Global Practices for Building Innovation Ecosystems

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Introduction to Innovation Ecosystems
What is an innovation ecosystem?

An innovation ecosystem is a network of organizations and individuals with assets such as human creativity, business acumen, scientific discovery, and investment capital. These organizations and individuals come together to cultivate ideas so they can grow into vibrant enterprises and competitive industries that create positive societal and economic impacts.

Similar to a natural ecosystem in biology, a healthy innovation ecosystem is formed by the quality and frequency of the interactions of a community of people, companies and institutions.

Adapted by RTI from: The Rainforest: How to Create the Next Silicon Valley
Innovation Ecosystems are Active Networks

- Ecosystems are much more than a collection of organizations; their value derives from their connectivity and interactions.
- It is important to view innovation ecosystems as a complex network of organizations and individuals with human creativity, business acumen, scientific discovery, and investment capital assets.
- Healthy ecosystems involve continuous interactions between the elements of this network. These are often described as “nodes” or “collisions”.
- When these collisions take place and coalesce around ideas, they can grow into vibrant enterprises and competitive industries that create positive societal and economic impact.
Considerations when Building an Innovation Ecosystem

- Realization that there is no “one size fits all” approach. **Customization** is required.

- Stakeholders across **institutional sectors** (e.g. government, academia, private sector) and **industrial sectors** (existing and future growth) need to be part of the strategy.

- **People** are the source and drivers of innovation. A strategy has to focus on developing talent and consumers who are positioned to participate and engage in an innovation economy.

- A **sense of urgency** to impact positive change is needed, but also a **patience** to understand that innovation for economic growth takes time. **Persistence** is rewarded.

- Innovation ecosystems are highly dynamic and need **constant attention**.
Benefits to Industry, Government and Higher Education

An innovation ecosystem starts with the triple helix as a base: **academia, private sector, and government** working in collaboration, often with an impartial intermediary, for a collective vision of economic development. Other sectors can also be important (non-profit, environmental) expanding the dimensions of the helix depending on development context.

Each sector benefits from collaboration, and the ecosystem creates outputs greater than the sum of their parts.
Returns on Investment in the Innovation Economy

Research Expenditure and Product Complexity

Investments in innovation are closely connected to economic growth.

Hidalgo and Haussmann's “product complexity index” (PCI) measures a country’s diversity of production and specialization of products, and is an accurate predictor of growth of GDP per capita.

Higher levels of R&D expenditures (X-axis) are correlated with a higher PCI (y-axis), indicating a correlation between research spending and economic growth.
How do Policymakers Support Innovation Ecosystems?

Countries tend to embrace a national vision for innovation supported by a portfolio approach to policies and investments to foster multiple ecosystem components.  

1. Create a **national policy or vision** to align efforts around innovation, which includes an **overarching organization to effectively coordinate** government agencies and **harmonize policy and regulation**.

2. Create policies that **incentivize the private sector and universities** to:
   - invest in R&D, entrepreneurship, and business growth
   - produce an innovation ready workforce ranging from researchers, technicians, to consumers
   - incentivize university-industry collaboration
   - stimulate private and public capital formation to invest in innovation
   - locate in co-working, co-creation spaces such as science parks, innovation districts, business accelerators, or other shared spaces.
Some Tactical Ways to Build an Innovation Ecosystem

How do we create a culture of entrepreneurship that increases chances of long-term success?
**Foster Effective Entrepreneurship Programs**

How can a government strengthen its policy tools to effectively foster growth in its innovation economy?
**Creating Policy Infrastructure for Innovation**

How do we match our innovation assets with sectors primed for rapid and sustained growth in global markets?
**Identify Industry Sectors for Growth**

How do we know what’s working? How do we build on success? What should we invest in next?
**Assess Initiatives for Effectiveness & Impact**

How do we better align university output with industry needs to produce market-ready technologies and job-ready graduates?
**Strengthen University-Industry Alignment**

How do Small & Medium Enterprises with limited resources find and adopt technologies and processes so that they can grow and thrive?
**Drive Technology Adoption in SMEs**

How do we produce a skilled workforce in the right numbers and with the right qualifications to propel high-value industries?
**Develop an Innovation-Ready Workforce**

How do we convert R&D investments into commercially valuable new products, processes and services?
**Accelerate Technology Commercialization**

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How do Countries Fund Innovation Ecosystems?

- Like policies, funding an innovation ecosystem requires a portfolio of investments in **strengthening the building blocks** of the ecosystem and **intensifying interactions**.

- Human capital, technology, and culture are the **foundation** of an innovation ecosystem. Other **actors and organizations serve as the assets that need to be built out** to bolster the frequency and quality of the intersections within the innovation related networks.

- The World Bank notes that the **most successful funding programs are based in partnerships between the triple helix**—industry, university and government.

- We provide **examples** of how countries fund ecosystem components in the following slides.
Investments in Human Capital

*People drive innovation, not technology or institutions.*

- Kenya’s ICT Authority created public-private and government to government partnerships to build ICT skills in graduates and existing workforce in the country. Some of these include:
  - **CodePamoja**: an ICT training program set up to promote ICT literacy capacity, and innovation and enterprise development
  - **Government of India’s Ministry of Telecommunication and IT**: Collaborate in public sector training for IT development and promotion of ICT investment, partnerships and market
  - **Huawei Technologies Co. Ltd**: Collaboration through internship mentorship and training programs for engineering students, provision of technical infrastructure to academic institutions, among others.
  - **Oracle Technology Systems Ltd**: Collaboration through IT skills development programs and initiatives, internship and mentoring opportunities
- The ICT Authority budgeted $26.6 million for its ‘Human Capital’ activities in its Strategic Plan 2013-2018
Investments in Information Technology Infrastructure

IT & Broadband Internet are the enabling infrastructure for an innovation ecosystem.

- South Korea’s technology infrastructure has dramatically advanced in the last 20 years.
  - In 1990, .02% of the population were internet users, by 2015 90% of the population used the internet.
  - Broadband speeds are the fastest in the world (Technology Inquirer).
- South Korea has invested in technology infrastructure since the 1987 Framework Act on Informatization Promotion, a highly ambitious technology development plan. Since the Act, South Korea has spent more than 5 billion dollars on connectivity efforts.
- Most of South Korea’s investments are joint ventures with the private sector. In 2003, the Korean government jointly invested 2.1 billion dollars with mobile carriers to upgrade the the nation’s multi-media network (Telegeography). More recently, 1.5 billion dollars were pledged to lead South Korea to 5G mobile standards by 2019.
Investment in Culture, Value and Norms

An innovative culture sets norms that foster trust among actors and supports risk taking.

- Malaysia’s Global Innovation and Creativity Centre (MAGIC) creates a risk-taking, entrepreneurial culture through its full suite of programs and by hosting frequent public events and meetings to celebrate and promote entrepreneurship. Some of its programs include:
  - Mentorship—young people are connected with skilled entrepreneurs to grow and learn from their experiences.
  - Global Accelerator Program—Builds a community of start-ups by targeting assistance to 80 new start-ups to get them investment ready.
  - Social Enterprise Venture—Capital fund for sustainable youth-driven social projects.
  - Impact Driven Enterprises—Inspires businesses to become a force for good by providing accreditation to impact driven enterprises, allowing them access to new markets and capacity development programs.
Investments in Support Services

Support service providers such as business accelerators, entrepreneurship organizations, science parks, or cluster organizations create structure and mechanisms to connect within the innovation ecosystem.

China’s Zhongguancun Science Park brings together research universities, labs, manufacturing facilities, business services, and corporate headquarters to attract entrepreneurs and innovators.

- Tech entrepreneurs have easy access to business services through incubators and accelerators
- Local university researchers have access to SMEs and large businesses to conduct applied research.
- In 2017, Expert Market named Beijing as the world’s top tech hub, led by the Zhongguancun district’s booming startup scene.
Investments in Capital

Access to capital is the entryway for entrepreneurs with viable innovations to reach market potential to aid in production and expansion.

- The mission of Chile’s Economic Development Agency (CORFO) is to transform Chile into a global innovation and entrepreneurial hub.
  - CORFO has an early stage venture capital tech fund that connects entrepreneurs with investors.
  - CORFO’ has seen a 35 percent increase in public financing for the fund.

- Malaysia's Cradle fund mission is to create a strong innovation ecosystem that supports the development of new ideas and represents the governments effort to increase the quantity and quality of innovations.
  - Incorporated under the Malaysian Ministry of Finance in 2003
  - In the past 13 years, Cradle has funded over 700 Malaysian tech start ups
  - Cradle Seed Ventures established in 2015 to expand the fund’s portfolio to equity investment.
Cross-Ecosystem Investments

STRIDE is the U.S. government’s largest higher education project in the Philippines. The 5-year project strengthens the Philippines capacity for innovation-led inclusive growth through bolstering human capacity development in science, technology and innovation (STI) and strengthening applied research capabilities in the Philippine universities and industry.

- 189 industry partners, 109 academic partners
- 30 innovation workshops with 1,923 participants
- 89 guest industry lectures with 56 different speakers
- 93 faculty externships at 14 hosts companies
- 7 knowledge and technology transfer office workshops engaging 39 universities
- $5.5M USD research grants awarded for 68 R&D projects, 35 with direct links to industry
The National Institute of Standards and Technology’s Hollings Manufacturing Extension Partnership (MEP) in the United States works with SME’s to help them create/retain jobs and grow revenue/profits. The program addresses the following challenges.

- SMEs may have costly process issues that can be solved with new technologies
- SMEs need to determine whether to invest resources in a new idea, product, or capability.
In December of 2014, the Saudi Arabia Advanced Research Alliance (SAARA) was launched to drive innovation and technology commercialization throughout the Kingdom. SAARA is a “first-of-its-kind” coalition between the private sector, academia and government agencies engaged in S&T/innovation.
Advanced Functional Fabrics of America (AFFOA) is a $317M USD million public-private partnership designed to accelerate innovation in high-tech, U.S.-based manufacturing involving fibers and textiles. The program focuses on both developing new technologies and training the workforce needed to operate and maintain these production systems. It includes a network of community colleges and experts in technical education for manufacturing.

- Partnership includes 32 universities, 16 industry members, 72 manufacturing entities, and 26 startup incubators, spread across 27 states and Puerto Rico.
- $75M USD from the U.S. Department of Defense is matched with funding from industrial partners, venture capitalists, universities, nonprofits, and states.
Lessons from National Innovation Ecosystems
Lessons Learned

Globally, there is no “one size fits all” approach or “quick fix” for creating an innovation ecosystem. It requires a long-term vision and a coordinated, intentional effort across institutions and agencies. As we reviewed the paths other countries have taken, we identified seven common practices that support implementing that long-term vision and coordinated effort.

1. Establish a coordinating organization
2. Set innovation plans and stick to them over time
3. Invest in education
4. Invest in R&D
5. Strengthen university-industry partnerships
6. Have an industry sector focus
7. Create places to innovate

We reviewed overarching policies and programs from seven peer countries: Malaysia, Vietnam, South Korea, Kenya, Mexico, the Philippines, and Vietnam.
Innovation Ecosystems are a Long-term Effort

They require vision, investment, and coordinated intentional effort across institutions

• An innovation ecosystem is the result of multiple policies, programs, and actions implemented over time.
  • They require coordination and investments across institutions, actors, and agencies.
  • There is no “silver bullet” for creating an innovation ecosystem. A portfolio of policies and investments build and strengthen ecosystems.
  • Successful ecosystems have a long-term vision and require sustained investment from public and private sources.
Example: Long-Term, Multi-Faceted Approach

South Korea’s success as an innovation economy dates to the 1960s, when its manufacturing firms began to move from OEM production for multinationals to the creation and adoption of domestically developed technologies.

- Leadership of the Ministry of Science and Technology and Korean Institute of Science and Technology, founded in 1960s.

- Skilled labor force, strong R&D spending from private and public sectors, and consistent reforms to the business climate helped the country remain competitive.

- In financial crises (1997, 2008), Korean firms continued to invest in R&D.

1: Establish a Coordinating Organization

Embracing innovation as a means of economic growth often entails a new way of working for government. Supporting innovation does not fit neatly into one agency’s purview. It crosses many functions and touches many organizations. Coordinating agencies help set the shared vision, facilitate collaboration among different organizations, and mitigate any “turf wars” among existing entities that may stymie progress towards larger shared goals for economic transformation.

- Coordinating organizations oversee the development and promote the growth of the national innovation ecosystem.
- Additionally, central coordinating bodies promote communication between science, industry, government and education leaders.

Innovation ecosystems are complex and involve multiple actors. A coordinating organization helps to facilitate transactions and support the foundation.
Examples: Coordinating Organization

- **Korea’s** National Science and Technology Commission was reconstituted in 2011 as a coordinating agency with responsibility for national STI policies and allocation of public R&D funding.
- **Mexico’s** 2002 S&T law established the National Council for Science and Technology (CONACYT), which allocates funds towards key sectors and applied research and is the country’s S&T entity.
- **Kenya** created National Commission for Science Technology and Innovation (NACOSTI) in 2013 to support the country’s emphasis on a strong foundation of ST&I in its Vision 2030. The commission has advisory, regulatory, coordinating and promoting roles. It budgeted $24.3 million USD in its 2014-2018 Strategic Plan.
2: Set Innovation Plans and Stick to Them

Innovation crosses institutional and industry sectors and is leveraged differently for economic development depending on geography and the kinds of people participating in the innovation economy. To address these issues in a wholesale way, many countries create national innovation plans. More importantly countries actively and intentionally follow their plans by committing to the ideas, goals, and targets they establish.

- Once plans are created and followed, we also observe that governments review progress, and every 5 – 10 years refresh the plans to adapt to current needs, opportunities and the economic climate.

- The distinction between countries that create plans and the countries that make progress towards the plans goals is political will. Leadership from the highest levels send signals about the importance of innovation and the commitment to this long-term investment.

- Countries like Singapore, Malaysia, Costa Rica, Korea, Rwanda, and China have demonstrated political will set and commit to an innovation driven economy. When leadership is not fully committed investments and support become erratic resulting in many “stops” and “starts” and making it difficult to seed systems level investments and change.
In the last 6 years, more than 50 countries have launched National Innovation Plans

2: Set Innovation Plans and Stick to Them (continued)
Examples: Setting Innovation Plans and Sticking to Them

- **Malaysia:** aims to be a high income country by 2020. It has been targeting growth towards innovation for 44 years.
  - Founding of MOSTI (1973)
  - First R&D budget established (1990s).
  - R&D funding doubled from 0.6% of GDP (2006) to 1.3% (2014) and they are aiming for 2% by 2020.
  - Tenth Malaysia Plan (2011)
  - Eleventh Malaysia Plan (2016)

- **Vietnam:** has a 2035 report
  - Building National Innovation Capacity
    - Focus on improving productivity, investment environment, and R&D spending by private actors
    - Focus on university-industry linkages and relevance of skills in labor force
3: Invest in Education

*People are the innovators of an economy—not technology or institutions. Investing in educating and training people to participate in an innovation economy is the most important investment a country can make to build out its innovation ecosystem.*

- Investing in education prepares workers to take advantage of job opportunities in an innovation economy and it prepared consumers to take advantage of products, services, and processes that can greatly enhance basic quality of life. Further, research indicates that an educated workforce is often one of the most important ingredients that creates an attractive climate for innovative companies to start, grow, and locate.

- With business and other organizations growing in an innovation economy, there are more opportunities that entice local talent to stay in country, mitigating "brain drain".
Examples: Investing in Education

- **Philippines** has worked to raise the quality of higher education institutions since early 1990’s by raising the quality of current higher education institutions instead of building more and supporting graduate scholarships to incentivize and reward research undertakings and outputs from Universities.

- **Vietnam** has the highest education expenditure among ASEAN countries. Over the past 10 years, it has been successful in expanding access to tertiary education. Both the Higher Education Reform (2005) and the Higher Education Law (2012) set ambitious goals for raising capacity, quality, and efficiency while giving higher education institutions greater autonomy.
  - Enrollments increased 57% between 2005 to 2012
  - Faculty members with PhDs increased by 54% between 2005 and 2012
4: Invest in Research and Development

People around the world are looking for ways to improve their lives through better products, services, and processes. R&D is the process by which new ideas evolve into products, services, and processes can reach markets. It is also the mechanism that countries use to unleash local talent and help them become innovators.

- Investing in R&D is a key component of a national innovation ecosystem.
- South Korea, Kenya and Mexico have each set goals to increase the percent of GDP invested in R&D.
- Many countries aim to invest 2.0% of GDP for innovation. 15 countries are investing at this benchmark as of 2014.
- Ideally there is a blend of funding from both the public and private sector. Typically the public sector is an investor in earlier more risky research which the private sector invests in more applied research.
Examples: Investing in R&D

- **South Korea**: R&D expenditure went up from 0.25% of GDP in 1963 to 2.8% in the early 1980s, and investment quality improved enormously. It is now a world leader with 4.3% of GDP invested in R&D.

- **Kenya**: Research Fund has been established under the National Council for Science and Technology in 2013. The initial allocation for the fund was of $2.43 million USD, which increased to $4.83 million USD for the 2015-2016 fiscal year. It funds multi-disciplinary projects in line with the country’s national priorities.

- **Mexico**: The 2014-2018 Program for Science, Technology, and Innovation sets government funding for STI, with a goal of R&D reaching 1% of GDP by 2018 (0.54% in 2014)
5: Strengthen University-Industry Partnerships

Universities and industry often are awkward partners. They often lack the experience, culture and norms for how to work together effectively towards mutually beneficial outcomes. Universities and industry tend to work to different timelines, outcomes and purposes. Yet when paired together they create a powerful synergistic combination that can accelerate the development of an innovation driven economy.

• Strengthening university-industry partnerships can limit brain drain, train the workforce to meet immediate employment demands, and align research towards viable commercialization opportunities.

• Incentives or ways to encourage collaboration take many forms but can include:
  • Joint R&D grants/investments
  • Curriculum development
  • Internships/externships
  • Professional sabbaticals in companies
  • Shared spaces that attract business people and academics to the same location, such as research parks, incubators/accelerators, shared laboratories, innovation districts.
Examples: University-Industry Partnerships

- **Kenya** is focusing on strengthening university and industry linkages, particularly through externship-like opportunities.
  - It is also linking industry to training with policy goals to:
    - Place 10,000 students on industrial attachment.
    - Train 5,800 students in industrial skills.
    - Examine all individuals who register for trade test exams.

Since 2007, university-industry collaboration in R&D increased from 3.22 to 4.22 in the World Economic Forum executive opinion survey, along with an increased perception in the capacity for innovation.
6: Have an Industry Sector Focus

Innovation ecosystems is a sprawling concept. It can be difficult for decision makers to focus how to best invest in the ecosystem for economic transformation. One way governments target innovation investments is to identify a subset of industries with the most potential for economic impact through innovation. This can provide a framework to help governments prioritize investments and coordinating activities.

• Potential for impact can refer to many kinds of economic development—future global competitor, impact to local value chain and thus many associated businesses, impact to workers or consumers (e.g. improved agricultural yields or healthcare services). It is advisable to develop a strategy behind the target industry sectors.

• The Philippines, Kenya, Malaysia, and Mexico have developed specific industry programs and policies within their innovation strategies to focus growth.

• Korea, Taiwan, Japan, and Singapore focused on industry sectors for growth as part of their economic transformation in the 1990’s.
Example: Industry Sector Focus

- **Kenya**: Vision 2030 has a focus on innovation to drive the development of a formal ICT industry sector. The government created micro/SME centers of excellence led by the Ministry of Mining to focus research.

- **Mexico**: National Council for Science and Technology, founded in 2002, aligned government S&T funds towards key sectors for growth in the country. It allocated funds towards key sectors and applied research such as sustainable energy, agriculture, and technological development in energy, among others.

- **Malaysia**: Some sector-specific public funds include the ScienceFund (nanotechnology), Biotechnology R&D Grant Scheme (covering Agro-Biotechnology, Pharmaceutical and Nutraceutical, and Genomic and Molecular Biology)
Lesson 7: Create Places to Innovate

Innovation requires new geographies and physical spaces to flourish. Places to that foster ways for ideas and people to collide unexpectedly are ideal. Countries and cities seek to create places and spaces that are accessible, attract people with diverse backgrounds, and have activities/events that bring people together.

- The types of places that countries create for innovation have evolved over the past 20 years. They include a range of options, such as science and technology parks, innovation districts, and innovation hubs.
- Spaces for innovating can include co-working or shared spaces and business incubators or accelerators.
- Innovative places tend to be dense, multi-purpose, and mixed use to ensure different types of people are frequenting the location.
Examples: Creating Places to Innovate

Kenya and the Philippines have invested in building innovation hubs to accelerate the growth of their ecosystem.

- **Philippines**: invested in building its innovation infrastructure by funding the establishment of innovation hubs in strategic locations in the country with varying industry foci. With development goals of promoting and accelerating tech commercialization and utilization; these innovation hubs will make resources (assets and capital) available for startups and MSMEs.

- **Kenya**: Created the iHub in Nairobi and is currently developing Konza Technology City, a smart city that will become the country's hub for education, life science, and telecom

- **Malaysia** established Technology Park Malaysia in 1996
  - ICT, Engineering and Biotech, Telecommunications clusters
  - 241 products have been launched, 22 intellectual property registered, 861 incubates have received incubation services.
Indonesia’s Innovation Economy
Country-level indicators of investment and output of innovation can provide insights into how a country is performing over time when compared to peers.

RTI tracked indicators across five categories (see next slide) for Indonesia and six peer countries (Kenya, Korea, Malaysia, Mexico, Philippines, & Vietnam) to give an overview of trends in innovation and economic growth.

Benchmarking is a first step in gauging progress in creating an innovation economy. It is not intended to prescribe a course of action.
Benchmarking an Innovation Ecosystem

RTI tracks 5 categories of country-level metrics to understand innovation ecosystems.

<table>
<thead>
<tr>
<th>Economic Transformation</th>
<th>Movement to higher value-added, innovative products, processes, and services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP per capita growth</td>
</tr>
<tr>
<td>Human Capital</td>
<td>Educated workforce in research and technical fields</td>
</tr>
<tr>
<td></td>
<td>Post-secondary enrollment, global patent filing</td>
</tr>
<tr>
<td>Research Inputs</td>
<td>Investment in R&amp;D and infrastructure for commercialization</td>
</tr>
<tr>
<td></td>
<td>R&amp;D spending, density of researchers, scientific publication</td>
</tr>
<tr>
<td>Idea Flows</td>
<td>Openness to sharing global ideas</td>
</tr>
<tr>
<td></td>
<td>Internet users, global patent filing</td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>Creation of new, innovative enterprises</td>
</tr>
<tr>
<td></td>
<td>New businesses registered</td>
</tr>
</tbody>
</table>
Indonesia’s GDP per capita, an indicator of the growth of the economy, remains relatively low compared to peers, and, in real terms, declined from 2011 to 2015 after sharp post-recession growth.

Economic growth over the past 20 years was primarily the result of natural resource exports and good trade links with global economies.
Human Capital: Post-Secondary Enrollment

Enrollment in post-secondary education is one indicator of the human capital capacity in a country.

- Indonesia’s enrollment has increased from below 15% of all eligible in 2000 to 31% in 2014, nearly doubling over the time period.
- Its increase is in line with other peers including the Philippines, Vietnam, Mexico, and Malaysia.
- Korea consistently enrolls over 90% of its students in post-secondary education.
Human Capital: Scientific and Technical Publication

Output of scientific and technical journal articles gives a relative measure of the outputs of R&D and the human capital available.

- Indonesian researchers published nearly 3,000 articles in 2013, showing incremental growth over a five year period and outperforming some regional peers.

- Over the same period, Malaysian output nearly tripled, to over 17,000 scientific journal articles published.
Research Inputs: R&D Spending as a Percent of GDP

R&D spending as a percent of GDP captures public and private investments in innovation.

Indonesia, like Vietnam and the Philippines, has few resources dedicated to R&D. Indonesia invests 0.08% of its GDP and most of it comes from government.

Regional competitors such as Malaysia (1.2%) and global peers including Mexico (0.5%) are dedicating more resources to R&D to compete in the global economy. Global leaders like South Korea spend upwards of 4% of GDP on R&D.
Global Patent Filings

Global patent filings through the Patent Cooperation Treaty (PCT) are an indicator of intellectual property output and global impact on innovation. Patent filings in Indonesia and regional peers are increasing.

- Indonesian patent filings increased from 2000 to 2014, from 157 to 702, an increase of 347%.

However, they are far below regional and global leaders.

- Over the same time period, South Korean PCT filings increased to over 164,000.
The density of human capital dedicated to R&D, measured by researchers per million, is an indicator of the resources available and dedicated to research.

- In 2009 (most recent year available), Indonesia had 90 researchers per million people in R&D, a decline from 213 in 2000.
- Over the same time period, researchers in Malaysia increased from 274 per million to 1,070 (nearly 4x increase), and by 2014 reached 2,052 (7.6x the density of researchers).
- In 2014, South Korea had nearly 7,000 researchers per million.
Idea Flows: Internet Users

Internet users is one indicator of the connection and flow of ideas in a country.

Less than 26% of Indonesians used the internet in 2016, far behind Vietnam (46%), the Philippines (55%), and Malaysia (79%).

Use of the internet has increased in Indonesia over the past ten years, but at a slower pace than in neighboring and peer countries.
Entrepreneurship: New Businesses Registered

Number of new businesses registered per year is a measure of the ease of doing business in a country, as well as the entrepreneurial culture.

From 2004 to 2012 the number of new businesses registered in Indonesia increased by 57%. Global and regional peers saw similar increases in new business output.

Business growth is aided by improvement of the ease of starting a business, which took an average of 24.9 days in 2016. This is an improvement from an average of 164 days in 2005.
Data Takeaways for Indonesia

• Indonesia, a middle-income economy, historically experienced economic growth from natural resource exports and good trade links with global economies.

• GDP per capita remains relatively low and GDP growth has slowed compared to peers.

• Additionally, Internet adoption is slow and lags behind that of peers.

• The country’s investment in R&D is low, at less than 0.1%, and most of it comes from government. Likewise, the government’s expenditure on education and higher education, while expanding over the years, is still low compared to some of its neighbors.

• Though still at an early stage, the innovation system in Indonesia shows potential in increased patent outputs and entrepreneurship. A young and growing population and improving business climate can help transform investments into economic growth.

Key figures

GDP Growth 2015-2016: 5.0%
Gross enrolment ratio, tertiary, 2014: 31.1%
Patent applications, residents, 2014: 702
% pop. using Internet, 2016: 22.0%
FDI (net inflows % of GDP), 2016: 2.3%
R&D Expenditure (% of GDP), 2014: 0.1%
Time required to start a business (days), 2016: 24.9
## Data Summary Table

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP Per Capita (PPP)</th>
<th>GDP per capita growth</th>
<th>Tertiary enrollment ratio</th>
<th>Resident patent applications</th>
<th>5 Year Percent change in patent applications</th>
<th>Percent of population using the Internet</th>
<th>R&amp;D expenditure (% of GDP)</th>
<th>FDI, net inflows (% of GDP)</th>
<th>Time required to start a business (days)</th>
<th>Gil Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>$11,126</td>
<td>3.5%</td>
<td>31.3%</td>
<td>702</td>
<td>69%</td>
<td>25.4%</td>
<td>0.09%</td>
<td>0.4%</td>
<td>24.9</td>
<td>87</td>
</tr>
<tr>
<td>Philippines</td>
<td>$7,254</td>
<td>4.2%</td>
<td>35.7%</td>
<td>334</td>
<td>94%</td>
<td>55.5%</td>
<td>0.14%*</td>
<td>2.6%</td>
<td>28</td>
<td>73</td>
</tr>
<tr>
<td>Malaysia</td>
<td>$26,314</td>
<td>3.5%</td>
<td>29.7%</td>
<td>1,353</td>
<td>10%</td>
<td>78.7%</td>
<td>1.26%*</td>
<td>3.7%</td>
<td>18.5</td>
<td>37</td>
</tr>
<tr>
<td>Vietnam</td>
<td>$6,024</td>
<td>5.5%</td>
<td>30.5%</td>
<td>487</td>
<td>89%</td>
<td>46.5%</td>
<td>0.20%</td>
<td>6.1%</td>
<td>24</td>
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<td>South Korea</td>
<td>$36,511</td>
<td>2.2%</td>
<td>95.3%</td>
<td>164,073</td>
<td>29%</td>
<td>92.7%</td>
<td>4.30%</td>
<td>0.8%</td>
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<tr>
<td>Kenya</td>
<td>$3,207</td>
<td>2.9%</td>
<td>4.0%</td>
<td>132</td>
<td>175%</td>
<td>26.0%</td>
<td>0.79%**</td>
<td>2.2%</td>
<td>22</td>
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<tr>
<td>Mexico</td>
<td>$17,534</td>
<td>1.2%</td>
<td>29.9%</td>
<td>1,246</td>
<td>51%</td>
<td>59.5%</td>
<td>0.54%</td>
<td>2.6%</td>
<td>8.4</td>
<td>58</td>
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</tbody>
</table>


Source: World Bank World Development Indicators, WIPO, UNESCO, Global Innovation Index 2017
*2013 **2010
Next Steps
The Need for Indonesia

Challenge

• There is a weak foundation to support an innovation driven economy

• The fragmented policy environment exacerbates the weak links and disconnects within the emerging innovation ecosystem.

Opportunity

Given that human creativity, knowledge and drive are the main sources for innovation, Indonesia’s significant young population can drive a new-found innovation economy.
Indonesia’s Opportunity

To harness its potential, Indonesia will need to do two things:

1. **Invest and build up the innovation building blocks for an innovation infrastructure.**
   - Indonesia will need to invest in R&D, education, university-industry partnerships and create places to innovate.

2. **Set a policy environment for innovation systems to thrive.**
   - Indonesia will need to set an innovation plan and stick to it, establish coordinating organizations, and have an industry sector focus.

Innovation ecosystems flourish in environments where synergies can be created and networks reinforced that link innovators, entrepreneurs, workers, finance, business, governments, and markets. The country will need to align laws, ministry budgets, and actions by government and universities toward the same goals and directions of the national innovation agenda.
Next Steps

We identified 6 next steps for Indonesia to embark on its next phase of building its innovation ecosystem.

1. Map the Innovation Ecosystem
2. Assess the Innovation Ecosystem
3. Assess Innovation policy Environment
4. Identify Industry Sectors of Focus
5. Assess the Political Economy
6. Determine Institutional Capacity

Many of these studies may already be complete or embedded within existing reports. We recommend compiling the information according to these six components to better outline a cohesive and actionable planning approach to building Indonesia’s innovation ecosystem.
Next Step #1: Map the Innovation Ecosystem

What innovation assets does Indonesia have across its innovation ecosystem?

- What key institutions comprise the actors and organizations of the innovation ecosystem (outer ring of the diagram)?

- How would you describe the status of the foundation of the innovation ecosystem (inner circle)?
  - Status and quality of workforce?
  - Appetite for risk taking? Openness to new ways of working? Level of trust or experience of government, university, and industry interactions?

- What programs or initiatives support or connect components of the ecosystem?

- Who are the main connectors and champions within the ecosystem?

How well are the components of the ecosystem connecting?
Next Step #2: Assess Innovation Ecosystem

• Are there innovation assets in place that comprise the ecosystem?
  • If present, what is the status of the assets in terms of its ability to operate in an innovation economy?
  • If assets are strong what are the plans and strategies to reinforce them?

• What assets are missing? Or what are the weak links within the ecosystem?
  • What are areas for priority investments to establish or strengthen innovation assets?
  • What are programs or incentives to facilitate joint collaboration and interaction among members of the ecosystem?
Next Step #3: Assess Innovation Policy Climate

**Overarching Questions to address:**

- What policies are reinforcing the ecosystem?
- What policies are bottle necking the innovation ecosystem?
- What policies are missing?
- What policies need to be removed or modernized to support an innovation economy?
Next Step #4: Determine Industry Sector Focus

- Which industries are best positioned in Indonesia?
  - For competitive economic growth regionally or globally through innovation
  - For economic benefit or impact to Indonesian households, workers, and companies

- What are the top 3 – 5 sectors for focus at the outset?
  - as the system strengthens and adjacent sectors begin to benefit through innovation consider refreshing and/or expanding industry targets
Next Step #5: Assess the Political Economy

- What is the **political appetite** for investing and implementing innovation-related programs?
- What are the **institutions and leaders most likely to champion** and press for necessary changes to orient the economy and society towards innovation-based approaches?
- Can you **anticipate bottlenecks** and develop strategies to address?
Next Step #6: Assess Institutional Capacity

- Is there an organization that can serve as an overarching coordinating body?
  - Can it collaborate effectively across government, universities and business?
- If no, how can an organization be established to serve this role with authority to coordinate, oversee and set a vision for Indonesia’s innovation ecosystem without overstepping into the work of other’s in the ecosystem?
Next Steps: Conclusion

• These next steps are intended to set a framework for how Indonesia can advance the development of its innovation ecosystem based on experiences of other countries.
  • Many of these assessments may already be complete or are underway.
  • We suggest compiling this information in one place to set a clear vision for the country; prioritize investments; and align organizations and policies to support the programs that will be implemented.
  • As you undertake these assessments, you may learn of related questions or topics that will be important to understand. The next steps in this document are meant to be a reference point so decision makers can best determine what is well established and what may need more clarity as Indonesia builds its innovation ecosystem.