

Inclusive Innovation

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5 The future of inclusive innovation

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5 The future of inclusive innovation

This chapter connects the vibrant cases of inclusive innovation in practice – as covered in Chapters 2 through 4 – with state-of-the-art literature on inclusive innovation in Southeast Asia and beyond. It details the concept and maps out the various ways in which inclusive innovation has manifested in policy and community-driven forms, responding back to the practices discussed in the three preceding chapters.

As we have argued and illustrated throughout the book, inclusive innovation involves a wide range of technologies (from social innovation through to low-tech to ICT), constitutes new forms of innovation by multiple stakeholders, and involves problem-owners as problem-solvers in addressing environmental and social challenges. Our conceptualization of inclusive innovation according to “how,” “what,” and “where” aims to capture this range of efforts.

In this chapter, we also examine the future of inclusive innovation, particularly in Southeast Asia. We strive to unpack the gaps and solidify the working understanding of the concept of inclusive innovation as it is evolving. Based upon this, we also offer a view for the way ahead, in the post-pandemic recovery and under the heading of “building back better,” as in the UN’s 2020 *Human Development Report*.¹ We close with a call to action for building the bridge between policy, practice, and theory.

Revisiting the concept of inclusive innovation

The myriad promises, and understandings, of inclusive innovation have led to the development of numerous approaches that consider the environmental and social purposes of innovation, the distribution of its benefits, and the roles and power relationships of those involved. In this brief section, we distil three themes that animate the proliferation of inclusive innovation, and the understanding of inclusive innovation, as articulated in the scholarship:

Table 5.1 Inclusion in terms of the production and consumption of innovation

	Production: <i>inclusion in innovation process</i>	Consumption: <i>use of innovation to aid social inclusion</i>
Aim	To increase the inclusion of underrepresented groups as producers of innovation activities.	To encourage the consumption of innovations in order to ameliorate social challenges faced by particular groups.
Target criteria	Ascriptive groups / demographics, disadvantaged socioeconomic regions / spatial determinants, traditional industries.	Disabled people, base-of-the-pyramid, traditional industry, rural populations.
Examples	Enable Code.	DMap, Liter of Light.

Source: Adaption based upon authors' review of extant literature.²

1. *Production versus consumption orientation*

As mentioned briefly earlier, an oft-cited conceptualization of inclusive innovation posits a dichotomy such that inclusion can either be about “producers” or “consumers” of innovation.³

Producer-oriented strategies aim to activate more segments of society as creators of innovation. This fits well with our notion of the inclusive innovation problem-owners also being the problem-solvers. Consumption-focused initiatives, comparatively, focus on encouraging the development of technologies, business practices, or services in order to solve social challenges for particular demographic groups, such as applying innovation to agriculture in order to improve crop production and benefit farmers. This can also emphasize innovation for a wider set of challenges and contexts, especially by those experiencing it. We depict the consumer-producer binary in Table 5.1, in terms of the aims, target criteria, and examples.

Vulcan Augmetics, as noted previously, offers an example of an inclusive innovation that is oriented towards an underserved consumer group (amputees in Vietnam) *and* aims to improve the job prospects of its users. The Ho Chi Minh City-based startup makes prosthetics using 3D printing technology to make affordable, modular prosthetics in, and for, the Vietnamese market.⁴ Founded by Rafael Masters and Akshay Sharma, Vulcan offers specialist prosthetic models for improving the range of employment opportunities for amputees. The prosthetics are affordable and modular for particular tasks, such as being able to work as a waiter. The challenge they solve is that prosthetics are often one-size-fits-all models that allow very little customization and often come at a high cost.

2. *Criteria according to demographic, spatial, and industrial characteristics*

Inclusive innovation typologies have also distilled efforts according to who, how and where they are being targeted;⁵ in this book, we advanced an

Table 5.2 OECD (2017) inclusive innovation framework

	<i>Demographic</i>	<i>Industrial</i>	<i>Spatial</i>
Target beneficiaries	Ascriptive traits, such as age, disability, ethnicity, gender, race, and sexuality.	Industry or sector.	Region or territory.
Rationale	Marginalization, underrepresentation, or exclusion in innovation activities based upon demographic characteristics.	Productivity gap across industries or sectors due to relative engagement or use of technological applications.	Geographic unevenness in the production and consumption of innovation activities, particularly across urban/rural dichotomies.

Source: Authors' understanding.⁶

approach that also analyzes the “what” dimension, particularly the development and use of technological innovation for social and environmental good.

Typologies such as those advanced by Planes-Satorra and Paunov in their OECD report on inclusive innovation policies are primarily interested in the who, or the destination, rather than the how or the what.⁷ Demographically-motivated efforts point to ascriptive groups, meaning those disadvantaged according to factors assigned by birth, not achievement, such as gender, age, and minority or ethnic status.⁸ Spatial efforts aim to diminish the gap between urban/rural, wealthy/poor, and core/periphery. The third domain is that of promoting innovation in traditional industry, which strives to infuse technological innovations or socially innovative approaches into firms' production processes. The OECD's 2017 framework, by Planes-Satorra and Paunov, distils inclusive innovation efforts into these three arenas: demographic/social, industrial/sectoral, and spatial/geographic, as illustrated in Table 5.2.

3. Distinct – rather than joined-up or intersectional – efforts across governments

Within the government, inclusive innovation policies have been initiated by numerous ministries, sometimes without coordination across government agencies, and not in cooperation with private sector, local communities and civil society groups. Ministries of Social Affairs and Education, for instance, act by way of active labor market policies, skills training, benefits transfer, and redistribution more broadly.⁹ Ministries of Science and Technology, without linking with the Social Affairs initiatives, strive to craft “distribution-sensitive innovation policy,” in which R&D budgets are more dispersed, in demographic and spatial terms, across society. The net result is that governments

have an opportunity to better leverage their myriad policies to promote more inclusive innovation across society.¹¹

Helping to operationalize the study of inclusive innovation, especially from a policy perspective, the 2018 Nesta framework contends that innovation policies may be inclusive if they are concerned with the direction, participation, and/or governance of innovation. Table 5.3 distills the description, core questions, and indicators that comprise the framework.

The indicators specified in the Nesta framework help to operationalize one's assessment of the extent to which an initiative – especially a policy – is inclusive. The EY STEM app, which gamifies STEM education in order to boost young women's engagement and skills, offers a good example of sparking interest and ability at a crucial age. Rohan Malik, who helped lead the EY STEM app's rollout in India, shares his story here, which is provided in Box 5.1.

Table 5.3 Nesta (2018) inclusive innovation policy framework

	<i>Description</i>	<i>Core questions</i>	<i>Indicators</i>
1. Direction	Ways in which distributive implications are considered.	Do the overall aims involve more than economic growth? Whose needs are being met?	1.1 Objectives are not exclusively related to economic growth, but take account of a wider range of socially desirable outcomes, such as sustainability, equality, health, and well-being. 1.2 Support for innovation addressing “societal” challenges and needs. 1.3 Support for innovation addressing the particular needs of excluded groups.
2. Participation	How inclusion is operationalized and for whom.	Who participates in innovation?	2.1 Measures to increase the participation of underrepresented and excluded social groups in innovation and innovative sectors of the economy. 2.2 Measures to increase the participation of disadvantaged or lagging regions or districts. 2.3 Measures to promote innovation in low-productivity or low-innovation sectors. 2.4 Measures to involve civil society and social economy organizations in innovation.

Table 5.3 Cont.

	<i>Description</i>	<i>Core questions</i>	<i>Indicators</i>
3. Governance	Process for involving wider society in governance.	Who sets priorities, and how are the outcomes of innovation managed?	3.1 Measures to broaden participation in innovation priority-setting. 3.2 Measures to broaden participation in the regulation of innovation. 3.3 Measures to mitigate the risks of innovation. 3.4 Measures to promote fair distribution of the benefits of innovation.

Source: Authors' understanding of the Nesta (2018) framework.¹⁰

The Nesta framework begins with the direction, which speaks to the ways, and extent, to which distributive implications are considered. The directional considerations are followed by participation, which speaks to the operationalization of this, in terms of who, specifically benefits. To apply this aspect of the framework, one may consider the precise criteria specified by the service or policy. If the aim is socioeconomically disadvantaged areas, how is that defined? In terms of income level, or in terms of a specific district, city, or region? Finally, the questions about governance then come back to the ways in which the initiative involves wider society in the management of the efforts. This includes agenda-setting, measurement, and distilling lessons learned.

Our framework, as advanced in this book, builds on these debates and concepts, by conceiving of inclusive innovation approaches in the following ways:

1. **How: innovation by and for the problem-owners** is a mix of top-down and bottom-up activities seeking to improve the quality of life and work for those in the most disadvantaged and marginalized communities (i.e. supporting the development of contextually-relevant innovations that address some of the root causes of poverty and inequality); problem-owners are also, often, the problem-solvers.
2. **What: innovation for environmental and social good** is mostly bottom-up, yet inclusive of larger-scale initiatives seeking to develop technological solutions to environmental and societal challenges (i.e. directing innovation towards achieving inclusive outcomes).
3. **Where: innovation everywhere** is mostly top-down government initiatives seeking to ensure that high-value, innovative activities are regionally distributed (i.e. encouraging the participation of more people, places, and sectors in the innovative economy).

The three approaches – in terms of these key questions – are the “how” (process and people-centered innovation), “what” (specifically, technology), and the “where” (geographic distribution).

Through our how, what, and where approach, we contend that the future of inclusive innovation needs to place (1) people *and* planet at the center of the objectives, (2) go beyond information technology, and the ideal of Silicon Valley, in conceiving of technological innovation, and (3) enable problem-owners to include themselves in innovation as problem-solvers, rather than having to wait for this opportunity to be offered to them by others. We began with the “who,” in establishing who is included and who owns the problem. The consideration of who, which takes stock of the interdependent relationship between humanity, nature, and the environment, features across the framework and the various chapters. We then put the “how” before the medium, or the “what” of technological innovation. We underscore the argument that the social aims of inclusive innovation, including in its BoP roots, must evolve to take intersectionality with the environment into account. This is owing to the urgency of the climate crisis and acknowledgment that those who are most economically vulnerable are also those most at risk to the perils of climate change.

A key similarity between these three expressions of inclusive innovation is their focus on creating value and opportunities with, and for, those who face structural disadvantages in becoming either consumers or producers of innovation. This applies to places, people, and sectors of the economy who are often neglected in discussions of “frontier technologies” or the Fourth Industrial Revolution (IR4.0).

These types of outcomes are not always prioritized by mainstream innovation policies, which are often more focused on reinforcing existing national strengths and centers of excellence, rather than democratizing access to the power, knowledge, and tools needed to innovate. There is inspiration to be taken here for innovation policymakers everywhere, placing the aims of local context and the environment, as in Schumacher, on par with the growth-centric aims of Schumpeter.

Box 5.1 EY STEM app: an innovator’s learning journey

By Rohan Malik, EY STEM app, Ernst and Young

For nearly two years after graduating from university in London, I felt like I had the best job in the world. Working as a Strategy Consultant at Ernst & Young’s growing Education practice meant I had the opportunity to solve important challenges in education for the central government, state governments, the UN, think tanks, and foundations. I could, for a certain amount of time, help solve a problem alongside people. Over time though, the glamour of the names started to fade, and it began to be the problems I was helping clients solve that stuck with me. Some of them were problems I knew and cared deeply about before

the first meeting – technology for social good, equity in education, and upskilling teachers. Others, I didn't know the extent of – teacher micro-innovations in classrooms with scarce resources, the power of technical education for a young population, and issues with how data was collected. But there was one cause that was overlooked, pressing, and had many nuances within it – the gender gap in technology.

After working as a client-facing consultant on a growth path that would have led to promotions, raises, and eventually an MBA, I took the decision to possibly give all that up and align myself full-time to EY's Women in Technology movement. For the first time, my purpose felt a lot greater than just working to solve a problem alongside a client for a finite period. This felt larger than a project; it was a "movement." From very structured teams where each member was an important "resource" whose time was billed by the hour, I was working with an incredible team of men and women all over the world working towards one common societal goal. Suddenly, the value of my time was not determined by my expertise in a certain area, but the impact of my ideas. Upon reflection, the entire team involved in the innovation felt a shift once they had this realization.

One of the pillars of the global Women in Technology movement, sponsored by the Chairman and leadership at EY, was the Educate pillar. This aimed to tackle the gender gap in technology at the stage when biases begin to dissuade girls from careers in STEM – biases, misconceptions, a lack of awareness or incentives to step out of their curricular comfort zones and explore applied content from leading thinkers. With this, I was fortunate enough to help design, build, pilot, and now scale EY STEM app.

EY STEM app (formerly EY STEM Tribe) is an innovative, gamified, and free platform for girls aged 13–18 that aims to identify, inspire, and empower the next generation. We built the platform with Tribal Planet, a Silicon Valley-based technology company driven by social good. To spark engagement, cross collaboration and to scale globally, the program created an ecosystem of governments, content providers, schools, nonprofits, corporations, teachers, and caregivers to create an environment of support for girls. The app itself incentivizes a learning model that has over 17 content channels and 450+ activities that are divided into channels such as Exploring Technology, Mysteries of Science, Designing our World, Natural World, Jobs of the Future, Getting Creative, Understanding Myself, and Helping the World. All the content is agnostic to any national curricular framework and asks questions like "why are the polar ice caps melting" or "how to build a space suit." The content was sourced from leading thinkers like NASA, Stanford University, UC Berkeley, Growing Leaders, UNESCO, and the World Economic Forum. All the content has been mapped back to all 17

SDGs and the OECD P21 Skills Framework. The incentivized learning model means that as girls explore activities that may ask them to watch a video, read an article, conduct an experiment or write a response, they win points. Once they build up their “rewards wallet” they can redeem their points for things like digital vouchers, mentoring sessions, work shadow opportunities, reading library access, or donating their points to a cause they care about.

The program was piloted for ten months across 7,000+ girls and 50 schools and not-for-profits in New Delhi, Seattle, and Atlanta. I was fortunate enough to lead the pilot in New Delhi with 6,000 participants. A deliberate decision was made to pilot the app across elite private, and affordable private and government schools in all three locations. The pilot was successful, with girls completing 90,000+ activity steps, winning 600+ rewards and donating 370,000 points (matched with a financial contribution from EY) to organizations such as Girls Who Code, AI for Good, and Junior Achievement. Girls also spent over one million minutes exploring content. The app also had a measured impact on the girls’ STEM interest, expressed commitment (whether they’d continue with STEM learning), value (in the world around them), and competence (ability) as well as systems thinking, leadership, self-confidence, teamwork, and more. At its conclusion, the EY STEM Tribe pilot had been featured in the Nobel Prize Summit, the UN General Compact on Gender Equality, and in industry conferences. It was also recognized by the OECD as an Outstanding Public Sector Innovation and the International Center for Research on Women as a key initiative enabling livelihoods for women in India.

The entire pilot experience was an absolute thrill as somebody on the product and program side. For example, one morning, a group of girls at our very first government school were having trouble registering on the platform. They had never seen an “MMDDYY format form” before. I took this feedback to the engineers who changed the form that same day. Small changes like this showed us how fluid and dynamic a product can be once it reaches the end user. EY STEM app is an “inclusive” innovation at its core, with the team being driven by the objective of closing the gender gap in technology. The app generates no revenue and is free for all stakeholders. After the successful pilot in India, Seattle, and Atlanta, the teams have been working on Phase Two of the program, scaling the app to 100,000 girls across ten-plus countries. This gave us the opportunity to use learnings from the field and question the existing “inclusivity.” While it was clearly impactful, in order to resonate with contexts around the world, would we not need to make changes to ensure impact for girls in Oceania, Southeast Asia, the Middle East, and the Americas?

We said yes, and started by ensuring that we prioritize underserved communities across our scaling locations and work to fit the app to local contexts. With the benefit of detailed insights from the app, we saw a higher learning impact from girls in schools further down the socio-economic ladder, and reached out to participants who would benefit the most from the platform. We also made nearly 60,000 changes to simplify the app's content and added subtitles, included videos from inspirational women changemakers across all ages in STEM, revised our rewards framework, and made user experience-driven changes. Finally, we began reaching out to leading STEM thinkers across our target regions – universities, individuals, foundations, and nonprofits. We are currently engaging to gamify their content into activities that can complement the existing content on the app.

In the spirit of inclusivity, we included the arts, so that our STEM aim became one of STEAM. Social and Emotional Learning, Race and Identity, Design Thinking and Individual Purpose will now feature prominently alongside the app's ever-changing content. We are continuing to partner with diverse content providers and bring this conversation to the forefront with every opportunity we get.

What makes this program powerful for me now is not necessarily the size of the effort, the awards or even the team. It's the endless effort to make it more inclusive. The aim is now around how this can help a wider group of girls and how each technical tweak can possibly make an impact. I've had the incredible opportunity to see how "tech for social good" isn't just an industry buzzword but something that can completely realign professional purpose.

After 100,000 girls are impacted by the app by June 2022, we will focus on ensuring its complete financial sustainability as well as its global reach. Until then, we will continue to deal with challenges head on – attitudes that an app on a phone can be anything except a distraction, our contribution towards increased "screen time" and the increased suspicion around EdTech after a rapid and unsustainable boom in places like India, for example. The strength of this innovation lies in its foundation – giving each bias, challenge, or criticism the dignity of the team's time and thinking regardless of where it came from. I'm proud that we are listening, thinking, and reacting in real time. It's knowing that we're working with and for the girls and potentially empowering them with knowledge and exposure.

The first time I felt I had the best job was going for a meeting in the corner office on the 12th floor of an office building in a suit. The first time I knew I had the best job in the world was my last session at a school huddled under a big guava tree, talking to 120 girls and sitting on the grass. It makes me smile every time I think about how many people will feel that same shift all over the world.

The COVID-19 pandemic and the future of inclusive innovation

The pandemic has magnified the impacts of unequal access to innovative employment, as well as underscoring the need for rapid, purpose-driven innovation in times of crisis. Thus, the need for innovation that benefits society, across demographic groups, industries, and geographic regions, has never been more urgent. The pandemic has also shown that innovation can – and does – come from all types of people and organizations. For example, a team of software developers that took part in the Hack Co Vy hackathon in Vietnam (see Box 3.3 for more details) adapted their last-mile delivery robot called Beetle Bot, featured in Box 5.2, in the COVID-19 pandemic so that it could help deliver medicine and medical supplies in hospitals that were trying to reduce human-to-human contact.

There is also greater awareness of the need for system design changes in order to further enable innovation to emanate from, and for, the benefit of the whole of society. The causes of underrepresentation are numerous, and include constraints on the supply of labor – such as insufficient training or desire to participate – which leads to a small set of initial applicants from underrepresented groups. And, of course, there are demand-side challenges, for example, conscious or subconscious preferences on the part of investors and employers that inhibit sufficient investment in, or employment of, applicants based upon demographic traits.

However, the pandemic has also ushered in an opportunity to draw lessons on which innovations, and broader approaches to innovation, are effective. In this way, it has served as a critical juncture – meaning an event that acts as a shock to the system – as it created the cognitive space for rethinking existing socioeconomic systems.¹² In many respects, the society-wide response to COVID-19 has democratized the notion of who is an innovator and what innovation should be designed by and for. For instance, teenagers developed innovative personal protective equipment, such as helmets that allowed the wearer to still scratch their head, and social innovators found ways to enable the distribution of resources, such as rice and face masks, that don't require physical person-to-person co-location.¹³ COVID-19 has prompted a rethink of innovation, away from one that narrowly emphasizes Silicon Valley-style technological innovation and high-tech startups.

Furthermore, studies on lesson-learning in the context of the crisis have shown that efforts to institutionalize new processes in response to previous pandemics helped assuage the impact of COVID-19.¹⁴ Research has also found that some technologies, such as AI, can help achieve broad economic growth, particularly the UN SDGs.¹⁵ In the context of innovation, the pandemic has already been said to have shifted the thinking about innovation towards a more inclusive way, in terms of public sector agility, data governance, the role of civil society, grassroots innovators, and social innovators.

Box 5.2 Beetle Bot: adapting the direction of innovation in times of crisis

By Ida Uusikyla, UNDP Vietnam

After obtaining their degrees in computer science, a group of friends – Hien Nguyen, Hung Nguyen, Trieu Nguyen, and Quang Tran – were enthusiastic about setting up a company to put their newly acquired skills to test. They are a team of highly talented AI-Robotics scientists and blockchain engineers who have published in academic journals and wanted to apply their skills and knowledge to real-world applications. What brought the team together was their passion for researching and developing cutting-edge technologies to solve critical societal problems of today.

According to Quang Tran, one of the founders, “AIOZ is a DeepTech company, Researching and Developing (R&D) AI, Robotics & Blockchain technologies for next-gen content delivery, video analytics, mobile robotics systems, smart city, and beyond.” In the early days, the team built several products, including optimal delivery scheduling, route optimization, warehouse management, and sales forecasting. The goal was to come up with a solution to be able to move things around easily; they felt that these “last-mile” logistics are critical for optimizing local commerce and increasing productivity and so wanted to innovate there. “The first online food order and delivery service was a pizza from Pizza Hut in 1994, since then, we have not seen a fundamental change in the way we do delivery,” Quang said. Current delivery solutions such as Grab or Gojek Food delivery have their own limitations such as costs and efficiency, he continued. In the Fourth Industrial Revolution, we need to continue to accelerate automated delivery – so, the team says, now is the time to build and develop robots.

To achieve this, the team of software engineers soon realized that they needed additional people who understood hardware development. They needed experts on developing components such as processors, circuit boards, memory devices, networks, and routers to bring the robot alive. This is how Anh Nguyen joined the team as a robotics scientist who is now leading the robotics team. He joined because he found academics too theoretical, wanted a more grounded understanding of sustainable development. He sees AIOZ as a bridge to connect academic researchers to real-world industrial challenges. Now, four years later, the Singapore-based company has a team of over 30 people, including both software and hardware engineers focused exclusively on AI, robotics, and blockchain in solving critical societal problems.

The development of the first robot started in 2019. It was developed for last-mile food delivery, similar to Grab Food, but as their autonomous

robot cousin. The team's vision was to change food and package delivery through the application of advancing AI and Robotics technologies. Then the global COVID-19 pandemic broke out. Something no one was expecting at the time. Quang, Anh, and the team, however, were quick to respond in the fight against COVID-19, for which Vietnam soon became famous.

Particularly, technology has played a crucial role in keeping Vietnam functional during various lockdowns and quarantines. The pandemic opened up new opportunities and markets for healthcare-related solutions. In particular, the AIOZ team realized the potential of autonomous robots for hospitals treating COVID-19 patients and turned the prototype they had developed into a service robot assisting doctors in the hospital. Robotic technologies would significantly help safely reduce the burden on Vietnamese doctors and healthcare workers who have been taking care of hundreds of patients and thousands of people under quarantine. With this idea, the Beetle Bot was born.

The team wanted to create a bigger impact with their innovation, so they entered – and won – the “Hack Co Vy” organized by UNDP Vietnam, AngelHack, and Hanoi Youth Union in April 2020. From this hackathon, Beetle Bot was developed with the mission of being a helpful assistant to reduce the risks of these frontline workers being exposed to the virus, helping them to stay safe in order to contribute their best to the fight against the pandemic.

Ever since Spring 2020, the team has been iterating and adapting the solution to be suitable for the healthcare sector. Prototype testing revealed that they needed to better balance between cost and functionality. To illustrate the tension, early feedback showed that carrying heavy food and other equipment requires a strong motor, but the strong motor means that the robot makes a lot of noise. This noise issue – the team learned – is a very important concern to doctors and nurses. It was so important, in fact, that the staff wanted to treat the COVID-19 patients themselves rather than rely on the noisy support of the Beetle Bot. This was an unexpected insight.

The team rolled up their sleeves and got to work developing a better robot for hospital use. It needed to be cost effective, strong, and quiet. The cost of development was very high. This was because the hardware was costly as the team had to experiment through lots of trial and error to come up with a complete solution. Also, software development took a lot of time and effort in R&D. One of the main technical challenges apart from the noisy motor remained the issue of making the robot fully autonomous, which has taken the team over two years to solve. The delivery function is very useful but only when it's fully autonomous. To address this, the team has been working to remove redundant parts and

optimize the design so the motor slows down and makes less noise. Now the new robot moves very smoothly, and crucially, quietly.

“In the beginning we made many mistakes – we came up with the product ourselves because we found it useful but to make it actually usable in the hospital setting, it’s important to understand the end-user demands,” Quang said. “Some of the features we initially thought were important, were not very useful in the end. Multiple functions including disinfection and video were too much,” he shared. In this case, the team adopted the mantra that “less is more.” They realized that the most important thing was to understand the demands of the end users. “We learned this through a lot of surveys, discussions with the team, and many different mockups,” Quang shared. Some of this feedback they got through UNDP-hosted webinars that connected the hospitals and development teams in aiming to strengthen the ecosystem of robotic developers for health. The team then spent nearly a full week in the hospital to deploy the robot and discuss the opportunities and challenges with the doctors and nurses in the field.

Overall, COVID-19 didn’t change the long-term vision for the AIOZ team, but opened up new opportunities – the hospital delivery robot being just one use-case. The team, however, is more determined than ever to use their knowledge and expertise in robotics and AI to address sustainable development challenges. The long-term vision for the Beetle Bot is to add more features so it can work in other settings such as restaurants, airports, or universities. Since the key function of the robot is delivery, its use can be applied to multiple sectors. “To adapt it for other specific sectors, we need to do more research, especially further discussion with the new clients as every sector is different,” Quang explained. “For instance, medication delivery is different from food. We need to make the robot safe and clean and customize based on end-user needs,” he continued. Overall, the value proposition for the product is a “low-cost solution to reduce manual work for humans.” Automation of manual work holds a huge opportunity to boost productivity, efficiency, and competitiveness which are the front and center of Vietnam’s economic development. “We see a bright future of robotic applications in healthcare in the form of delivery robots in hospitals or service robots for taking care of the elderly,” Quang says.

Policy strategies for the future of inclusive innovation

Focusing on the bridging of policy, theory, and practice of inclusive innovation, we suggest ways in which governments, in particular, can build on and strengthen approach.

1. Coordinate cross-government action towards inclusive innovation

Innovation promotion tends to be the responsibility of ministries or departments that oversee science and technology policies or economic and industrial development. These departments often prioritize supporting the development of new technologies and building up regions, sectors, and firms that already have high economic growth potential. Meanwhile, responsibility for questions relating to inequality, poverty, and social growth tends to sit within ministries of social affairs. Cross-fertilization of ideas and solutions between these areas could be a powerful stimulus for inclusive forms of innovation, to orient towards solving environmental and social challenges, and to think of innovation beyond a high-tech sense. However, the mechanisms to allow for collaboration across government in these areas are often underdeveloped or lacking.

In the Philippines, the government has tried to address this challenge by framing the country's innovation law as an Inclusive Innovation Industrial Strategy. Government stakeholders told us that the new law's intention is to make the Filipino innovation system more cohesive and to ensure that science, technology, and innovation policies promote social inclusion, as well as technological invention.¹⁶ Within the Philippines, the National Economic Development Authority has been tasked with creating a cross-government National Innovation Council, which will bring together all the main government departments with innovation responsibilities to increase R&D in both high-value sectors and to address social challenges – particularly those that affect low-income groups.

2. Tailor innovation support models to local needs

There is enormous pressure to build local Silicon Valley–styled ecosystems. Such clusters promise a panacea: to advance disruptive innovation, which in turn boosts productivity and spurs job growth. In order to do so, policymakers may study which policies have been pursued in the Valley, or more proximate innovation clusters. However, copying what has worked elsewhere is unlikely to prove effective locally, if initiatives are not tailored to fit the local economic conditions, social values, and needs of a country's government and its people. The innovator responsible for the Rice ATM offers a vivid example of the role of a context-relevant solution to a challenge faced in urban Vietnam during the COVID-19 pandemic, as detailed in Box 5.3.

Multi-stakeholder dialogue processes can advance a shared understanding of inclusive innovation, one that goes beyond seeing innovation as synonymous with technological advance and explores structural impediments, such as education, to wider society's participation in innovation. For example, a workshop organized by the UNDP in Hanoi in December 2019 brought together government policymakers from multiple ministries, union representatives, and researchers to define inclusive innovation policy in the

Box 5.3 Rice ATM: innovation to bring people together, without transmitting COVID-19

By Berlin Tran, Lecturer at the University of Economics Ho Chi Minh City

I saw that there were thousands of people wanting to do charity, and there were thousands in need of essential food.

In 2020, around five million workers across Vietnam struggled without income due to the fallout of COVID-19. The situation was especially dire for the informally employed and low-income laborers, workers without contracts, and youth and elderly workers, many of whom lost income overnight when strict measures like social distancing and lockdown were implemented. Their families could no longer afford even the most essential thing – food. At the same time, philanthropists were lost as to how they could give out food to the poor without creating a crowd and potentially a viral hotbed. This dilemma was noticed by Hoang Tuan Anh, an engineer and businessman in Ho Chi Minh City.

Mr. Hoang pieced together the simple technologies his company possessed to create a semiautomatic rice dispenser, which he called Rice ATM, to connect support givers and recipients.

Mr. Hoang is a mechanical and electrical engineer and runs a company, called Blue Universe, that distributes electronic locks and designs solutions for smart homes. When social distancing and lockdown were implemented nationwide in 2020, he saw that, with widespread and sudden redundancies, not only informal workers but even a “typical [Vietnamese] salaryman” might not be able to afford “daily meals” for oneself and his/her family. Moreover, he was able to witness firsthand the socioeconomic fallout of COVID-19 among the poor, since his shop was located in one of the less affluent districts of Ho Chi Minh City. At the same time, Mr. Hoang noticed that the philanthropy community was “[at a] loss with COVID,” even though it had always been quick to volunteer and make charitable donations during crises:

We have a national spirit, a strong sharing and giving spirit, [but] the Government called for not crowding, and any charity work might create a crowd, then a viral hotbed, so everyone was concerned and nobody knew how to help others.

Thus, the engineer discovered a key problem caused by the pandemic in Vietnam – a lack of “means to connect support givers and recipients.” This motivated him to develop a solution.

His solution was a semiautomatic dispenser of rice, called Rice ATM. The machine comprised a human-sized box (like an ATM) and a rice container, which were pieced together with the technologies and machineries he had around the shop, including an electronic lock with camera, a water tank (to contain rice), and a lock-testing machine repurposed into a flow controller for outgoing rice. To use the ATM, a person first presses a button on the box, which turns on the electronic lock, which is also installed; the lock then sends video feed to an operator working remotely who, with a smartphone, can then see the person coming for rice and control the ATM to release it. Mr. Hoang engineered the ATM in a way that it could run 24/7 and dispense rice at a rate of five to ten packets per minute, each weighing 1.5kg–2kg. The first ATM was installed in front of his shop, dispensing rice donated by friends and family. Hand sanitizers were also provided, and there were drawings on the ground to help users queue at two meters apart; a member of staff, including Mr. Hoang himself, was always present for assistance.

The Rice ATM addressed multiple issues at the same time. To begin with, there was no physical interaction between rice donors and recipients, and in fact donors could send rice and recipients could come and use the ATM at any time. Neither did recipients need to crowd or fight over the rice, as Mr. Hoang had engineered the ATM to be fast and always operational:

Normally the mentality is that people crowd because they don't want to lose their portion. I tried to change this way of thinking by letting the ATMs run 24/7, and rice was never depleted, so no one had to crowd or wrestle for a portion, they could come any-time, midnight was okay, 1 or 2am was okay, so they would not feel missing out.

Fairness was also ensured, in that the ATM video recorded who had received rice during the day, so if the same person came multiple times, the remote operator could control the machine to not release rice. This had the added perk of preventing quarrel: "As givers it is hard for us to refuse them, and this can cause quarrels. But a machine can refuse." Finally, the ATM was a scalable solution, being small enough to transport in a minivan and simple enough to be installed in the streets and operated by anyone with a smartphone.

The very first ATM went viral on social media after Mr. Hoang showed it on Facebook to call for rice donation, and shortly afterwards the mainstream media picked up on the story. Thanks to such coverage, he received "tons more rice" from philanthropists and managed to offer

his solution to various provinces across Vietnam for free. In the end, he made over 100 ATMs, 30 of which were gifted to the government, and the amount of rice dispensed was approximately 10,000 tons, worth around US\$5 million. Perhaps most importantly, the engineer made his design an open intellectual property by letting news channels and content creators on social media film the inner workings of the machine, as well as how he himself conducted the operations (e.g. loading rice, managing queues). Speaking about his contribution to Vietnam's response to the pandemic, he humbly said:

My role was very small. What was important was that I could connect people who were willing to help with people who needed help. Hence, we created this butterfly effect.

Since the first Rice ATM, many people were inspired, and different versions of the machine were created to adapt to different contexts. For instance, one adaptation was a nonelectric ATM that could be operated with a foot pedal, thus suitable for rural and mountainous areas where there are shortages of electricity. Looking ahead, Mr. Hoang's intention is for the government to continue using the rice ATMs to help the vulnerable, especially during other pandemics or natural disasters. Through the Ministry of Foreign Affairs, he sent some ATMs to Cambodia, India, Myanmar, the Philippines, and Timor-Leste. For Mr. Hoang, the most important thing is that "when people face difficulties, rice still flows from the ATMs to their rice cooker."

local Vietnamese context.¹⁷ Participants explored which international models could be relevant, as well as how existing local policy efforts could be adapted to better drive innovation that delivers economic and social benefits. One of the key takeaways was that innovation is currently too narrowly understood in relation to science and technology policy; efforts need to be taken to advance an understanding of innovation that is in line with Schumpeter: that of a novel product or process that stands to boost productivity, not necessarily an information and communications technology.

3. More inclusive policymaking processes

A key observation from our field research is that there are emerging efforts to involve those who stand to benefit in policy design and governance. Without such participation, inclusive innovation policymaking poses the risk of creating a system where people are innovated for, but where they have little agency to represent themselves as problem-solvers. To deliver a positive impact, the

policy-making process needs to begin with giving a voice to those who are impacted, to ensure that efforts are “by, for, and of” society, rather than emanating from elsewhere.¹⁸ The policy-making process should be informed by the mantra that the problem-owners should also be the problem-solvers.

What is shaping the future of inclusive innovation?

Our research found a clear interest on the part of government policymakers and other actors in the ASEAN region to use innovation as a means of addressing societal and environmental challenges and bringing more people, places, and sectors into innovation ecosystems. But we also observed a general lack of coordination within governments on this agenda, and a disconnect between what is happening inside and outside government. Many of the socially-oriented tech startups we spoke to in the region felt like they were operating without the funding, policies, and regulations required to really develop or scale up their solutions.

Our research team conducted a horizon scan in June and July 2021 by canvassing social media (Facebook, Twitter, and Instagram), blog posts (e.g. Medium), and news sources (national and key newspapers in each country and across the region). We also looked at Google Trends, to see what was trending, and completed a keyword search on Medium, searching for keywords and for a given year (e.g. 2021). The keyword strings used were similar to those that we used to identify inclusion innovation content and trends more broadly for the study. The difference here was that we covered a broader and different set of sources: social media, news, and press releases rather than published books, articles, and policies. The aim of the exercise was to find what is on the horizon but is not yet obvious.

The horizon scanning was completed across a few steps. After the keyword search, the research team used Miro – a collaborative online platform for sharing ideas and stories – prompts to pull together examples, links, images, etc. Then we conducted a Miro-based session to assess themes and codify the signals (as weak or strong) and the drivers and trends. We are aware that these themes are not wholly new, but in our scanning, we see them as rapidly emerging towards the mainstream of policy and practice. Here we highlight the three emerging themes most evidenced in the variety of traditional and social media sources we analyzed: sustainability, digitalization, and financial inclusion.

Sustainability

Policies geared towards sustainability, in both the government and corporate world, have been on the uptick lately in Southeast Asia. Policies intended to propel sustainability are guided by a few factors across the region. First of all, COVID-19 has served as a critical juncture, giving the world an opportunity to reevaluate our unsustainable relationship with the planet. More awareness

regarding resource exploitation has emerged, as seen with the UNDP and the Swiss State Secretariat for Economic Affairs partnership to foster sustainability in Indonesian palm oil production.¹⁹ Similarly, in Vietnam, the MPI aims to raise investment and resources in advanced technologies for green growth and more efficiently use natural resources. Efforts have been growing since the country adopted the five-year Vietnam Country Planning Framework in 2016.²⁰ Since the onset of COVID-19, sustainable tourism is being pursued at a greater rate, with policymakers presenting this type of tourism, which is respectful to local heritage and protects the environment, as a form of green growth.²¹

Digitalization

There are policies indicating that digitizing the future of the workforce is on its way. For instance, in May 2020, the Philippines Department of Science and Technology (DOST) launched the Science for Change program (S4CP) to accelerate the use of technological innovation in Filipino businesses.²² Under the program, the aim is to have the innovation capacity of the Philippines levelled up by introducing new technologies, and new machinery, to Filipino businesses. In addition to wider industrial inclusion efforts, awareness of demographic differences in participation rates is growing. For instance, women in the Philippines are increasingly involved in digital workspaces, in recognition of their historically low rates of participation and the opportunity for change, as presented by COVID-19.²³ Policies are, collectively, striving to help local businesses to harness the latest digital developments and technology, and purposefully increase the rates of participation of underrepresented groups.

Looking at the demand side of the market for entrepreneurs, while e-commerce was already prevalent, the pandemic catalyzed a major rise. For businesses, e-commerce has been a means to reach customers under lockdowns, or those who are less keen to shop as normal. By moving online (small) businesses avoid the costs associated with volatilities in inflows of customers and can open and close businesses at the whim of restrictions.

Financial inclusion

Southeast Asia is home to one of the world's largest unbanked populations. According to a study by KPMG, as of 2018, only 27 percent of those living in Southeast Asia had a bank account.²⁴ This leaves a huge gap in banking penetration, with around 438 million unbanked individuals. In poorer countries such as Cambodia, where the figure is 5 percent, the numbers are even lower. Lacking access to financial services has created barriers to escape poverty as it is difficult to have savings or borrow money without bank access.²⁵ This problem can be translated into opportunities for services such as mobile financial services or other financial products leveraging digital platforms and technologies.

Policies are strengthening around the aim of growing financial inclusion. With the pandemic sprang an onslaught of new businesses being established and operated from home and therefore many people in need of financial products and services to effectively run their companies. Women-led businesses have, in particular, received support given this shift. In Indonesia, the Ministry of Women Empowerment and Child Protection is providing training and digital literacy courses to women who own micro businesses.²⁶ In a similar vein, the initiative Rebuilding Better: Fostering Business Resilience Post-COVID-19 – launched by the International Labour Organization (ILO) and the JPMorgan Chase Foundation in February 2021 – aims to help women entrepreneurs by leveraging digital tools to access critical support services, such as financial resources, training, market information, and networks.²⁷ More generally, financial inclusion is also being observed with the expansion of fintech to underserved populations. This trend can be observed in the Philippines where Bangko Sentral ng Pilipinas is launching several programs, such as providing 70 million free national IDs to make banking more accessible.²⁸

While these emerging forms offer promise, the risk of “inclusive innovation washing” is something to worry about. As one of our advisors lamented, if inclusive innovation includes everything, then it means nothing. In this book we have worked to build a bridge between policy and practice, and in the language used by those doing inclusive innovation, and those researching it. What we did not include were activities or products that were either not new or novel, and so, not innovative. We also did not profile innovations that did not have environmental or social challenges central to their motivation. We hope that by drawing a line around what inclusive innovation is, we are better able to avoid the risk of it becoming a “washing” term.

A call to action for the future of inclusive innovation

Though much of what we have covered in this book has been current to the early 2020s, we close by underscoring that while inclusive innovation as a term is relatively new, the underlying idea is not. The notion of supporting technological innovation for social and environmental benefit for the local context began with the AT movement in the 1950s. The movement was asserted as a strategy to assuage the tendency towards innovation investments in – and the gains being captured by – the rich, industrialized world.²⁹ In emerging economy contexts, AT emphasized the promotion of locally-relevant technological capabilities and minimal environmental damage.

The particular language of inclusive innovation came, as mentioned in Chapter 1, when Mark Dutz coined the phrase in a 2007 World Bank report on sustainable innovation in India. He defined it as “knowledge creation and absorption efforts that are most relevant to the needs of the poor.”³⁰ Shortly after the term appeared, inclusive innovation was invoked by practitioners, academia, and policymakers. The concept has grown in use in recent years,

and is often associated with the BoP consumers or participation in technology-centric innovation. In the contemporary use of the term inclusive innovation, technology has become synonymous with ICT and inclusion focusing primarily on social issues. A richer understanding of technology as a novel tool has been lost. And, the environmental degradation issues that were central to the AT movement have fallen by the wayside.

Our call for action is to reinstate an understanding of innovation that includes social forms, such as the Zero Baht Shop, and the Circular Design Lab, and a wider range of technologies, as in the Rice ATM, SJI, and Proximity Designs examples profiled in this book. Tech for environmental and social good – as epitomized by DMap, Learning Coin, and the EY STEM app – is part of inclusive innovation, but is not the only way. Multiple stakeholders can come together in new ways, as in FemLab.Co, and innovations can include new low-tech products, such as ABC Bakery’s “pink bakery movement,” to simultaneously address both environmental and social challenges and to link urban and rural populations effectively.

It is clear that there is growing momentum and opportunity for inclusive innovation to drive substantive societal and environmental impact in Southeast Asia and beyond. Throughout the book we have revealed how a range of actors – including academia, civil society, funders and investors, governments and international organizations, grassroots innovators, large firms, startups, and SMEs – are advancing innovation that has environmental and societal aims at the heart. Policymakers and practitioners alike are aware of the myriad causes and consequences of exclusion, and so approach innovation in order to benefit wider society, to drive equity, and advance regenerative futures. The risk, though, is that efforts continue to take a narrow view of innovation and inclusion.

Now is the time for inclusive innovation’s theory, policy, and practice to come together, so that the term does not come to be used disingenuously, nor used in too restrictive a way. For instance, in *The Dark Side of Social Enterprises*, it is argued that it is important to look beyond “the myth of impact” and to be open to the fact that enterprises could be “corrupted by conflicting motives and the pursuit of private gain.”³¹ There are also critical development frameworks that strive to go post-development, by taking a human-centered, pluralistic approach.³² Inclusive innovation is not a panacea, as these critiques rightly note. But, orienting towards addressing intersectional environmental and social challenges through a variety of innovation paths, as we have shown in this book, is a promising alternative. More of society can be empowered to innovate in response to environmental and social challenges they are experiencing in their local context.

We close with our Call to Action. Academics, policymakers, and practitioners can come together to take forward an understanding and practice of inclusive innovation that sees problem-owners as problem-solvers, environmental challenges as central, and innovation as wider than ICT. Join us on LinkedIn at the #InclusiveInnovation Community of Practice. Share

your story, and connect with others active in the space. Let's together advance research, dialogue about what works, and what doesn't, in terms of innovation that has environmental and societal aims at the heart.

Notes

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- 3 Heeks, Foster, and Nugroho, "New models of inclusive innovation for development"; Zehavi and Breznitz, "Distribution-sensitive innovation policies."
- 4 Glennie, Ollard, Stanley, and Klingler-Vidra, *Strategies for Supporting Inclusive Innovation*.
- 5 Cozzens and Thakur, *Innovation and Inequality*.
- 6 Planes-Satorra and Paunov, "Inclusive innovation policies."
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