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**Transformation towards sustainable development goals:
Role of innovation ecosystems for inclusive, disruptive advances
in five Asian case studies**

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Transformation towards Sustainable Development Goals: Role of innovation ecosystems for inclusive, disruptive advances in five Asian case studies

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Abstract

The transformation of sociotechnical systems is considered necessary for achieving the Sustainable Development Goals (SDGs). However, this transformation process is inhibited by institutional inertia of the public sector, vested interests of the private sector, routine habits of individuals, and increased complexity of globalised activities. While policies to stimulate the transition exist, these policies and pathways are still considered insufficient. Meanwhile, there are many individual private initiatives taking place to advance the societal agenda. Although these are still isolated actions of new actors, they have the potential to become broader movements bringing disruptive advances through innovation. This study explores the potential of innovation ecosystem to understand the emerging private sector initiatives to meet social agenda through innovations that are disruptive and inclusive. Four types of businesses are examined: venture capital, an incubator, venture start-ups, and a social impact fund. A common feature underlying these cases are the creation of tailored innovation ecosystems that effectively utilises complementary assets. Currently these activities are self-generated without much government support. However, by aligning with public policy impact can be accelerated towards achieving the SDGs. Examining cases as ‘signals’ provide hints for how policy can be formulated to scaled-up and transform currently isolated private initiatives.

Keywords: Innovation Ecosystems, SDGs, Emerging business, Complementary assets, Transformative change, Asia

JEL CODE

O35 Social innovation, O38 Government policy; M13 New firms and start-ups

1. Introduction

In 2015, United Nations member states adopted the 2030 Agenda for Sustainable Development, which outlined Sustainable Development Goals (SDGs). Under these targets, nations aim to create new pathways toward sustainable development while leaving no one behind. Science, technology, and innovation (STI) are expected to play critical roles in this process and to initiate transformation (TWI2050, 2020; Schot and Steinmuller, 2018). However, existing studies indicate that current policy instruments are insufficient for achieving the magnitude of transformation needed in the expected timeframe. While policy-led transformation is limited in its efficacy, many private initiatives are already taking place in meeting the societal challenges

through innovation that is both disruptive and inclusive¹. These initiatives employ emerging technologies by devising new business models and leveraging the complementarities of innovation ecosystems. Innovation ecosystem is an idea referenced in business management and innovation policy literature to express the loosely structured groups of actors to jointly act to generate focal value. (Adner, 2016).

This paper proposes that innovation ecosystems led by the private sector can be complementary to policy efforts to achieve the SDGs. In emerging economies, functioning ecosystems are often lacking. The private sector can bring innovative models to fill these ecosystem gaps and advance businesses with a significant and sustainable impact on society. The ways in which businesses have extended value networks through complementarities is important not just for creating value but also for capturing innovations (Teece, 2018). The role of government, in this context, is to create conducive environments for disruptive business activities with social purpose so that they can become the drivers of change. This paper references selected cases of successful private initiatives employing disruptive, inclusive innovation for societal impact. Their success facing new, blue ocean customers in emerging economies can help to understand effective means to stimulate such activities via policy.

Section 2 of this paper reviews the literature to formulate the conceptual framework. Section 3 explains the conceptual framework. Section 4 refers to the result of case studies. Section 5 offers discussion and conclusions and sets out the limitations and future research challenges.

2. Review of related concepts

2.1 Transformational innovation and its challenges for SDGs

¹ Disruptive and inclusive innovation is explored more in detail in Iizuka and Hane(2020).

The transformation is considered inevitable for achieving the SDGs (TWI2050, 2020; Schot and Steinmeuller, 2018; UNCTAD, 2014). While recognised as essential, initiating transformation is difficult owing to path dependency constituted of institutional inertia by incumbent actors with vested interests and consumers and users with habits and routines (Scott, 2015). These inhibiting factors, at distinctive levels, result in maintaining the system in its status quo. In addition, the globalisation of economic and social activities that has occurred in past decades has created intricate webs of activities, making transformation a complex process. In particular, such process obliges the Global North and the South to collaborate to deal with global agenda (Schot and Steinmeuller, 2018).

Several studies have pointed out that existing policies are insufficient to initiate transformation. These studies have claimed that while some policies can positively encourage change (e.g., feed-in tariffs and carbon taxes), very few actively destroy the existing systems to facilitate transitions (Kern et al., 2017; Kivimaa and Kern, 2016; Rogge and Reichardt, 2016; Turnheim and Geels, 2012; Weber and Rohracher, 2012). This means that unless there are substantially advantageous (i.e. simple, low cost, superior, and universal) alternatives offered to individuals and society at large, transformation is difficult to take place (Franken, 2017). Indeed, existing policy instruments, such as subsidies for eco-products and public procurement for large infrastructure, aim at encouraging change from the demand side. However, these public initiatives have had limited results so far due to transformative failure that consists of failure to: identify the future trajectory (directionality), articulate demands (demand articulation), coordinate beyond conventional boundaries (policy coordination); and self-evaluate and correct (reflexivity) (Weber and Rochracher, 2012). This makes it imperative to collaborate closely with private (or non-public) actors to offer distinctively new innovative solutions—disruption—to change potential users' behavior with inclusive outcomes. In addition, there are

increasing numbers of businesses and private initiatives that place societal purpose as one of their core objectives.

For instance, the following aspects have emerged independent of government interventions:

- 1) Emerging business actors aiming to solve societal problems². E.g. social entrepreneurs, start-ups, and VC firms seeking social returns in addition to economic returns;
- 2) New types of financial resources focused on returns beyond pecuniary value. E.g. ESG (Environment, Social and Governance) finances, impact investment, and crowdfunding for social causes;
- 3) Open knowledge appropriation tools and mechanisms that allow sharing for public purposes. E.g. creative commons licenses, open and free source movement, and copy left³.
- 4) Rules, regulation and guidelines beyond existing boundaries of countries, disciplines and sectors to advance social agendas. E.g. international standards addressing environment and social and ethical issues, including environmental certification (eco) and social labelling, sustainable and ethical business codes of conduct, such as fair trade⁴.
- 5) New governance methods allow experimentation for positive transformation⁵. E.g. regulatory sandboxes, regulatory pacing (Marchant et al., 2011), agile governance (WEF, 2019), use of virtual reality simulations for participatory or open policy making, crowdsourced policy making, public-private data sharing, open science.
- 6) New business models enabled by emerging (mostly digital) technology. E.g. peer-to-peer sharing service models, customised and decentralised small lot production (makerspaces & fablabs), decentralised (off grid) power generation, financial inclusion using mobile phones (e.g., M-Pesa and Go-pay) with accompanying e-commerce services.

Above are isolated dots of actions but these are gradually transforming the core principles of how private actors behave. For instance, the UN's Principles of Responsible Investment (PRI) that defines social and environmental factors as important areas for consideration in investment decisions is now changing the idea of responsibility of trustees, which have traditionally obliged them to focus only on financial return. Similarly, the dominant role of the government in

² For instance, Zebra Unite, numbers of prescriber for PRI (Principle of responsible investment), emergence of concept of shared values (Porter and Kremer 2011), valuing stakeholders than shareholders statement by Business Roundtable in 2019. <https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans>

³ Copyleft, distinguished from copyright, is the practice of offering people the right to freely distribute copies and modified versions of a work with the stipulation that the same rights be preserved in derivative works created later.

⁴ Includes Corporate Social Responsibility (CSR), Principle of Responsible Investment (PRI, 2009), Triple Bottom line (1994), Creating Shared Value (CSV) (Porter and Kremer, 2011, 2016) among others.

⁵ In some countries, regulatory sandbox is introduced as government policy but here, it is mentioned as generic terminology.

selecting ‘the right’ technology, products and services prior to commercialisation for the benefit of citizen is also at stake. Increasingly citizens are taking part in expressing their needs and are involved in governing STI policies. Governments have also started adapting agile forms of regulatory formulation introducing experiments such as regulatory sandboxes. The above ‘signals’ indicates that, in a short space of time, these isolated efforts are being connected to manifest transformation in paving the road toward SDGs (Schot and Steinmueller, 2018). The transformation may occur more rapidly in the Global South than the Global North owing to the potential benefits of overwriting the inhibiting factors, namely, regulation, institutional inertia, vested interests, and habits being far greater than the potential risk.

The key to the transformation is not just to focus on generating new knowledge, but also on generating positive externalities via collaboration with external actors (Prahalad and Mashelkar, 2010). Here, the innovation ecosystems and complementary assets are considered to play an instrumental role (Teece, 1986; Gawer and Cusumano, 2014). These may also address the challenges identified in the framework of national innovation systems (Chaminade et al, 2018).

In this study, particular attention was given to initiatives that were both inclusive in their engagement of all societal levels as well as disruptive, with greater possibility for accelerating transformation. By inclusive, we are guided by the work of Mashelkar and Pandit (2019) who uses the operational concept of ASSURED innovation. The seven elements of ASSURED innovation are 1) affordable, 2) scalable, 3) sustainable, 4) universal, 5) rapid, 6) excellent, and 7) distinctive. These characteristics are critical for creating products and services that can solve societal problems and will be accessible to a large population.

Regarding disruptive innovation, we consider this to be forms a new market and value network that generates disruption and eventually replaces existing markets, firms, products, and alliances (Bower and Christensen, 1995; Markides, 2006). The disruption is generated as the outcome of innovation or subsequent generation of value chains and customers adapting to the new context (Bower and Christensen, 1995, Christensen et al., 2006)

2.2 Transition of Science, Technology and Innovation (STI) policy

It has been widely accepted that STI policy had gone through three frames (Schot and Steinmeuller, 2018). The first framing (1950s-1980) viewed science and technology in the linear formation following the economic growth model (Kuznetz, 1973) that focused on the importance of R&D and science-based industry to sustain improvement in factor productivity for prosperity. The second framing (1980s-2010) emerged with the realisation that attention to science and technology alone was not sufficient for economic growth and upgrading productivity and commercialisation. In the second framing, the systems of innovation became the critical frameworks for policy (Freeman, 1988; Nelson, 1991; Lundvall, 1992). These pay attention to innovation that can also take place without science and technology (ST) in which the firms play the central role in generating and transforming the codified and intangible knowledge (Cohen and Levinthal 1989; von Hippel, 1994; David 1975, Gibbons et al, 1994; Nonaka and Takeuchi, 1995). In fact, this realisation made important contributions to the understanding of the catching up process, especially through learning and incremental improvements, in many developing countries (Lundvall, 2009; Lee and Lim, 2001; Kim, 1998; Lee and Malerba, 2020; Klein and Rosenburg, 1986). Here the policies that facilitates collaboration of firms to generate knowledge, such as university-industry collaboration (Etzkowitz and Leydesdorff, 1997) as well as open innovation (Chesbrough, 2003) are

considered effective in generating innovation. The innovation systems is considered as the useful focusing device in coordinating interaction between the stakeholders (resolving coordination failure).

The third frame (2010s-) is said to deal with transformative change, coming from the understanding that a sustainable future is not possible just by the extending current trajectories but requires fundamental transformation in existing socio-technical systems (Schot and Steinmeuller, 2018). This calls for overcoming transformative failure (Weber and Rochracher, 2012). The innovation systems still serve as the focusing device for policy formulation but complementary frameworks become necessary as networks go beyond the conventional boundary of country and sector due to globalisation of firm activities, diffusion of digital technology and accompanying disruptive businesses models. This view coincides with the claims that suggest the limitation of national innovation systems in dealing with globalisation⁶, disruptive change and social disparity (Chaminade et al, 2018; Iizuka, 2015; Lundvall, 2009).

Several frameworks are already being explored to deal with transformation. There are functions of the innovation systems (Berkgek et al, 2008; Hekkert, et al, 2007) and the multilevel perspective (MLP) or sociotechnical transitions approach (Geels, 2002, Geels and Schot, 2007; Ripand Kepm, 1998). Both provide deep insight to the policy formulation when specific focus are determined; however, these approaches, by spotlighting the subject of study, have danger of omitting the potential actors or activities present elsewhere that may serve critical linchpin to new areas of activities via complementarities. This suggest the need for understanding on more open and loosely structured framework that allows more adaptive networks following the argument of complementary asset (Adner, 2006; Teece, 1986).

⁶ For globalization, the attempts were already made with NIS and GVC (Pietrobelli and Rabellotti, 2009) among others)

2.3 Innovation ecosystems and the potential to address core enabling factors

Innovation ecosystems are defined as “the alignment structure of a multilateral set of particulars that need to interact in order for a focal value perspective to materialize” (Adner, 2016: 40). This offers more open and loosely structured setups among actors in generating transformative impact (Chesbrough and DiMinin, 2014; Christensen et al., 2019). Innovation ecosystems are currently used in management study to identify the firm strategies to enhance competitiveness. Boundaries are more loosely drawn due to enhanced modularity and platform capabilities with the advancement of digital technology (Adner, 2016; Gawer and Cusumano, 2014; Jacobides et al., 2018). Furthermore, the setup also facilitates complementarity to be generated in a shorter time span. For ecosystems to successfully execute their missions, they require shared values, and the sustainable flow of financial resources among participants is critical. Hence, key elements of a successful ecosystem appear more like a package (e.g., business model) of adaptive modules rather than a production chain for products and services. In such context, technologies are only half of the story, because disruptions require complementary assets to deploy and diffuse innovations to potential users.

This involves innovative business models to ensure: the flow of finance, development of human capacity, provision of agile and adaptable physical and legal infrastructure to ensure access to the market for both producers and users (Marchant et al., 2011; Shapiro and Glicksman, 2002), partnerships with stakeholders that provide services and inputs (Gawer and Cusumano, 2014), and engagement of leading/strategic intermediaries or coordinating entities (Adner and Kapoor, 2010; Gawer and Cusumano, 2008, 2014; Iansiti and Levien, 2004; Jacobides et al., 2018). These factors determine how networks are shaped, actors are aligned, the flow of knowledge is

open or closed, governance (rules of the law) is exercised, and values are shared (Gawer and Cusumano, 2014). For innovation ecosystem to thrive and be resilient, it is important that the design includes value capture in complementarity assets (Teece, 1986, 2019). The value capture is an important concept for leveraging mutually beneficial relationships among stakeholders involved.

2.4 Types of technologies, complementarities, and innovation ecosystems

To illustrate the importance of innovation ecosystem with regards to transformational change three stages of technologies, emerging, enabling and general-purpose technology are compared (see Table 1).

Table 1: Types of technology

	Emerging Technology	Enabling Technology	General Purpose Technology
Novelty	Radical technology	Drive radical change in use	Affect broad socio-economic areas
Impacts	Uncertain and ambiguous	Enhance user capability	Change extant economic and social structure
Impact of technology	Coherence/Convergence	Applicability to diverse field	Creates many spillover effects
Observed change	Relatively fast growth in use	Rapid development of subsequent technology	Societal transformation
Complementarity	Explore methods of use	Complement for broader impacts	Complementary for transformative change and acceleration

Source: Iizuka and Hane, 2020.

Emerging technology is often considered as the driving force in materialising the 4th industrial revolution. It is defined as “radically novel and relatively fast-growing technology characterised by a certain degree of coherence persisting over time and with the *potential* to exert a considerable impact on the socio-economic domains.” (Rotolo et al., 2015: 1828, emphasis added). The definition indicates that the impact of “emerging technology” lies in the future. In contrast, GPT and enabling technology exert impacts in real time through diffusion and materialising complementarities (Carlaw and Lipsey, 2002).

Teece (2018) argues that “technological complementarity occurs when the value of an innovation depends on altering the nature of one or more existing technologies and/or on creating new ones. It applies when the full benefit (or even any benefit) of the innovation cannot be achieved until some other, complementary technology has been created or re-engineered. The complements can be related vertically, horizontally, or laterally” (Teece, 2018: 1374). In other words, complementarity influences the degree and magnitude of impacts. For the technology to have broader impacts, disrupt and make transformation, it requires complementary parts. For instance, if the complementary parts are being affordable, scalable, sustainable, universal to attract a critical mass of users, it would consequently amplify the overall impacts of the technology. The digital technology, such as mobile phone, facilitates the connection among different complementary parts, eventually enhancing ability of each user in the network.

The comparison of impacts as per technology types illustrates the importance of complementarity and ecosystems that transform the mere ‘potential’ of disruptive change into actual impacts through involving broader actors and reaching out non-users. Thus, emerging technology is an important element to be considered in transformation but the magnitude of its impact is determined by the complementarities they can exercise in the innovation ecosystems.

3. Conceptual framework, research questions, methodology and selected cases

This study aims to understand how innovation ecosystem play important role towards meeting SDGs taking inductive approach by looking at the disruptive private activities. The underlying assumption is that promotion of disruptive business will advance transformation from the bottom up, ultimately speeding up the achievement of SDGs. For any firm, choosing a

disruptive and inclusive path is taking a risky option. Hence the research pays attention to how innovation ecosystems are shaped in such process of challenging social agendas. Understanding of how innovation ecosystem is formulated can serve effective policy measures in assisting transformation process.

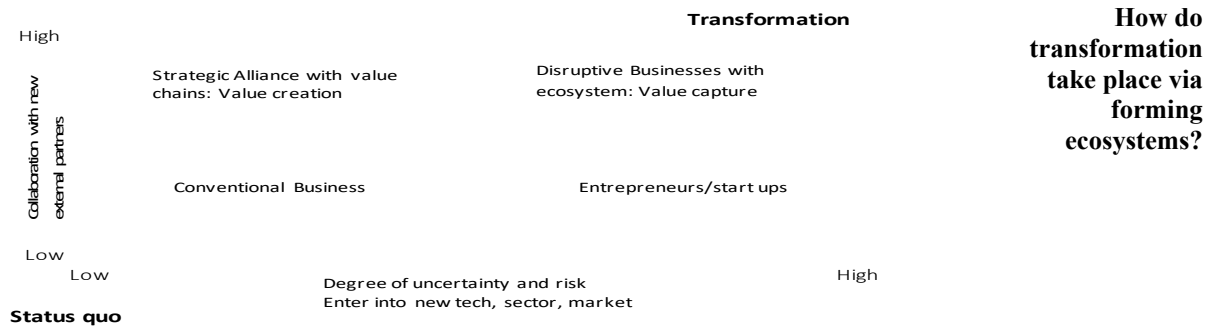


Figure 1 How collaboration and risk taking relate to transformation

Source: authors

As this is an exploratory study to find out how emerging firms that address societal challenges run successful businesses, case study approach is chosen. This method is considered best to analyse the inner works of certain processes that take place in an exploratory manner (Eisenhardt, 1989; Yin, 2014). The information to understand each case is obtained from both primary and secondary sources. The primary sources are interviews with CEOs as well as information obtained by the authors’ participation in seminars and events. The secondary sources include books written by the CEOs, magazine articles on the CEOs and firms, newspaper articles, and website information on firms and their recent activities. (see appendix for list of interviews).

Five cases are selected that employ technologies and business models in unconventional ways and generate scalable social impacts. The purpose of comparison is not to focus on their differences but to observe their common enabling factors. The cases are selected based on the following criteria: 1) new type business (disruptive) (Christensen et al., 2006); 2) generate

inclusive outcomes (Chataway et al., 2014; Heeks et al., 2014); and 3) use technology and innovation (but not be limited to high technology). (see Table 2).

Table 2 Case overviews⁷

Name	East Ventures	Samurai Incubate	Aavishkaar Capital	Nippon BioFuel / ADM	Makuake
Activity	Venture capital	Incubation/ Venture capital	Impact investment	Start-up	Crowdfunding
HQ	Indonesia Singapore Japan	Japan	India	Japan/Mozambique	Japan
Year establish	2008	2009	2001	2000*/ 2012	2013
Activity take place in	Indonesia	Japan, Israel, East Africa, South Africa	India, South Asia, Southeast Asia, East and West Africa	Mozambique	Japan

Source: author. * The company was established in 2000 but operation in Mozambique from 2012 as ADM.

4. Case studies

4.1. Summary of case comparison⁸

The comparative analysis identified to two common features from the cases examined. First, all successful cases established innovation ecosystems. This tendency is more salient for those operating in the environment not conducive to business, such as the Global South. Second, the entities formulate innovation ecosystems by creating networks of complementary activities to enhance their overall impacts.

All the cases established innovation ecosystems that both create and capture value. East Venture, the venture capital firm in Indonesia, established a venture keiretsu ecosystem to create synergies among its invested companies. Samurai Incubate, the incubator of seed venture capital in Japan that is active in Africa, established an investee value chain ecosystem to create

⁷ Information comes mainly from interviews listed in the appendix 2.

⁸ Please see the extended description of case in the SciRex Center working paper. Also see table in appendix.

a business infrastructure (i.e. postal services, financial transactions, logistics) among invested start-ups. The pioneering social impact fund, The Avishkaar Group in India, established an internal financial ecosystem to cater diverse financial needs of customers. Nippon Bio-Fuel (ADM in Portuguese), a Japanese start-up firm active in Mozambique in providing Fintech services in addition to energy generated from Jetropha and solar, developed an adaptive micro-innovation ecosystem. The leading crowdfunding in Japan, Makuake, has a virtual multi-stakeholder innovation ecosystem that not only raises funds from the crowd but proactively intermediates actors to make projects successful. Each ecosystem was tailored to bring in complementary assets that were critical in bringing successful change and impacts. These cases, though very similar in two aspects, can be separated in two groups: one that strengthen internal collaborative network to capture risk, while the other is directed at collaboration with external actors to expand activities to spread the risk and seize opportunities. The term capture risk refers to the reduction of market risk by facilitating business transactions among companies within the investor’s portfolio (see Table 3)

Table 3: Summary results of case studies

Name	Type of business	Innovation ecosystems	Collaboration	Strategy
East Venture	Venture capital	Venture keiretsu network to work on joint project	Internal	Capture Risk
Samurai Incubate	Venture capital	Create value chains with invested start ups	Internal	Capture Risk
Aavishkaar Capital	Social Impact Fund	Internal financial institutions to accommodate diverse financial needs	Internal	Capture Risk
NBF	Venture startup	Identify potential demand and adaptively expand business	External	Expand opportunity
Makuake	Crowdfunding	Expanding network with clients and customers providing access to market and experiment new products	External	Expand opportunity

Source: authors

4.2 Discussion on each case

This section summarises the findings of each case in more detail.

4.2.1 East Ventures' Keiretsu eco system

East Ventures, an Indonesian-Japanese venture capital firm, generates collaborative business links among portfolio companies to strengthen early business growth. As venture capital was new to Indonesia when East Ventures established operations there in 2009, companies had limited access to technology and trained personnel, poor connections to suppliers and customers, and little access to start-up or follow-on financing. For example, East Venture launched Warung Pintar, a smart kiosk business for street vendors. This business draws upon the services and products of several portfolio companies to improve the street vendors' operation and income opportunities in Indonesia. Working with its portfolio firms, East Ventures added numerous digital services, including digital payment, wifi, displays, security cameras, charging stations, and accounting and logistics support. East Ventures also assisted in attracting follow-on investors. This was a model that is being replicated nationally.

East Ventures' ability to leverage its group for social impact was also well demonstrated in the early phase of Covid-19 pandemic in Indonesia. The East Ventures group managed to raise financing through crowdfunding, generate the Covid-19 testing kits, and deliver them to the people, working jointly with the government. East Ventures created its own innovation ecosystem to gather the needed complementary assets.

4.2.2. Samurai Incubate Africa's value chain start-ups support

Samurai Incubate, with its genesis as a successful incubator and seed investor in Japan, typically engages at the earliest stage of seed company assistance and builds the ecosystem through hands-on assistance from the incubator. At the earliest stages they engage in business plan development, technology planning, network development and defining customer requirements. In the case of Africa, Samurai Incubate Africa found it a faster launch strategy to first assist

emerging venture companies which needed help. To finance start-ups that address social needs in Africa, Samurai Incubate Africa selected a series of start-ups to form a chain of activities. This included portfolio of start-ups involved with postal services (MPost), digital payment (Xento), mobile delivery services with motor bikes (Sendy), and e-commerce with distributed manufacturing (Fashpa). The approach links complementary modules in an ecosystem to make their businesses more competitive and resilient. In the absence of existing complementary businesses and reflecting shortages of public services, this investment strategy created its own value chain of activity to support synergic development. Here, digital technologies were particularly important to leverage their synergies.

4.2.3 Aavishkaar Capital's internal impact financing eco system

The Aavishkaar Group is a pioneer social impact fund located in India. Aavishkaar, which means “invention” in Hindi, invests in social entrepreneurs with a vision to bridge the opportunity gap for the emerging 3 billion. It invests in projects that solve problems which are 1) worth solving; 2) affect everyone, not just privileged few; 3) take more than capital to solve; and 4) create solutions that offer a paradigm shift (Rai, presentation Nov. 2019). By supporting small steps in rural societies, the Aavishkaar Group has had a large-scale impact on the livelihood of millions. Beginning in 2002 as a small rural business consulting and seed investment activity, Aavishkaar has grown in a financial conglomerate with the ability to fund all stages of a company's development from microloans to equity investments. The Aavishkaar Group currently comprises four organisations. Arohan engages in micro finance and gives credit lending services to microbusiness with loans ranging US\$ 100 to US\$ 1500. Ashvi invests in small to medium companies in India with entrepreneurial intentions, investment range from US\$3000 to US\$1.5 million. Aavishkaar Capital places investments ranging from US\$500,000 to US\$10 million. Intellecap deals with consultation and business advice. Their work goes well beyond financing for a project, and includes enhancing the cashless infrastructure, managerial

capacity building, and fostering better business environments for would-be entrepreneurs. Aavishkaar capital provides an end-to-end financial ecosystem to promote its invested businesses. They provide business advice and capital that helps companies to launch, and further support those companies to gain market expansion and grow.

4.2.4 NBF's adaptive micro-innovation ecosystem

Nippon Bio-Fuel (NBF) is a start-up firm that initiated its activity by providing sustainable energy sources to non-electrified rural villages in Mozambique via jetropha-based biodiesel combined with solar panels via contract farming. It used village kiosks to manage financial transactions with farmers and users of energy. Seeing the irregularity of bookkeeping at kiosks, where the payments for their services are collected, NBF introduced its own cashless payment system for all the purchases at kiosk (POS card system) with the help of partners, NEC and JICA. NBF soon discovered that their cash cards became important savings instruments for the local population. This led to a new business opportunity in micro financing for financial inclusion. Today NBF is conducting microfinance with full data of farmers' financial transactions.

NBF built its own adaptive micro-ecosystem reflexively through meeting the challenges on the ground and paved new pathways to business opportunities. First, to validate that this idea, NBF use external project opportunities. After NBF introduced a cashless payment system in kiosks, it was offered to implement the same model in Mozambique for a project of the Food and Agriculture Organization(FAO) and the World Food Program(WFP). This led to an experimental project on digital cooperatives in Mozambique financed by WFP. Based on the learnings and experience, they developed an idea for a platform business, teaming up with additional ecosystem partners, the Ministry of Agriculture, Forestry and Fisheries of Japan and the African Business Council and JICA, to establish a central platform for connecting suppliers

and customers under an E-Agri Platform. (African Business council working group for Africa's agriculture, 2019). This initiative is still at the early stage but NBF/ADM is now engaging in a platform business that has broad impact. This case demonstrates a how NBF/ADM established an ecosystem in a highly adaptive manner involving numerous external stakeholders. Once they identified the target market niche, they collaborated with external actors to seek the complementary asset needed to materialise new areas of activity.

4.2.5 Makuake's virtual multistakeholder innovation ecosystem

Makuake is a leading crowdfunding firm in Japan. Makuake operates as a crowdfunding resource but its unique feature is using its internet platform to offer a multi-sided, multi-stakeholder ecosystem for product acceleration. Their platform connects innovators to early adopters who will provide feedback on offerings and how the products can be improved. By increasingly involving former clients as part of its ecosystem, it has expanded the role of market mediation in its platform. The platform connects a broad set of actors that can provide valuable services and products to the company's new clients. It is a test bed and place for iterative improvement, especially for those that do not have access to market under conventional business settings such as regional small lot producing suppliers to the large firm or innovative individuals with a great idea without the possibility of financing. An interesting feature of Makuake is that its clients can become part of network for the curation of the evolution of a project. The platform also enables partnerships with individuals or companies that can bring complementary skills. Initially Makuake provided a place to showcase products and services and to provide access to the market for small and medium enterprises (SMEs) in the regions where they are either restricted to the local market or constrained as suppliers of larger firms. Recently, regional banks are paying attention to the result of crowdfunding as additional information for project evaluation for financing projects. Furthermore, the use of Makuake's

service is not limited to start-ups and SMEs but extends to innovators inside of large corporations seeking to explore new market and customers. This trend is enhancing the space for Makuake to maneuver to intermediate.

4.2.6 Summing up on the cases

To sum up the following emerge as common features. First, the cases show that building networks of actors in an ecosystem are important for business growth and for creating disruptive social impacts from bottom up. Ecosystem creation is critical to overcome shortcomings of the given physical infrastructure and legal institutions in emerging economies, where operation takes place. Additionally, in some cases, these constraints can work positively to stimulate conditions to nurture disruption. Second, ecosystem creation is important not only for creating value but also for capturing value and reducing risks. Third, focusing on social needs, unarticulated demand of the mass population, can define the purpose and targeted impact of a business. By focusing on the core needs of a large population, entities naturally address large markets. Fourth, in meeting social needs ecosystems generate complementary businesses and activities, enhancing follow on impacts. Fifth, these examples demonstrate the importance of a creating spaces that allow flexible experimentation with reduced risk using various types of collaborative mechanisms.

4.2.7 Some potential challenges identified from the cases: Regulatory institutions

The cases paint overall positive features of loosely structured ecosystem whose potential can be extended through complementarities with internal or external partners. However, regulatory boundaries still exists within the national borders and this can restrict innovative activities and impact company organisation and markets. Aavishkaar in India struggled to gain regulatory clearance for foreign investment due to domestic ownership thresholds, to enable financing for

their impact fund. In Indonesia, where East Ventures operates, domestic control regulations were initially applied to e-commerce companies, which forced the most promising early companies to locate their headquarters abroad. Makuake also needed to deal with regulations prohibiting equity investment via crowd funding until recent liberalisation. In other commonly regulated sectors such as finance, health, environment, energy, nutrition, safety, etc., adapting regulations to new innovations is often a significant challenge. NBF first attempted to acquire a financial license in Mozambique to act as bank but this was not granted. It is now operating as a microfinance company that does not require rules as restrictive as those for a bank (Goda, 2018).

While regulation can hamper activities, it is also the case that a more permissive regulatory environment can be one of the reasons for seeking business launch elsewhere in order to experiment with new products and services. Drone companies, for example, have been drawn to African nations due to more permissive flight regulations as well as the need to serve dispersed and remote populations. It is possible to experiment with new technology and business models prior to implementation in other developed markets that can have more stringent rules (regulatory arbitration); making the new market a regulatory sandbox⁹.

5. Discussion and conclusion

To achieve the SDGs, the transformation is needed (TWI2030, 2018, 2019, 2020; Schot and Steinmeuller, 2018). Yet it has become evident that there are still no clear and effective policy mechanisms to generate needed transformations. Thus, fresh perspectives are needed for innovations in policy, society, business, and knowledge generation aiming at unifying goals for

⁹ Regulations affecting drone use, for example, differ between countries and some areas of Africa have become important innovation test beds for drone business models. Samurai Incubate Africa, for example, invests in digitally-based new businesses in emerging new business environment with few regulatory hurdles. NBF/ADM was able to quickly acquire a microfinance license to operate in Mozambique even though the concept was new to the economy.

2030. In order to contribute to the discussion of options, this study reviewed several cases of emerging businesses that are working to advance toward the SDGs in leaps, and that are inclusive of all levels of an economy. We called these examples “Disruptive Inclusive Innovation (DII) cases”.

Various initiatives that can contribute to needed transformations have been taking place without much government involvement. These reflect entrepreneurs responding to unmet demands of citizens by devising innovative business models to generate broader impact from the bottom up. Digital advances are helping to open the horizon for disruptive and inclusive businesses to emerge. However, although opportunities and initiatives are present, these are not generating transformation fast enough. Policy engagement is also needed.

The cases studied have shown that building an innovation ecosystem is a strategic choice not only for building resilient businesses but also for achieving an organisation’s social mission and scaling-up impact. These ecosystems are intended to maximise the value generated from networks, enlarge financial streams, and improve market access via better adaptability to mass customisation (catering to local diverse needs) that have emerged as a result of meeting unsatisfied needs for clients by enabling access to the full package of lacking services-- finance, infrastructure, trusting partners, and technology.

The cases offered perspectives on how private initiatives have met the challenges of generating social impact while coping to survive in not so business conducive environments. The cases demonstrated that the successful companies created their own innovation ecosystems and sought complementary assets from internal or external collaborators. The very action of ecosystem creation by emerging businesses signals what was missing in the policy domain.

Further research will be needed for designing detailed and effective policy instruments to complement this study.

With the cases studies here as a beginning, it is possible to identify potential agenda items for public policy which can help to create more participatory ecosystem gaps. First, is recognition in policy that supporting ecosystems at the earliest stages of business development is valuable to accelerate the impact of innovations as they comprise a system of synergistic incentives, assets and capabilities. Second is the need for supporting innovative financing. Although impact funds and BOP accessible funds are increasing, such new financing modes including crowd funding and microfinances, effective regulations still emerge as a challenge. Policies need to promote fund access rather than stay buried in outdated capital controls, while at the same time ensuring transparency of management. Third, policy should encourage opportunities to experiment with proof of concepts, prototypes, and market testing through the support of innovation and regulatory sandboxes, both physical and virtual. This experimentation of new technology and business models would also inform regulatory change for innovation. Fourth, there should be support for capacity building not only for new technology and business models, but also for innovative (blended) financing, agile governance, and reflexive policy making in order to enhance the human base for innovative capability. These policy themes would support the transformation of systems yielding positive impacts. Last, capacity building is critical to prevent social disparity caused by the access to technology.

The above discussions are made based on cases examined. These are limited in number and scope. However, given the shortage of research in this field, it is hoped that this offers a stepping stone for further investigation into this topic.

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Appendix

Appendix 1 Ecosystem factors tapped by cases

	East Ventures	Samurai Incubate Africa	Aavishkaar Capital	NBF/ADM	Makuake
Activity	Venture capital	Venture capital	Impact investment	Start up	Crowdfunding
Ecosystem Type	Keiretsu network of investee	Value chain of invested seed venture	Internal impact financial ecosystem	Adaptive micro ecosystem	Virtual multistakeholder ecosystem
Social Challenges (aims) mentioned	Support the country's growth via empowering local small to medium business and building the local ecosystem	Solving societal problems with the innovative application of technology and business models	Solving social challenges through creating broad impacts	Providing BOP communities with equal access to energy and a financial service	Providing market channels and market experimentation opportunities all types of producers/creators including those in regions
Technology applied	Synergies among different services based on digital technologies	Digital technology, (Mobile and ICTs) synergies	Digital financial synergies	Renewable energy and digital money synergies	Multi-sided platform enabling crowdfunding, market feedback, and collaboration
Business Model	Keiretsu model	Value-chain model	Financial value-chain model	Adaptive and gap filling	Crowdfunding and community building
Finance	VC syndication	VC syndication	External funders/ Impact fund/ microfinance	Combining private investment, government aid, and grants	Crowd funding
Network established	Within group	Within group	Within group	Partnership with diverse actors	Partnership with diverse actors
Access to Customers	Leverage portfolio	Leverage portfolio	Investor, internal networks, and scale up of investee	Expanded through broadened ecosystem and platform	Multi-sided platform access
Human Resources	Leverage returnees	Leverage VC training	Leverage internal networks	Leverage local and provide trainings	Leverage platform network
Regulations or counter measures taken	Collective power for change	Regulatory sandbox in the new market	International presence for financial regulatory management	Regulatory sandbox in the new market	Financial regulation existed on equity investment; regulatory testing
Outcome of Ecosystem/ Sources of resilience	New network to experiment and expand to new businesses within Keiretsu	Value chains to mutually capture the synergies to enhance the business as a whole	Accommodate diverse scale of needs for their services	Expanding their business and diversifying into new fields	Expanding their business and social impacts, especially for SMEs in the regions

Source: based on Authors

Appendix 2 List of interviews conducted

	Organization	Title	Date of interview
	Makuake	CEO, Founder	April 8, 2019
	Samurai Incubate	CEO, Founder	April 11, 2019
	East Ventures	CEO, Founder	August 5, 2019
	Aavishkaar Capital	CEO, Founder	November 8, 2019
	Aavishkaar Capital	Advisor	September, 10, 2020
	NBF/ADM	CEO, Founder	February 27, 2020

Source: author

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