</td>
<td>2002</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Data analysis and coordination</td>
</tr>
<tr>
<td>WindGen Power Products</td>
<td>Nairobi</td>
<td>2011</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Small wind and solar</td>
</tr>
<tr>
<td>M-Changa</td>
<td>Nairobi</td>
<td>2012</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Mobile fund raising platform</td>
</tr>
<tr>
<td>elenii</td>
<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Commodity exchange</td>
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<tr>
<td>Sanergy</td>
<td>Nairobi</td>
<td>2010</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Sustainable slum sanitation systems</td>
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<td>Ushahidi</td>
<td>Nairobi</td>
<td>2008</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Virtual crisis mapping</td>
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<tr>
<td>BitPesa</td>
<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>Connect Bitcoin and Kenyan mobile payment systems</td>
</tr>
<tr>
<td>BRCK</td>
<td>Nairobi</td>
<td>2013</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>‘Off-grid’ mobile Wifi</td>
</tr>
</tbody>
</table>

Total 19 10 7 18
ket for their product goes far beyond Kenya and Africa, as there are hundreds of millions of small one-acre farms around the globe that face similar problems. In December 2014, after winning the Agriculture Innovation award, the company received seed funding from VilCap, a San Francisco based business Accelerator with great experience in supporting entrepreneurs in less developed countries. Today the pump costs approximately 400 USD and the company offers payment plans. The next years will show whether Futurepump can also find a sustainable business model solution, which allows to diffuse their innovation and improve it through interaction with their customers.

Sanergy’s goal is to make hygienic sanitation affordable and sustainable in high-density urban slums in Kenya. The company was founded in 2010 by 4 MIT students. Sanergy combines lean technology in form of their modular pay-per-use Fresh Life Toilet with an innovative franchise business model. The local operators are responsible for cleanliness of the units and wast disposal, which is turned into organic fertilizer and renewable energy in central facilities. According to Sanergy’s webpage to date nearly 700 toilets have been installed in informal settlements. Including the company’s team, local operators, and their employees, nearly 700 jobs have been created.

4 other cases are companies that offer products for solutions to problems typically found in developed economies.

When looking at the competence bases used within the companies, from our desk research based analysis, we find that 18 companies are actually, to a high degree, building on local competence bases. These firms were founded by locals, have a large share of local employees, and rely—to some extent—on locally developed or adapted technology.

International investments in less developed economies have, throughout the last decades, often been associated with aid, thus assuming some kind of direct social impact. Within our sample, we identify only 7 firms (under a third of the sample) that develop products and services that have social character, meaning that they intend to directly improve the living conditions of primarily people at the BoP. All other firms develop mostly highly technological solutions, without aiming at direct social impact.

Investors

For a first overview, Figure 3 illustrates the location of the different foreign investors engaged in financing start-ups in Kenya. Further, Table 2 provides some information and Table 3 some further descriptions on the 42 identified investors that are involved in Kenyan technology-intensive ventures in the last decade. Most of them are indeed VCs or similar equity investors – plus
some foundations, western development banks, and two MNEs. Over half of these investors (24) are located in the United States, mostly clustered in the Californian San Francisco Bay Area around Silicon Valley (San Francisco, Palo Alto, San Mateo).

Figure 3: Location of investors (outside Kenya) and investments (in Kenya)

Regarding the investments pattern visualized in Figure 5, it is interesting to see that some investors who are specialized in very particular technological fields are active in the Kenyan investment landscape, especially centered around mobile payments, digital currencies, and renewable energy technologies. The following example illustrates the case of a such a highly specialized investor.

Pantera Capital Management LLC is a San Francisco based investment management firm, which, until recently, focused on global macro hedge fund investments. Believing blockchain technology and the associated crypto-currency ecosystem to be the enabler of disruptive future applications that will fundamentally change the internet and the digital economy, they now shifted their
Table 2: Investors active in Kenya - Indicators

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
<th>Country</th>
<th>Founded</th>
<th>Type</th>
<th>Inv. Range</th>
<th>For-profit</th>
<th>For-social</th>
<th>Inv. total</th>
<th>Inv. Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peery Foundation</td>
<td>Palo Alto</td>
<td>United States</td>
<td>1978</td>
<td>VC / Foundation</td>
<td>25k-1m</td>
<td>●</td>
<td>●</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>East Africa Capital Partners</td>
<td>Nairobi</td>
<td>Kenya</td>
<td>2002</td>
<td>VC</td>
<td>15m</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HIVOS</td>
<td>The Hague</td>
<td>The Netherlands</td>
<td>1968</td>
<td>VC</td>
<td>100k-15m</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Humanity United</td>
<td>San Francisco</td>
<td>United States</td>
<td>2005</td>
<td>VC</td>
<td>200k</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sarona Frontier Markets</td>
<td>Canada</td>
<td>United States</td>
<td>1953</td>
<td>VC</td>
<td>55m</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pantera Capital</td>
<td>San Francisco</td>
<td>United States</td>
<td>2014</td>
<td>VC</td>
<td>100k-15m</td>
<td>●</td>
<td>●</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>8mph.ac</td>
<td>Nairobi</td>
<td>Kenya</td>
<td>2011</td>
<td>VC</td>
<td>25k-1.5m</td>
<td>●</td>
<td>●</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Future Perfect Ventures</td>
<td>New York</td>
<td>United States</td>
<td>2013</td>
<td>VC</td>
<td>1-30m</td>
<td>●</td>
<td>●</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Bitcoin Opportunity Fund</td>
<td>San Francisco</td>
<td>United States</td>
<td>2012</td>
<td>VC</td>
<td>250k-12m</td>
<td>●</td>
<td>●</td>
<td>6</td>
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<tr>
<td>Liberty Global Ventures</td>
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<td>United States</td>
<td>2005</td>
<td>VC</td>
<td>2-40m</td>
<td>●</td>
<td>●</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Tomorrow Ventures</td>
<td>Palo Alto</td>
<td>United States</td>
<td>2009</td>
<td>VC</td>
<td>2-40m</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Urban,Us</td>
<td>Miami</td>
<td>United States</td>
<td>2013</td>
<td>VC</td>
<td>200k-2m</td>
<td>●</td>
<td>●</td>
<td>9</td>
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</tr>
<tr>
<td>Better Ventures</td>
<td>Oakland</td>
<td>United States</td>
<td>2010</td>
<td>VC</td>
<td>20k-1m</td>
<td>●</td>
<td>●</td>
<td>10</td>
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<tr>
<td>Rethink Education</td>
<td>White Plains</td>
<td>United States</td>
<td>2012</td>
<td>VC</td>
<td>2-15m</td>
<td>●</td>
<td>●</td>
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<td>1</td>
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<td>Crypto Currency Partners</td>
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<td>United States</td>
<td>2012</td>
<td>VC</td>
<td>500k-20m</td>
<td>●</td>
<td>●</td>
<td>14</td>
<td>1</td>
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<td>Emergence Capital Partners</td>
<td>San Mateo</td>
<td>United States</td>
<td>2003</td>
<td>VC</td>
<td>500k-100m</td>
<td>●</td>
<td>●</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Savannah Fund</td>
<td>Nairi</td>
<td>Kenya</td>
<td>2012</td>
<td>VC</td>
<td>25-500k</td>
<td>●</td>
<td>●</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Invested Development</td>
<td>Boston</td>
<td>United States</td>
<td>2009</td>
<td>VC</td>
<td>500k+</td>
<td>●</td>
<td>●</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>VIICap Investments</td>
<td>San Francisco</td>
<td>United States</td>
<td>2014</td>
<td>VC</td>
<td>50k+</td>
<td>●</td>
<td>●</td>
<td>12</td>
<td>4</td>
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<td>Nokia</td>
<td>Helsinki</td>
<td>Finland</td>
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<td>MNE</td>
<td>50k-25m</td>
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<td>Cisco</td>
<td>San Jose</td>
<td>United States</td>
<td>1984</td>
<td>MNE</td>
<td>2-65m</td>
<td>●</td>
<td>●</td>
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<td>Omvestments</td>
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<td>United States</td>
<td>2013</td>
<td>Micro-VC</td>
<td>1m</td>
<td>●</td>
<td>●</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Synergy Growth</td>
<td>New York</td>
<td>United States</td>
<td>2010</td>
<td>Micro-VC</td>
<td>1-2m</td>
<td>●</td>
<td>●</td>
<td>2</td>
<td>1</td>
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<td>Oppenheimer &amp; Co., Inc.</td>
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<td>United States</td>
<td>1950</td>
<td>Investment bank / management</td>
<td>50m</td>
<td>●</td>
<td>●</td>
<td>2</td>
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<td>Stephens Investment Management</td>
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<td>United States</td>
<td>2001</td>
<td>Investment bank / management</td>
<td>1-15m</td>
<td>●</td>
<td>●</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Morgan Stanley</td>
<td>New York</td>
<td>United States</td>
<td>1935</td>
<td>Investment bank / management</td>
<td>5m-1b</td>
<td>●</td>
<td>●</td>
<td>11</td>
<td>1</td>
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<td>Startupbootcamp</td>
<td>London</td>
<td>United Kingdom</td>
<td>2010</td>
<td>Incubator / Accelerator</td>
<td>15-100k</td>
<td>●</td>
<td>●</td>
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<td>United States</td>
<td>2009</td>
<td>Incubator / Accelerator</td>
<td>50k-2.5m</td>
<td>●</td>
<td>●</td>
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<td>Chile</td>
<td>2010</td>
<td>Incubator / Accelerator</td>
<td>40-100k</td>
<td>●</td>
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<td>Kenya</td>
<td>2003</td>
<td>Foundation</td>
<td>250k</td>
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<td>United States</td>
<td>1950</td>
<td>Foundation</td>
<td>500k-50m</td>
<td>●</td>
<td>●</td>
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<td>CDC Group</td>
<td>London</td>
<td>United Kingdom</td>
<td>1948</td>
<td>Development bank</td>
<td>5-350m</td>
<td>●</td>
<td>●</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>KFW</td>
<td>Frankfurt</td>
<td>Germany</td>
<td>1948</td>
<td>Development bank</td>
<td>500k-50m</td>
<td>●</td>
<td>●</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>International Finance Corporation</td>
<td>Washington</td>
<td>United States</td>
<td>1956</td>
<td>Development bank</td>
<td>3-650m</td>
<td>●</td>
<td>●</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Africa Angels Network</td>
<td>Johannesburg</td>
<td>South Africa</td>
<td>2014</td>
<td>BA / Micro-VC</td>
<td>3m</td>
<td>●</td>
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<td>Peery Foundation</td>
<td>Invests in early to mid-stage social entrepreneurs who are effectively addressing the issues of poverty. Also does grants for social impact projects.</td>
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<td>East Africa Capital Partners</td>
<td>Technology, media and telecommunications sector focused Venture Capital Fund Manager investing in the greater Eastern Africa region.</td>
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<td>HIVOS</td>
<td>Venture Capitalist that also does grants for social impact projects.</td>
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<td>Humanity United</td>
<td>Micro VC doing seed. Is committed to building a world where modern-day slavery and mass atrocities are no longer possible.</td>
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<td>Sarona Frontier Markets</td>
<td>VC and PE investor in frontier and emerging markets.</td>
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<td>Pantera Capital</td>
<td>Investment firm focused exclusively on Bitcoin, other digital currencies and companies in the space.</td>
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<td>Future Perfect Ventures</td>
<td>Early stage venture capital fund partnering with entrepreneurs who are humanizing data.</td>
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<td>Bitcoin Opportunity Fund</td>
<td>Bitcoin Opportunity Fund is an investment vehicle for bitcoins and 20 bitcoin-related companies.</td>
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<td>Liberty Global Ventures</td>
<td>Global investment fund owned by Liberty Global, the largest cable company outside of the U.S.</td>
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<td>Tomorrow Ventures</td>
<td>Opportunistic investment firm with a focus toward seed and early-stage venture capital investments that develop innovative ideas that have the power to change the way people live, interact, and thrive.</td>
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<td>UrbanUs</td>
<td>Seed investor and advisory network for startups that are helping solve urban challenges in areas such as transportation, mobility, sustainability, governance, and public safety.</td>
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<td>Better Ventures</td>
<td>VC and accelerator. Funding and support to technology startups building innovative solutions to big and important problems, from work and education to health and sustainability.</td>
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<td>Rethink Education</td>
<td>Venture capital fund focused exclusively on education technology that invests in early- and growth-stage start-ups.</td>
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<td>Crypto Currency Partners</td>
<td>Professional investors and entrepreneurs driving innovation in the blockchain ecosystem.</td>
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<td>Emergence Capital Partners</td>
<td>Leading venture capital firm focused on early and growth-stage enterprise cloud companies.</td>
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<td>Savannah Fund</td>
<td>Seed capital fund specializing in early stage high growth technology (web and mobile) startups in sub-Saharan Africa. Initially focused on East Africa, the fund aims to bridge the early stage/angel and venture capital investment gap that currently exists in Africa.</td>
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<td>Invested Development</td>
<td>Invest in seed-stage startups in emerging markets. Yet also provides growth capital. Targets technology solutions to the world's biggest problems, impact investment.</td>
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<td>ViICap Investments</td>
<td>Dedicated to investing in global entrepreneurs &amp; offering investors a portfolio of companies addressing social &amp; environmental challenges.</td>
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<td>Nokia</td>
<td>MNE engaged in the manufacturing of mobile devices, network infrastructure, location-based technologies, and advanced technologies businesses.</td>
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<td>Cisco</td>
<td>US origin MNE that designs, manufactures and sells networking equipment.</td>
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<td>OnInvestments</td>
<td>BA / Micro VC that does Seed Investments.</td>
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<td>Synergy Growth</td>
<td>Micro VC that does Seed Investments.</td>
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<td>Oppenheimer &amp; Co., Inc.</td>
<td>Investment bank and full-service investment firm that provides financial services and advice to high net worth investors, individuals, businesses and institutions.</td>
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<td>Stephens Investment Management</td>
<td>Financial investments: Hedge Funds, sector-focused Venture Funds, an Income Fund, a Real Estate Fund, a Fund-of-Funds, and private company Direct Investments.</td>
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<td>Morgan Stanley</td>
<td>Morgan Stanley Venture Partners manages a group of private equity funds which invest in high growth companies, concentrating on the technology and health care industries.</td>
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<td>Startupbootcamp</td>
<td>Global network of industry-focused startup accelerators that provides investment and mentorship services.</td>
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<td>MassChallenge</td>
<td>Accelerator doing grant investments. Largest-ever startup accelerator and competition.</td>
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<td>Start-Up Chile</td>
<td>Program of the Chilean government to attract high-potential entrepreneurs to bootstrap their startups in Chile.</td>
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<td>Safaricom Foundation</td>
<td>Foundation provides a formal process for charitable contributions to communities, community groups and NGOs in Kenya.</td>
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<td>Knight Foundation</td>
<td>Supports transformational ideas that promote quality journalism, advance media innovation, and engaged communities.</td>
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<td>CDC Group</td>
<td>The UKâ€™s Development Finance Institution (DFI) wholly owned by the UK Governmentâ€™s Department for International Development.</td>
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<td>KFW</td>
<td>Promotional bank under the ownership of the Federal Republic, support to encourage sustainable improvement in economic, social, ecological living and business conditions.</td>
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<td>International Finance Corporation</td>
<td>Fosters sustainable economic growth in developing countries by financing private sector investment, mobilizing capital in the international financial markets, and providing advisory services to businesses and governments.</td>
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<td>Africa Angels Network</td>
<td>Invests in Africa-focused startups, primarily in the Tech sector.</td>
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investment focus completely to this area.

Their investment portfolio includes new solutions to encrypt, secure, transfer, and trade crypto-currencies, but also the integration of crypto-currencies in mobile payment and the like. Examples from their investment portfolio are the bitcoin social media microtransaction platform “Changetip” and “Bitpesa”, a Kenyan emittance platform that employs the bitcoin payments system to offer an easy way to send money to East Africa. Prior to founding Pantera Capital in 2003, CEO Dan Morehead worked in a leading position at Atriax, an electronic foreign exchange platform.

In line with our classification provided in section 3, we distinguish between for-profit and non-profit oriented investors. While the for-profit investors mainly consist of VCs and investment banks or capital management firms, in the non-profit sector we find mainly charitable foundations and two European development banks (the German KFW and the UK CDC). Yet, we find that this classification is not fully capturing the rationales of investors in our sample. While non-profit investors, almost by definition, focus on the social impact rather than the economic profits of their investments, the opposite is not necessarily true for for-profit investors. Among the most active for-profit investors in our sample, we find organizations which highly emphasize the social impact of their investments. Furthermore, we find some mixed for- and non-profit investor-constellations, like grant-awarding foundations that are associated with a for-profit investment firm, or venture capitalists that also award grants. Therefore in Table 2 we also distinguish between firms that place a high (though not ultimate) emphasize on the social impact and not only on the profitability of their investments, independent of their legal form. We identify such firms by their governance structure, profile of their investment portfolio as well as their mission statements. The following example provides an illustration of such a mixed for- and non-profit investor.

**VilCap Investments, LLC** is a San Francisco based for-profit venture capital investment fund associated with the non-profit organization “Village Capital”, a business incubator and accelerator. Village capital trains early-stage ventures tackling major global problems in agriculture, education, energy, financial inclusion, and health in intensive training programs around the world. These acceleration programs are designed as problem-based, meaning they focus on specifically announced problems which have to be tackled by the participants. Examples are “Edupreneurs to reduce the education gap in India” and “Leveraging ICT and web-technology to solve urban challenges of Nairobi”. “VilCap Investments” in turn invests in the top peer-ranked company of the 35 programs executed in nine countries (among others in Taiwan, India, Kenya, and Tanzania) so far, where the amount invested ranges from 25.000 to 2.5 million USD. For their combination of non-profit social-impact and for profit economic impact, Village Capital
was awarded with the Harvard Business Review/McKinsey M-Prize for Management Innovation in 2013. Their current investment portfolio includes AsthmaMD which gathers anonymous asthma data to facilitate asthma detection and intervention research, and Futurepump—a Kenyan company that develops low-cost solar-powered irrigation technologies for one-acre farmers (see minicase above).

**Aggregated Interplay: Investments and Investors**

Figure 4 visualizes the aggregated investment patterns in our sample, with investor types on the left and classified investments on the right. The graph exhibits the extent to which various types of investors support certain types of ventures, according to our classification. It is obvious that there is a bias towards for-profit investors in the CB dataset, however, it is an interesting observation that almost half of these investors have a strong social impact focus.

Comparing the magnitudes of investments flows, we can see that the largest ones are the investments of socially oriented for-profit organizations into ventures that leverage local or mixed competences. The support of these investors is stronger for companies that to a higher extent address developing needs. The largest flow is, however, the one between conventional for-profit investors and companies that target advanced needs, combining local and global competence bases.

**Figure 4: Alluvial Diagram: Investor type - Investment type intensity**

In Figure 5, plot a network between start-ups and investors, where we
again highlight the interplay between non- and for-profit investors with the competences applied and needs served by the investment targets. It primarily illustrates again that profit oriented investors such as VCs primarily target start-ups which serve global (advanced) needs, and apply local or a mix of local and global knowledge and competences. Further, we clearly see profit oriented investors and correspondingly start-ups with products and services to supply a global market to be in more central positions, while the less interconnected non-profit investors tend to be located in the periphery.

5 Discussion

In the previous section, we analyzed recent investments in Kenyan start-ups, which we categorized according to the nature of capabilities, skills and knowledge applied, and the needs and thereby potential markets they might serve. Within the data we can identify a number of Kenyan technology start-up cases that became success stories, generating “high-quality” employment opportunities, income, and have attracted international attention and investments. In this section, we take stock of what we observed, provide what we believe to be a helpful taxonomy of investments and investors in LICs in order to set a foundation for further investigation, and raise open questions to be addressed in future research.

A proposed classification of investments and investors in LICs

When comparing historical finance flows towards SSA, as depicted in our background section, with current activities illustrated in our analysis, we see stark differences regarding their qualitative characteristics. We here focus on the differences between the origin of applied knowledge and capabilities, as well as the potential to serve local or global markets. In particular, we contrast current technology and growth oriented investments mainly carried out by VCs with previous ones, commonly showed aid characteristics (meaning they prioritizing social over economic impact) and/or where based on models, logic, and knowledge “imported” from advanced countries. While there is nothing wrong with aid and the associated focus on the social impact of investments as such, a predominance of aid-like investments clearly signals either the perceived lack of attractive for-profit investment targets or strong barriers (institutional, regulatory, cultural, etc.) for such activity.

Equally, a high share of investments applying external knowledge (FDI by MNEs) indicates a perceived lack of local capabilities. Competitive international VC investments in Africa may mark a turning point in the perception of business opportunities in sub-Saharan countries. This new mode of investment activity signals the existence of attractive for-profit investments which
Figure 5: Investment network between Kenyan firms and their international investors.

Note: Gray nodes are other connected organizations (co-investors and investments outside Kenya), which influence the networks structure but are not analyzed in detail in this study. The size of the nodes is determined by their degree centrality.
often utilize local capacity, and may have the potential to become competitive on global markets. Up to now, one dominant perception was that the world has to solve SSA’s problems; we now see the opposite begin to emerge.

To sum up, we find foreign investments in low-income economies to mainly differ in three dimensions. First, from a knowledge perspective we distinguish between investments that target the utilization of local (indigenous) or investments that are mainly based on foreign knowledge, skills, and capabilities. Finally, from a market perspective, the purpose of such investments can be either to meet local or global needs and therefore markets. With local, in this case we simply distinguish between the needs associated with resource-constrained and infrastructure-poor low-income countries, while global ones are the needs and markets of advanced mid- and high income economies. Here, overlaps are possible in a way that products and processes developed to solve problems in a local low-income context over time prove to be also suitable to meet the demands of mid- and high-income economies.

Figure 6 provides an illustration of the discussed dimensions and resulting taxonomy of investments in SSA, and more generally low-income countries.
Certain combinations of states in these dimensions can be expected to be more or less interesting for particular types of investors. Obviously, investors like foundations, NGOs, and private philanthropists will favor social over economic impact of their investments, and most professional investors and private enterprises may focus on the opposite. Investors aiming at “doing good” will target investments solving the needs of LICs, while investors with particularly high profit aspiration, such as VCs, will prefer investments that are able to address needs—and therefore markets—with high margins, hence advanced economies. While activities of social impact investors indicate the perceived global need to support the development in SSA, profit oriented investors tapping into Kenyan capabilities can be interpreted as a sign of promising local technology intensive entrepreneurship. Furthermore, the activity of such investors and the associated supply of risk capital might lead to further demand for it—signaling local entrepreneurs of possibilities to get such ventures financed. However, without initial demand for VC investments, meaning the existence of high potential technology intensive entrepreneurship, neither the activity of international VCs nor the emergence of a domestic VC industry is likely to occur (Avnimelech et al., 2006, Avnimelech and Teubal, 2008).

What such investments have in common is that the products, facilities, or practices they create are based on knowledge and capabilities developed in advanced economies, and then are more or less adapted to the local (low income) context. When NGOs provide medical supplies or set up education centers as part of an aid program, or MNEs set up production factories for profit reasons, the organization is often guided by the logic of advanced (western) economies with the implicit assumption that the receiving countries neither have the resources nor capabilities to manage such projects on their own. For all that, the latest developments indicate that investors started to target activities that aim to utilize local knowledge developed in a low-income context.

Following the assumption that low-income economies very well possess the capabilities to tackle their own problems but lack the resources to do so, profit as well as non-profit oriented investors started to search for creative ideas developed inside SSA to either tackle local social problems and/or provide products and services. Business accelerators such as the San Francisco based Village Capital or The Aspen Network of Development Entrepreneurs are examples of such organizations that identify and, in different ways, support upstarts in developing countries around the globe.

Yet, there are also first indicators that such local developments eventually prove as well-suited for developed markets. In other words, the limiting conditions of such environments such as low purchasing power and lack of infrastructure and resources might, in some cases, ultimately be enabling factors triggering creative solutions for global markets.

Open questions, and a proposed research agenda

In this exploratory analysis of the emerging entrepreneurial ecosystem of Kenya, and the current involvement of global VCs, we emphasize the interaction between start-up characteristics and investor rationales, and highlight the substantial shift investments in SSA and particularly Kenya have undergone during the last decades. This phenomenon clearly is worth further investigation and raises a set of related questions:

i What created the conditions for such technology intensive entrepreneurial activity and their recognition by the international VC and tech-investor community?

ii What are the implications of international VC presence in Kenya? And related to that point:

iii How can policy support and shape this development?

In this study, we aim at identifying and characterizing various types of international finance flows into technology-intensive start-ups in Kenya, and fully answering the above questions is probably beyond its scope. Nevertheless, in the following we attempt to provide some first intuition.

First, what triggered the emergence of entrepreneurial, technology intense clusters in Kenya? We know from the literature on innovation systems (e.g. Carlsson and Stankiewicz, 1991, Lundvall, 1992, Nelson, 1993) that such innovation capacity does not emerge in a vacuum, but is nurtured by-and grown through-interaction with customers, suppliers, and the public sector. In fact, we see a set of policies put into place in this century, aiming at facilitating the development of the Kenyan ICT sector. For instance, the national ICT Strategy issued by the government in 2006 places particular emphasis on unleashing the enormous potential of this industry through privatization of telecommunication and infrastructure investments (MoIC, 2006, Zavatta, 2008). Furthermore, the new Kenyan constitution approved in 2010 includes bill of rights provisions on fundamental rights and freedoms of access to, and use of, information and communication infrastructure and content (MoIC, 2011, Waema and Nd’ung’u, 2013). The resulting increase in the national, as well as the international, private sector activity of network operators has generally stimulated the ICT sector, but more importantly triggered the building up of ICT infrastructure and the associated improvements of stationary and mobile access to telecommunication and the internet. Furthermore, increased diffusion of electronic devices, such as mobile phones, leads to growing market and impact possibilities for ICT businesses as well as “learning by using” among the population, and user-producer interaction. Together

11 The activity of foreign firms in SSA has shifted strongly towards technology, information, and media related sectors during the last decade (Young and Ernest and Young, 2014).

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with increasing quality and quantity of general university (Gudo et al., 2011), and particularly ICT related education (Kinuthia, 2009) in urban Kenya, this seems to have led to a critical mass of knowledge and capabilities for such sectors to emerge. Our intuition – supported by a growing body of literature (Bramann, 2017, Drouillard et al., 2014, Gathigi and Waititu, 2012, Kelly and Firestone, 2016, Marchant, 2015, World Bank, 2016) – is that recent developments within ICT have begun to enable African entrepreneurs to come up with sophisticated technological solutions to problems, their societies are facing. This makes these solutions attractive for the world market as they can be used context-independently - “If it can work in Africa - It can work anywhere”.

This leads us to the second question, what are possible implications of increasing foreign VC activity for Kenyan technology-intensive entrepreneurship and the economy as a whole? It has been highlighted (eg. Zavatta, 2008) that when turning these competences into practice, Kenyan startups and SMEs–particularly in the ICT sector–face high barriers in raising capital (Bramann, 2017). Traditional banks are wary of lending to SMEs and demand heavy securitization of personal assets in risky and not fully understood sectors, while newer financial instruments such as microfinance usually offer small amounts of capital and/or target other sectors. Yet, firms in the digital economy require relatively low upfront investments as compared to manufacturing industries, and have the added bonus of running business models that are highly scalable. This configuration has proven manifold in other places that it very well fits the model of venture capital which provides equity-based finance of risky but potentially high-growth enterprises. Venture capital investment schemes have neither proven to be the holy grail of industrial and innovation policy, nor a necessary condition for the establishment of vibrant high tech sectors. For all that, a large body of evidence from developed countries demonstrates that, given the proper institutional setup, the activity of VCs not only promotes innovative activities in general (Kortum and Lerner, 1998, 2000, Samila and Sorenson, 2010, 2011), but also provides additional value-added support to enable innovative products or services to be rapidly brought to market (Black and Gilson, 1998, Bygrave and Timmons, 1992). The main contribution to innovation attributed to VC activity can be summed up into three components: First, they influence the selection environment by shaping capital markets in favor of growth-oriented but risky perceived ventures.

Second, they add value to the invested companies by managerial support.

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12 Erik Hersman, co-developer Ushahidi, TED talk 2009
13 For instance, countries such as Korea or Finland have managed a rapid catching up in technology based sectors not based on VC or similar types of investments at all. Further, VC has shown to be not well suited for industries that are very capital intense in upfront and scaling-up investments, as well as for such industries with slow and steady as opposed to very rapid growth opportunities.
And third, they introduce the supported venture to their usually well-developed networks of firms, other finance sources and facilitating business services (Baum and Silverman, 2004). Thus, local activities by international VC not only provided an extra inflow of capital, but also of financial, technological, and business expertise, triggering learning opportunities on multiple levels. Besides the learning opportunities through direct interaction with the investment targets, co-investments with domestic investors also contribute to competence building for best practice among financial intermediaries (Avnimelech et al., 2006, Avnimelech and Teubal, 2008). Further, interaction between venture capitalists and domestic authorities facilitates institutional reforms (Saxenian and Sabel, 2008).

Finally, what made Kenya an appealing investment target for top-tier Silicon Valley VCs and other international tech-investors, and how can policy facilitate further advances in this direction? The attraction of foreign VC investments, as well as the creation of flourishing domestic VC markets, has become an integral goal of recent innovation-related public policies in developed and emerging economies alike (Beck et al., 2008, Kortum and Lerner, 2000). Such attempts showed varying success (Cumming, 2010, 2011) and illustrate that there exists no Silicon Valley blueprint that can be transferred to a different economic and institutional context without adaptation. Yet, some developed and also emerging economies such as Israel (Avnimelech et al., 2006), Brasil (de Lima Ribeiro and de Carvalho, 2008), Taiwan (Saxenian and Sabel, 2008), India (Dossani and Kenney, 2002), and China (Xiao, 2002), succeeded in the development of a vibrant venture capital industry from scratch. Lessons learned from successes and failures alike are that policies that jointly tackle supply/demand for high tech finance and encourage cooperation between local and foreign investors prove to be the most efficient (Avnimelech et al., 2006, Avnimelech and Teubal, 2008, Hain et al., 2016).

We also believe that findings from studies in advanced economies about the positive effects of knowledge intensive business services (KIBS) on the countries’ innovation systems (see e.g. Muller and Zenker, 2001), may be true in developing countries. As MNEs—especially from Asia—begin to integrate African companies and subsidiaries into their global value chains, it becomes important for the countries to find out how they can increase their gains from these collaborations. Having the capacity to provide advanced services is likely to increase potential benefits from MNEs presence. Furthermore, scholars within the GVC tradition have found that clustering and interaction between companies in the developing world is likely to improve the competitiveness of enterprises in international markets (Giuliani et al., 2005). One aspect that many of the investors in our sample have in common is the strong wish to increase interaction on many levels. Take for instance VilCap’s “Innovations for Agriculture 2014” challenge that brought together Kenyan entrepreneurs, working with agriculture innovations. There are also many other examples of international network building, fostered by these
new investors. In addition to the positive effects attributed to the growth of supported companies, their products and services, and the capacity increasing VC activity in general, the backed technology-intensive start-ups in SSAs are likely to have positive spillover effects on other sectors. Many of the companies in our sample are providing IT-based business services, which can benefit local manufacturing or retail enterprises, allowing them to offer more sophisticated services.

The implications for policy that can be derived from these observations would be twofold: First, it appears imperative that states provide the necessary conditions for the development of modern communication infrastructures, by actively investing in their construction and maintenance or by providing a favourable and stable institutional setup for private providers. Secondly, policies should acknowledge the potential of the emerging digital entrepreneurship and support the activities of technology hubs, as well as wider network formation. This may facilitate access to resources that are often lacking and in the same time further legitimize entrepreneurship as a career choice (Bramann, 2017). It is argued that the drive to modernization in independent Africa led to experimentation with development models which were borrowed from outside. Most of the experiments failed as they did not seek African solutions to African problems (Hyden and Others, 1990). Therefore it is argued that outside interventions should build on Africa’s internal dynamics and institutions to develop alternative strategies.

6 Conclusion

This paper presents, looking at the case of Kenya, an emerging entrepreneurial ecosystem in a context that yet has not received much attention by research. Its main aim was to identify and characterize new types of (mainly non-aid-character) international finance flows into technology-intensive start-ups that can contribute to competence building and sustainable development in less developed economies in the global South.

While there exists a rich body of research on micro- and macro-causes and consequences of FDI and foreign aid, as well as an emerging literature on micro-finance and its impact, venture capital investments into tech-start-ups is a rather new and unstudied phenomenon in the developing world.

It is also among the first to exploit the rich information and graph-based structure of the CrunchBase dataset, and to the best of our knowledge, the first to utilize it to explore technological investments in an economically less-developed context.

We observe that there is a new type of mostly young investors that support innovative ideas in sub-Saharan Africa and, as we can see in the extended dataset–that we collected but do not analyze in detail in this paper–also in
other parts of the global South. In many cases the financial investment is accompanied by intensive technical and business support; some of these investors are actively building up networks and connecting supported companies. This scenario is new for companies and institutions in sub-Saharan Africa and gives rise to many research questions.

This exploratory study aims to shed light on the currently emerging entrepreneurial ecosystem of Kenya, and its interaction with global sources of capital. However, this first attempt to explore an emerging phenomenon is subject to a number of limitations. First, the complex hybrid nature of organizations makes it difficult to classify investors and their targets. Desk research and evaluation of internet/social media appearance of the organizations should be supplemented with surveys and expert-based evaluations in future versions and extensions of this study.

Second, in this study we assume that the interaction between investors and start-ups leads to learning and capacity building, as is mostly the case in advanced economies. Yet, it cannot be ruled out that western business practices and other knowledge is not suited for these start-ups. In-depth research about the interaction between the investors and funded companies would shed light on that. Equally, understanding the interplay between investors, local institutions, and regulations could provide valuable insights for innovation policy.

More generally future research may target this new types of investors. Not only do we for the first time see risk capital investors from advanced economies targeting innovative, often high-impact projects in SSA, but we also identify cases of new selection mechanisms and financial instruments applied. Our mapping of the investor-enterprise network suggests that a further exploration of the co-investment patterns might reveal the interaction patterns between the investors. Such an exercise is likely to shed light on the development and diffusion of new business and funding models to finance innovation in less developed countries. Likewise, a more thorough mapping of funded enterprises in less developed countries can reveal a more clear picture of the different types of ventures and technologies that are recently emerging in less developed regions around the globe.

In many cases, personal networks play an important role in the development of ventures. In our sample, we can see that some of the company founders have received education in the US—particularly in the Bay Area. We can only speculate as to whether the investments into their companies by Silicon Valley investors are related to their personal networks. Plaza and Ratha (2011) pointed out the importance of the diaspora for the development of African countries, among others the role of migrant networks for international investment. So-called “returnees” that start up business in Kenya bring technical knowledge and their personal and professional networks. Analyzing these networks could be a way to identify key actors.

The graph data structure of CB is well suited for these kind of studies. In
addition, it can easily be linked to other data sources. The microblogging service Twitter, which is very popular in the corporate world in the US and—due to its lean structure—increasingly used in many less developed countries, can be used to enrich the CB data. It can also be utilized to identify additional important actors and connections. Techniques from natural language processing (NLP), such as entity extraction (cf. Jurowetzki and Hain, 2014), can be applied additionally to map interaction patterns between companies, technologies, institutions, and persons from unstructured text data available online.
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