

MARCH 2019

Rebooting the Innovation Agenda

The Need for Resilient Institutions

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A Report of the
CSIS PROJECT ON PROSPERITY AND DEVELOPMENT

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Center for Strategic & International Studies
1616 Rhode Island Avenue, NW
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202-887-0200 | www.csis.org

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Overview and Project Background

After undertaking a successful year-long research project that began in the fall of 2016, the Center for Strategic and International Studies (CSIS) and RTI International entered into their second year of partnership focusing on the power of innovation and technology in pursuing transformational change in countries around the world. Building on the 2017 report titled *Innovation-Led Economic Growth*, CSIS and RTI sought to focus this 2018 report on the critical role that institutions, stakeholders of the innovation economy, and the international community have to play in managing technological disruption.

To better understand this disruption and the broader, so-called “fourth industrial revolution,” CSIS and RTI International convened a series of expert roundtable discussions in Washington, DC, San Jose, California, and New York, New York and met with over 75 representatives from various academic institutions, the financial sector, the philanthropic community, and technology firms. The goal of these roundtable discussions was to understand how best the agendas and approaches of these key stakeholders in an innovation economy and the roles of the institutions can be reconciled with the requirements of managing the fourth industrial revolution.

In this report, the term “institutions” alludes to a set of structured norms, protocols, and rules that govern the behavior and operations of actors and agencies in society. Institutions can be both formal and informal. When these norms, protocols, and rules are codified (e.g., through a charter, constitution, legislation, or statute), they become formal institutions. Almost every public sector entity and regulatory body falls within the realm of formal institutions. However, societies are also governed by informal institutions, which are primarily a set of uncoded, communally-accepted rules that are enforced with a threat of social sanction. Culture- and faith-based practices that are embedded deeply in communities, especially in rural areas that have yet to fully engage with technology and modernity, serve as perfect examples of informal institutions. Furthermore, having recognized that innovation can be conceptualized as core, adjacent, disruptive, or transformational, the authors acknowledge that this report focuses primarily on disruptive innovation and its impact on markets, politics, and society.¹

1. Harvey Schachter, “How to Manage the Three Types of Innovation,” *The Globe and Mail*, May 6, 2012, <https://www.theglobeandmail.com/report-on-business/careers/management/how-to-manage-the-three-types-of-innovation/article4104762/>.

Executive Summary

Disruptive changes to the world economy are increasing in magnitude and frequency. A “fourth industrial revolution” is currently underway, with powerful new technological forces like artificial intelligence, automation, 3-D printing, and robotics undermining conventional economic models.² This ongoing revolution is setting up the world for unprecedented social upheaval, with new technologies having the potential to exacerbate the impact of such turmoil for the following reasons:

- the gradual phasing out of an economic system whereby low- and middle-income countries competed based on their lower cost of labor, and their workers had relatively better means and freedom to move to locations with high concentrations of traditional manufacturing jobs;
- the impending displacement of millions of workers due to increasing automation of industries, coupled with a greater movement of people and jobs globally;
- the increasing concentration of influence and wealth in the top echelons of firms and individuals; and
- the erosion of trust in public institutions and the democratic political process.

If left unaddressed, these changes will bring about widespread economic anxiety and frustration. Some of these reactions are already underway, with populist nationalist movements gaining traction and entering mainstream political processes in countries around the world. This anxiety will further reinforce divisions, especially in economically and socially diverse communities, and will heighten sentiments of ethnonationalism and tribalism. Eventually, changes caused by the fourth industrial revolution will destabilize democracies and undermine the credibility of their institutions.

While much of the spotlight surrounding the fourth industrial revolution has focused on the transformative role technologies themselves play, comparatively little attention has been paid to the transformation of institutions required of this new reality. For countries to adopt measures that reduce the ill effects of disruptive forces on societies and enable

2. The term “fourth industrial revolution” was made popular by German engineer and economist, Klaus Schwab (Founder & Executive Chairman, World Economic Forum) in his book *The Fourth Industrial Revolution* (Geneva: World Economic Forum, 2016). Please see the *Introduction* section of this report for more details on this book.

the positive forces that can result from technological progress, economies around the world need to reboot the global innovation agenda rather than make incremental changes to isolated challenges. Countries must have a set of resilient and robust institutions that can play constructive roles in enabling private sector-driven, knowledge-based, innovation-led economic growth. Concurrently, powerful tools such as development finance institutions and foreign aid, if channeled effectively, can play an indispensable role in mitigating the risks of disruption, spurring innovation, and creating new and adaptive economic models.

Economies around the world need to reboot the global innovation agenda rather than make incremental changes to isolated challenges.

In the past, technological revolutions were accompanied by disruptions to the norms and conventions surrounding labor markets and industrialism. These disruptions left the broader institutional framework largely unaffected. However, the ongoing industrial revolution is

radically changing the relationship between states and societies and is straining the institutions governing this relationship. Institutions need to play constructive roles in enabling private sector-driven, knowledge-based, innovation-led economic growth, all the while mitigating the potential negative impacts of technological changes on society. Engaged in a complicated balancing act, these same institutions face additional challenges to their legitimacy, precisely at a time when their strength or weakness could shape the impact of the fourth industrial revolution, especially in developing countries where domestic institutions are weak and private sectors nascent. Swift and intentional interventions are needed to ensure that institutions exhibit resilience in the face of rapid technological change.

Building on the existing literature on fourth industrial revolutions, and the past work done by CSIS and RTI International, this report examines the risks, responsibilities, and roles of institutions and various other stakeholders.³ Furthermore, it looks at how coming disruptions can be channeled for long-term, sustainable development while strengthening the economic, political, and social institutions charged with turning the challenges of today's technological change into the opportunities of tomorrow.

The following chapters will unpack these themes in greater detail and provide ideas for how to position stakeholders as leaders during this revolution. Chapter 1 emphasizes the relevance of institutions in this conversation while examining their role in mitigating the adverse impacts of disruption and in creating an enabling environment that could help reboot the innovation ecosystem. Chapter 2 underscores the centrality of innovation policies in securing inclusive urban growth and development while reinvigorating rural economies. Chapter 3 revisits the current models of skills development and identifies the new investments that are needed to build an inclusive human capital development model. Chapter 4 lays out the challenges to credibility faced by institutions and the trust deficit that has created, while calling for a reboot to the way we think about social

3. Daniel F. Runde, Erol Yayboke, and Charles Rice, *Innovation-Led Economic Growth: Transforming Tomorrow's Developing Economies Through Technology and Innovation* (Washington, DC: CSIS, September 2017), <https://www.csis.org/analysis/innovation-led-economic-growth>.

capital. Resolving these problems will require integration, and the roles played by each stakeholder must complement each other. For example, education and skills development cannot be independent of urban development and infrastructure challenges. The report ends with high-level conclusions and main takeaways from the research.

The report offers lessons from history, grounds itself in theory, and leverages unique insights into the challenges of the communities that would be most impacted by a reboot of the innovation agenda. For those with limited ability to read every word of this report (though the authors strongly recommend it), each chapter begins with key points on how institutions can play productive roles in the rebooting of the innovation agenda. If you read nothing else, read these points and the conclusions at the end of the report.

Introduction | The Revolutions

The global economic landscape has undergone radical transformations since the turn of the 21st century. Advances in information, communications, and transportation technology that began in the 1970s were followed by significant structural reforms undertaken by the developing world during the 1980s. The advent of the internet and e-commerce in the 1990s enabled today's interconnected, idea-centric global innovation ecosystem that powers fast and frequent disruptions to business models, industries, and technologies.⁴



In 2017, the CSIS Project on Prosperity and Development, in partnership with RTI International, produced a report titled *Innovation-led Economic Growth* which underscored the importance of innovation in building and maintaining a healthy and robust market economy, particularly for developing nations attempting to join the ranks of advanced and industrialized economies.⁵ The report emphasized the centrality of education, translational research and development, commercialization, and the policy environment in facilitating innovation, and applied that framework to case studies on India, Kenya, and Malaysia.

Traditional models of economic growth and development are evolving to accommodate and incorporate new models centered on innovation-based market competition. Firms are increasingly automating their production processes and replacing low-skilled human capital to achieve increased efficiency, resulting in massive labor displacement and largely reducing access to the job market to highly-skilled people. Such large-scale displacement of labor creates stress on social systems which in turn threatens political institutions and norms, economic stability, and social order. Austrian economist Joseph Schumpeter, who described this phenomenon as “creative destruction,” argued that such radical shifts are an inevitable feature of industrialization and essential for the growth and survival of the free-market economic system.⁶ Today, new technologies such as artificial intelligence, automation,

4. Harold Edquist, “How ICT Measures up to Other Great Inventions in History,” *Telefonaktiebolaget LM Ericsson*, December 19, 2016, <https://www.ericsson.com/research-blog/ict-measures-great-inventions-history/>; James M. Boughton, *The IMF and the Silent Revolution: Global Finance and Development in the 1980s* (Washington, DC: International Monetary Fund, 2000), <https://www.imf.org/external/pubs/ft/silent/index.htm#pref>; Alastair Crawford, “E-Commerce Lessons from the 1990s,” *The Guardian*, January 8, 2014, <https://www.theguardian.com/small-business-network/2014/jan/08/e-commerce-lessons-1990s>.

5. Runde, Rice and Yayboke, *Innovation-Led Economic Growth*.

6. Ricardo J. Caballero, “Creative Destruction,” in *The New Palgrave Dictionary of Economics*, 2nd ed. (London: Palgrave Macmillan, 2008), <https://economics.mit.edu/files/12606>.

ARTIFICIAL INTELLIGENCE & ROBOTICS	
DYSTOPIAN OUTCOME	<p>Together, these two technological forces threaten the jobs of about 600 million people who constitute one-fourth of the global labor force.</p>
	<div><p>AI is expected to primarily disrupt businesses in the service sector. By leveraging machine learning and data analytics, AI can potentially displace nearly 250 million knowledge workers (or a tenth of the global labor market) in traditionally labor-intensive firms.</p><p>Robotics is expected to primarily disrupt businesses in the service sector. The biggest threat is to the jobs of more than 350 million people who constitute a sixth of the global labor market. Premature deindustrialization is a big concern as these forces continue to open up in developing countries.</p></div>
VS	
FAVORABLE OUTCOME	<p>Cumulatively, these two technologies eliminate US\$ 15 trillion (accounting for 46 % of global employment costs) in operational expenses incurred by employees.</p>
	<div><p>AI has the potential to reduce over US\$ 9 trillion (or 27% of global employment costs) in operational expenses incurred by employees. In addition to increasing efficiencies, this could open up the economy to new jobs that don't exist today. As WEF states, two-thirds of children entering school today will work in jobs that don't exist yet.</p><p>Much as with AI, advanced robotics has the power to eliminate over US\$ 6 trillion (or 19% of global employment costs) in operational expenses incurred by employees.</p></div>

These shifts and impacts are not limited to advanced and industrialized parts of a globalized world; they are felt even in the most remote and rural parts of developing countries. Middle- and low-income countries can use these technologies to automate production and remain competitive in international markets, but not without risk to long-term human development. Called “premature deindustrialization,” such automation could put millions

of people out of work in newly industrialized sectors of emerging market economies, adding pressure to the demands of fast-growing and urbanizing populations.⁷ To avoid such social disruptions and instill sound economic planning and management, developing nations—supported by multilateral organizations – must look to adopt a new playbook that strengthens institutions and creates an enabling environment for innovation-driven economic growth.⁸ Recognizing this need, institutions must better understand the needs of the private sector and work towards expanding its role and the scope of its engagement. Institutions must also increase the level of cooperation between the key stakeholders of the innovation economy, namely academic, financial, philanthropic, and technology sectors, with the objective of addressing three central challenges.

Previous Industrial Revolutions

It is important to note that such challenges to the order of the day are not new; however, the current revolution is different from past revolutions in several important ways. In his renowned book, *The Fourth Industrial Revolution*, German economist Klaus Schwab provides a valuable historical perspective to current trends.⁹ Characterizing today's revolution as “fundamentally different” from the previous three revolutions, Schwab sees the disruptive nature of the new technologies brought forth by the revolution fundamentally as a force of good. The potential of this revolution, if fully harnessed, can help the world leapfrog into inclusive development and can bring together the economic and political lives of billions around the world through a network of digital platforms. While cautiously optimistic of the promises of the fourth industrial revolution, Schwab believes that, through this interconnectivity, economies can become more efficient and productive while reversing the legacies of economic inequity and social injustice from previous revolutions.

To avoid such social disruptions and instill sound economic planning and management, developing nations—supported by multilateral organizations – must look to adopt a new playbook that strengthens institutions and creates an enabling environment for innovation-driven economic growth.

No conversation about the impact of the fourth industrial revolution is complete without examining the legacies of past industrial revolutions. By differentiating the present revolution from the previous three, one can better identify the opportunities and pitfalls of the fourth industrial revolution. In subsequent chapters we will discuss the important role of institutions in realizing more opportunities than pitfalls.

The **first industrial revolution**, which began in Great Britain in the late eighteenth century, quickly spread through Western Europe and North America by the end of the

7. Dani Rodrik, “Premature Deindustrialization” (paper presented at John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts, November 2015), https://drodrik.scholar.harvard.edu/files/dani-rodrik/files/premature_deindustrialization_revised2.pdf.

8. “International institutions” are defined as any non-private sector entity that could play a role in creating the enabling environment for innovation-led, private sector growth. These include, but are not limited to, multilateral development banks, bilateral development agencies, and development finance institutions.

9. Schwab, *The Fourth Industrial Revolution*.

19TH CENTURY

1ST INDUSTRIAL REVOLUTION

1763

James Watt improves the Newcomen model of steam engine. By 1766, these improvements to the engine become commercialized and go into production.



1799

Parliament passes the Combinations Acts, making it illegal for workers in England to unionize and bargain for better pay and labor conditions.



1811

Luddite Rebellion begins. Luddites attack factories and smash machines in protest against the industry.

1824

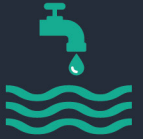
Trade (labor) unions are legalized in Great Britain

1832

Parliament passes the Great Reform Act, expanded the size of the electorate and increased the representation of large cities in the House of Commons

1848

British government sets up the General Board of Health to investigate sanitary conditions, setting up local boards to ensure safe water in cities.



20TH CENTURY

2ND INDUSTRIAL REVOLUTION

1875

Public Health Act gives government responsibility to ensure public health for housing and sewage

1879

Thomas Edison and Joseph Swan perfect the **design of the light bulb**, making it commercially viable.



1886

The American Federation of Labor (AFL) is founded in Columbus, Ohio.

1908

Henry Ford created the Model T car. By 1913, Ford begins mass production of automobiles.



1913

President Wilson signs the Federal Reserve Act into law and establishes the Federal Reserve Bank.

1914

First World War begins.



1958

The Microchip is invented by Jack Kilby (Texas Instruments) revolutionizing the semiconductor industry.



1969

With funding from U.S. Department of Defense, **the ARPANET (predecessor to the Internet) was created** to implement the protocol suite TCP/IP.

1983

ARPANET officially changes to use the Internet Protocol, thus creating the Internet.



Microsoft Word is released.

Handheld mobile phones become commercially available.

21ST CENTURY

3RD INDUSTRIAL REVOLUTION

2004-2006

Facebook (2004), Twitter (2006), and YouTube (2005) are created, democratizing access to information on the internet.



nineteenth century.¹⁰ The invention of the steam engine by James Watt in 1781, and the various applications that followed its invention, radically transformed European nations from agrarian to manufacturing-based societies. Industrialization led to a sequence of socioeconomic and political upheavals, leading to urbanization, the emergence of a middle-class that sought improved living conditions, new means for education, and better skills. These events ultimately resulted in increased democratization as Western states gradually began to confer greater political rights upon their societies. A new set of economic guarantees streamlined the terms of employment and compensation for workers, particularly those employed in factories. The British Parliament's passage of the Great Reform Act of 1832 (which significantly expanded the size of the electorate that would be represented in the parliament by lowering the threshold for franchise) and the Factories Act of 1833 (which brought about the first set of policies that regulated child labor and working conditions) are quintessential examples of the industrial revolution fundamentally and irreversibly transforming the social order.

The **second industrial revolution** took place between 1870-1914 and brought unprecedented changes to energy, transportation, and health care sectors, primarily by drastically bringing down the overall costs of production. Notable innovations during this revolution include the development of standardized and interchangeable machine parts, the advent of assembly-line production, and the electrification of factories.¹¹ Unlike its predecessor, the second industrial revolution also led to the development of a robust scientific base and the emergence of a new class of engineering and medical professionals who facilitated rapid industrialization, increased levels of urbanization, and focused on mass production.¹² The impact of the developments of the second industrial revolution spilled into the sociopolitical theater with labor movements gaining more traction and influence in electoral politics. Labor-based politics became increasingly popular not only in developing countries like Argentina and Brazil (the impact of which is felt to this day), but also in industrialized countries like the United States where the labor movement grounded itself in mainstream politics with the foundation of the American Federation of Labor in 1886. This period of economic, scientific, and technological transformation ended in 1914, as major economic powers of the world reallocated their resources in preparation for World War I.

Often referred to as the “digital revolution,” the **third industrial revolution** took root in the 1950s in the aftermath of the Second World War and lasted until the 1980s. Set against the backdrop of the Cold War, this period of socioeconomic transformation was marked by major economies making significant investments in scientific research and development, both through public funding and private sector investments.¹³ Many of the public investments – and support to private investments – were made by enlightened institutions attempting to harness technological change for economic and geostrategic influence. This period was marked by the large-scale production of integrated circuits and their increased commercial

10. History, “Industrial Revolution,” *A&E Television Networks*, October 29, 2009, <https://www.history.com/topics/industrial-revolution>.

11. Joel Mokyr, *The Second Industrial Revolution, 1870-1914* (Evanston: Northwestern University, August 1998), <https://pdfs.semanticscholar.org/769c/a06c2ea1ab122e0e2a37099be00e3c11dd52.pdf>.

12. Ibid.

13. Steven W. Usselman, “Research and Development in the United States Since 1900: An Interpretive History” (paper presented at Economic History Workshop, Yale University, New Haven, Connecticut, November 11, 2013), https://economics.yale.edu/sites/default/files/usselman_paper.pdf.

utility and thus viability. Consequently, digital electronics became more affordable, allowing firms and industries to replace several human-dependent economic activities with digital alternatives, boosting overall production levels while offering an early example of technology displacing human work. The two examples that best capture the impact of the third industrial revolution are the evolution of offices due to the increased use of desktop computers and the surge in the efficiency of businesses and firms, particularly when dealing with supply chain management due to the prevalence of internet commerce in households.¹⁴

The net gains that were made in the aftermath of each of these revolutions are comparable: increased productivity, growth in urban populations coupled with the expansion of the middle-class, improved socioeconomic conditions, more efficient markets, easier mobility of goods, services, and people, and advancement in science and technology. The social, political, and human costs of these revolutions also had clear trends: economically distressed working classes, social upheaval, and significant loss of human lives. With the first industrial revolution, the world saw that the Russian Communist revolution and the establishment of the Soviet regime led to the loss of more than 20 million lives.¹⁵ Even as the second industrial revolution decreased the overall cost of production and boosted industrial efficiency exponentially, it led to massive unemployment and suppression of wages that were precursors of the Great Depression and, subsequently, the Second World War.¹⁶ The social safety nets that emerged in response to the second revolution helped mitigate some socioeconomic costs of the third industrial revolution. The proliferation of new information and communication technologies during the third revolution had a profound effect on governance, policymaking, and even the political process. Methods of mass communication and growing public access to media allowed populists around the world to tap into the sentiments of reactionary populations for electoral gains and subsequently use such media to discredit institutionalized checks on their power.¹⁷ This last trend has continued into the fourth revolution, as evidenced by the manipulation of social media to disrupt democracies.

Successive industrial revolutions have emerged from the shadows of their predecessors, and the fourth industrial revolution is no exception. Digital and internet-based technologies are rapidly changing various industries in the manufacturing and the service sectors that had otherwise been experiencing steady employment or growth trends for several decades. The Schumpeterian understanding of capitalism and free-market evolution explains the continued disruption to current models of economic growth and development – which subsequently affects political and social institutions. Arguably, the developing world has become more affluent, free, and capable with each successive revolution as average standards of living rose.¹⁸ Today, these countries are seeking to build more stable economies in order to secure

14. BBC, “How the Computer Changed the Office Forever,” BBC News, August 1, 2013, <https://www.bbc.com/news/magazine-23509153>; Petras Barsauskas, Tadas Sarapovas, and Aurelijus Cvilikas, “The Evaluation of e-Commerce Impact on Business and Efficiency,” *Baltic Journal of Management* 3, no. 1 (2008): 71-91, <https://doi.org/10.1108/17465260810844275>.

15. Bill Keller, “Major Soviet Paper Says 20 Million Died as Victims of Stalin,” *New York Times*, February 4, 1989, <https://www.nytimes.com/1989/02/04/world/major-soviet-paper-says-20-million-died-as-victims-of-stalin.html>.

16. Steve Forbes, “The Horrid Economic Consequences of World War I – We Still Suffer from Them,” *Forbes*, August 2, 2014, <https://www.forbes.com/sites/steveforbes/2014/08/02/economic-consequences-of-the-great-war/#650bd2a92b21>.

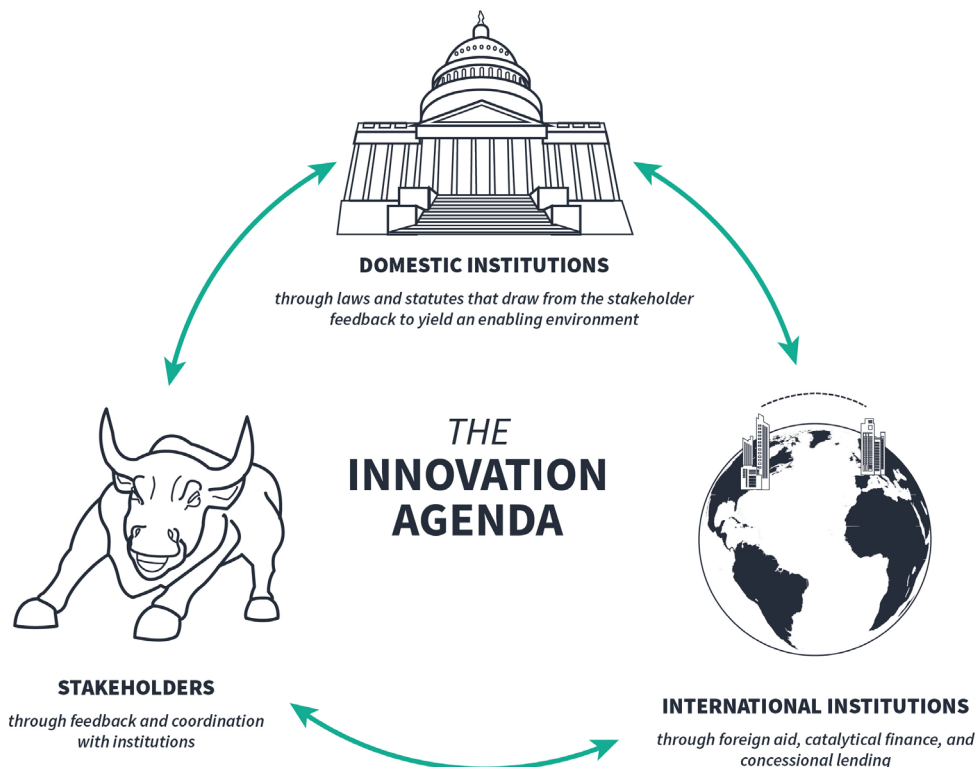
17. Juan Perón of Argentina and Indira Gandhi of India are notable examples of mass leaders who capitalized on the gains of the ICT revolution to power populism in their countries. So strong was the magnification of their populist rhetoric that critical aspects of their political legacies continue to shape institutions in the two countries.

18. Daniel Runde, “Foreign Aid is About U.S. Interests,” *Foreign Policy*, June 26, 2017, <https://foreignpolicy.com/2017/06/26/foreign-aid-is-about-u-s-interests-marshall-plan/>.

development and prosperity for their people. They intend to do so by establishing deeper economic partnerships based on trade, science and technology exchanges, and investments. But considering the precarious stage of economic growth in which many developing countries find themselves in currently, the disruptive effects from the fourth industrial revolution are real and consequential. Without proper management and support from relevant institutions, the current revolution could leave many a developing economy in a near-permanent state of repair and in perpetual need of foreign assistance.

Three Central Challenges Facing the Fourth Industrial Revolution

For much of modern history, global, national, and local institutions have provided the frameworks within which political and economic changes have been channeled to preserve social order and stability. With the fourth industrial revolution set to disrupt this order, institutions must rise to the occasion and mitigate the risks and the adverse impacts of these forces. They must also provide an enabling environment that can enhance the innovations of the fourth industrial revolution in productive and beneficial directions. To fully develop an innovation ecosystem, emerging markets will require significant reforms to their regulatory architectures and governing structures, with institutions bringing about these reforms through strategic interventions. However, with the full effects of new technological forces unknown, and given the pace, complexity, and multi-dimensionality of governance, rebooting the innovation agenda becomes a challenging task. State authorities and policymakers, who rely heavily upon institutions, must conceive a new framework that fosters and protects the innovation ecosystem and encourages intelligent risk-taking while guarding it against misuse that could undermine social order.



Supplementing the roles played by institutions are the stakeholders who stand to gain the most from – or be negatively impacted by – the innovation economy. These stakeholders are expected to coordinate with institutions to provide reliable feedback and information. In the absence of such coordination, institutions—who retain the authority and the imperative to enforce norms, procedures, and protocols—provide less than perfect policy options to state authorities, leading to inefficiencies, redundancies, and missed opportunities. The lack of feedback from these cross-sectoral stakeholders can also result in imperfect risk assessment models that can cloud the calculus and judgment of potential investors, ultimately hampering innovation-led economic growth.

A rebooted conceptual framework must outline the roles and responsibilities of institutions in helping address three central challenges created by the fourth industrial revolution:

- Policymakers and stakeholders must remain cognizant of the impact of continued urbanization on inequality and economic stratification. As the rapid growth of urban centers that could take place at the expense of rural development, policymakers must put forth innovation policies that provide for an inclusive urban development model while reinvigorating rural economies (Chapter 2).
- Institutions must make new and strategic investments to build a human capital development model that is adaptive to the innovation economy and meet its demands (Chapter 3).
- With institutions themselves facing constant challenges to their credibility, and the subsequent increase in trust deficit in recent years, governments and state actors must take radical efforts to rebuild their fast-eroding social capital (Chapter 4).

Stakeholder efforts must complement each other, as they attempt to resolve these challenges. For instance, efforts to overhaul education and skills development programs cannot be independent of infrastructure and urban development initiatives. The reality is that the roles played by the stakeholders, and their perceived relationship with the state, are often not in harmony. Consequently, the efforts to reboot the innovation agenda remain uncoordinated.

A closer examination of the impact expected from the fourth industrial revolution further reveals that the older models of economic growth and development, that were used to mitigate the shocks of industrial revolution, are no longer relevant. Current models—e.g., Silicon Valley – are often cited as copy-ready solutions to jumpstart vibrant innovation economies. However, developing countries must remain cautious about the dangers and risks of attempting to replicate the Silicon Valley model. Undoubtedly, Silicon Valley continues to be a universally admired and desired space for business, technology, and innovation. The United States leads the world in venture capital funding as it took in nearly \$67 billion (roughly 55 percent of the global share) in venture capital investments in 2017.¹⁹ At \$26.6 billion, Silicon Valley alone is responsible for 40 percent of the investments. Nevertheless, the Silicon Valley model has proven hard to replicate. Emerging markets looking towards Silicon Valley as a model for development must acknowledge that at the heart of its emergence was the heavy influence of Stanford University and

19. Laurie Meisler and Christopher Cannon, “U.S. Venture Capital Swells and Spreads,” Bloomberg, January 25, 2018, <https://www.bloomberg.com/graphics/2018-venture-capital-deals/>.

the United States Department of Defense (which invested billions into research and development at Stanford and many firms in the area), followed by the decades of growth and development within established networks of scientists, engineers, innovators, and investors, leading to its own unique culture.²⁰ Replicating the model is unrealistic as new technology markets in developing countries—which rapidly evolve due to the nature of modern technological innovations and local realities—cannot afford to wait decades for return on capital investments, nor do they have decades’ worth of social and business interactions that set norms for an innovative culture to thrive.

A new rebooted innovation policy agenda is needed, one that realizes that the fourth industrial revolution is set to permanently leave its mark on the global economy in at least the following ways:

- ending an economic system whereby many jobs moved to countries where the cost of labor was lower and/or whereby labor moved freely to places where jobs were more plentiful. Commonly referred to as the “global labor arbitrage,” these phenomena drove the national economic strategy of several low- and middle-income countries;
- creating a massive displacement of workers that is resulting from industries increasingly automating processes and from the political end of this global labor arbitrage system;
- concentrating power and wealth in relatively few private firms and financiers; and
- rapidly eroding the public trust in public institutions and the democratic political process.

Given the crippling effects that these challenges can have on order, peace, and stability, it is time for policymakers and institutions to reaffirm their roles and, in close consultation with the stakeholders and drivers of this new industrial revolution, build new models for innovation-centered economic development that reduces the adverse effects of disruption and reorients the fourth industrial revolution into a force for greater social cohesion, economic growth, and trust in institutions.

20. Chris Baraniuk, “Why We Shouldn’t Try to Replicate Silicon Valley,” BBC Capital, February 8, 2018, <http://www.bbc.com/capital/story/20180208-why-we-shouldnt-replicate-silicon-valley-evolution>; Barry Jaruzelski, “Why Silicon Valley’s Success Is So Hard to Replicate,” *Scientific American*, March 14, 2014, <https://www.scientificamerican.com/article/why-silicon-valleys-success-is-so-hard-to-replicate/>.

1 | The Role of Institutions in Rebooting the Innovation Agenda

KEY POINTS

- Representatives of the academic, financial, and technology communities acknowledge that their current operational models emerged as a result of the gradual consolidation of norms, procedures, and values themselves, and that intentional interventions were needed for them to align behind a new innovation agenda and overcome any systemic resistance.
- In order to meet the contemporary demands of emerging markets, conventional economic development models that functioned well in the mid- to late-twentieth century need substantial reforms. This is especially true regarding the overall regulatory environment.

Innovation occurs when bold, calculated risks are taken to invest in new ideas that consider both resource allocation and market adoption potential. Disruptive forces bring with them instability but also create an opening for innovation that has the promise to solve pressing problems. While these forces cannot necessarily be stopped, their impacts can be decoupled to mitigate the long-term costs of disruption. Governments do not have to carry the burdens, costs, and obligations of change alone. Global institutions and the broader academic, finance, philanthropic, and technology communities can provide support to public sector entities, though too often each has its unique agenda and approach.

To better understand the drivers of these communities and how best their agendas and approaches can be reconciled with the requirements of managing the fourth industrial revolution, CSIS and RTI International convened expert roundtable discussions with representatives of constituent groups in Washington, D.C., San Jose, California, and New York, New York. The institutions housed in these cities constitute powerful engines of global economic growth and development. At the outset, there was near-unanimous agreement that public institutions and state actors must coordinate among various stakeholders to solicit inputs, design policies, engage with them as implementing partners, and adjust the capacity of relevant institutions. The concern, however, was that the role of government—particularly in developing countries—was ill-defined. This is especially concerning as many of the newly industrializing economies face the

risk of premature deindustrialization and losing millions of jobs over the next decade just as more jobs will be needed to keep up with population growth alone. Roundtable participants acknowledged that since academic institutions, the financial sector, and technology communities are all products of gradual consolidation of norms, procedures, and values themselves, they would need intentional interventions in order to align behind a rebooted innovation agenda.

Disruptive forces bring with them instability but also create an opening for innovation that has the promise to solve pressing problems.

For states to adopt measures that reduce the ill effects of disruptive forces on societies, they need a set of resilient and robust institutions that can play a constructive role in enabling private sector-driven, knowledge-based, innovation-led economic growth. However, institutions are currently confronting an unprecedented crisis of

confidence. They face new challenges to their legitimacy and are losing public support at a time when the degree of their strength (or weakness) has become a crucial determinant of the outcome of the fourth industrial revolution. This is particularly true in developing countries, where institutions are comparatively weaker, and the private sector is nascent.

Conventional development models that functioned in the mid- to late-twentieth century are no longer able to meet the contemporary demands of emerging markets. A substantive response to today's demands requires reform of old institutions that are holding back progress. Meanwhile, newer and more capable institutions need to be established. These institutions need to be supplemented by making changes to the regulatory environment. This may shift power balances in government ministries and departments, generating strong internal efforts to protect the status quo. But the status quo will not be enough to respond to the current demands of emerging markets and the strains of technological disruption. Risk mitigation will require institutions to address a series of challenges. The focus must be on reworking institutions, so they can mitigate negative impacts and create an enabling environment that fosters the innovation ecosystem, unleashes economic potential, and ensures optimal social harmony and human prosperity on the road to escaping the "middle-income growth trap."²¹

Mitigating the Negative Impacts of Disruption

The promise of technology can be positive, negative, or both, depending on how its effects are managed. An important role for institutions is mitigating the negative impacts of technological disruption, such as the large-scale displacement of workers around the world, increased levels of inequality, and ultimately massive socioeconomic upheaval.

For many developing countries, the root causes of these challenges predate the introduction of disruptive new technologies. Political instability, for example, is perceived as one of the highest risks for investments in the developing world. Investors, corporate philanthropists, academic institutions, and leaders of technology firms are often wary of making significant commitments in places where returns are far from guaranteed.

21. Pierre-Richard Agénor, Otaviano Canuto, and Michael Jelenic, "Avoiding Middle-Income Growth Traps," The World Bank, November 2012, <http://siteresources.worldbank.org/EXTPREMNET/Resources/EP98.pdf>.

Consequently, their decisions are directly influenced by changes to social and political order. Additionally, corruption, bureaucratic rent-seeking, and political interference directly depress development. These impacts are felt most acutely in the academic community and technology sector (which demand the highest degree of autonomy and independence that allows them to be the engines of innovation and change) while casting a similarly debilitating shadow on investments by the finance and philanthropic communities. Both emerging markets and advanced economies lack critical support structures that can absorb the shocks of institutional changes and disruptive innovation. However, many developing countries actively foster an environment that tethers innovation and punishes risk-taking, discouraging the multinational entrepreneurs and investors often required for countries to reap the benefits of technology.

Conventional development models that functioned in the mid- to late-twentieth century are no longer able to meet the contemporary demands of emerging markets.

Financial stability of academic institutions mitigates risk. Of the four different constituent groups (academic, technology, finance, and philanthropy), the academic community emerges as one that is more resilient, capable of absorbing the shocks of disruptive forces while it helps devise new models for harnessing the transformative power of such forces. This resilience is, in part, due to financial stability created by the endowment model, particularly for established academic institutions. Though

not always the most adaptive to fundamental change, as permanent social institutions universities enjoy the unique privilege of building broad and diverse networks through graduates and to, in turn, generate enormous pools of capital. These pools of capital often turn into endowments that, along with growing enrollment numbers, have created steady and guaranteed streams of funding. The world's largest university endowments can be found in the United States and the United Kingdom.²² Universities in the United States pulled in \$43.6 billion through various voluntary contributions, 44 percent of which came from alumni and individual donations.²³ The United Kingdom, in the meantime, raised \$1.37 billion in higher education giving, of which 45 percent of it came from alumni and individual contributions.²⁴ Developing countries have countless successful fundraising examples, especially as they seek to tap into their alumni network bases to strengthen and grow their endowments.

The academic community faces its own barriers to reform, though increased financial stability can assist here too. By design, universities have relied upon models of imparting education (e.g., 4-year, multi-disciplinary undergraduate degrees) developed centuries ago. The disruptive and evolutionary nature of technology puts these classical university models under tremendous pressure and forces them to ensure that the rate

22. Eduvisors, "Endowment Funds—Current Scenario in India," Eduvisors, August 2011, http://eduvisors.com/dwnld_assets/PDF/Eduvisors_Monograph_-_Endowment_Funds_-_August_20112.pdf.

23. Council for Aid to Education (CAE), "Colleges and Universities Raised \$43.60 Billion in 2017," CAE, February 6, 2018, <https://cae.org/images/uploads/pdf/VSE-2017-Press-Release.pdf>; Rick Seltzer, "Giving to Colleges Rises by 6.3%," Inside Higher Ed, February 6, 2018, <https://www.insidehighered.com/news/2018/02/06/personal-giving-pushes-donations-colleges-and-universities-new-level-2017>.

24. Paula O'Neill and Pam Russell, "Donations to UK Universities Surpass £1BN Milestone," Council for Advancement and Support of Education (CASE), May 3, 2017, https://www.case.org/About_CASE/Newsroom/Press_Release_Archive/Donations_to_UK_Universities_Surpass_%C2%A31BN_Milestone.html.

of obsolescence of technical knowledge remains lower than the pace of innovation. Increased endowments not only provide financial security but empower universities to make long-term investments, using endowments essentially as venture capital to support innovation and lessen the costs of high-risk ideas. In doing so, universities can play an influential role in broader risk mitigation by innovating methods, improving curricula, and investing heavily in developing the workforce for the future.

Philanthropy as a risk mitigator. An equally risk-tolerant stakeholder in this conversation is the institutional philanthropic community, financed by both corporate and individual donations. While primarily concentrated in high-income countries, the global philanthropy world is made up of 260,000 foundations spread across 39 nations with assets worth \$1.5 trillion and annual expenditures of \$150 billion.²⁵ Through creative investments, this sector has emerged as an influential player only recently, with nearly three-fourths of these foundations established within the past 25 years. The lack of well-established institutions or state capacity has left gaps in social safety nets in developing countries and is perceived by investors as risks to their capital commitments. This is where philanthropy has demonstrated its central role in mitigating risks. By increasing the volume of investments in the private sector (or at least in creating the enabling environment for private sector growth) and by making investments in primary education, health care, and human security, philanthropies have filled gaps and played an important role in preparing developing countries for disruption.

Philanthropy is a de-risker; but its role goes well beyond addressing gaps in social safety nets. At the same time, it does not seek to expropriate the roles and responsibilities of the state. Instead, philanthropy aims to play a catalytic role in riskier development projects. New investments from philanthropic institutions fund ground-breaking research initiatives to solve threats to economic development, global health, and social harmony, especially efforts that leverage new technologies. Even as philanthropy fills gaps created by inadequate public sector institutions, they remain immune from the popular sentiments that often influence public investments. Philanthropic and technology communities can and should enter into collaborative partnerships to accelerate investment and growth.

The right investments mitigate disruption. Developing countries need investments that can build and upgrade foundational institutions and infrastructure, helping them tap into the full potential of new technologies. It is important that these investments adhere to established international quality norms and standards, making sure that any financing is targeted and transparent, and any debt structured in a sustainable way.²⁶ Such quality investments build resilience while being catalytic. Their principal goal is to raise the investment appeal of emerging economies to risk-averse investors who hold the keys to unleashing much greater private sector capital. Official development assistance (i.e. foreign aid) has played that role for emerging market economies in the past. However, the current annual investment needed to meet the sustainable development goals stands at

25. Paula D. Johnson, *Global Philanthropy Report* (Cambridge, MA: John F. Kennedy School of Government, Harvard University, April 2018), https://cpl.hks.harvard.edu/files/cpl/files/global_philanthropy_report_final_april_2018.pdf.

26. Daniel F. Runde and Sundar R. Ramanujam, *Financing and Implementing the Quality Infrastructure Agenda* (Washington, DC: CSIS, September 2018), https://csis-prod.s3.amazonaws.com/s3fs-public/publication/180829_Financing_Quality_Infrastructure.pdf?mu2rmvHUk7hSS7u6P1Bs7F3DoMYnkmFI.

\$2.5 trillion.²⁷ In comparison, the total level of foreign aid has not grown in proportion, with only \$150 billion per year available globally. Significant amounts of private capital will be needed to meet this multi-trillion-dollar global gap. Even though the growth in private capital inflows to developing countries has been remarkable over the past two decades, it remains well behind total investment demands. Blended finance, public-private partnerships, and development finance institutions are a few examples where foreign aid has been used to enable many middle- and low-income countries to attract private investments in infrastructure and connectivity projects.²⁸ Better and more innovative development finance instruments are needed, especially if these investments are to prepare developing economies for technological disruptions to come.

Between 2011-2015, an average of \$121 billion in investments financed infrastructure projects in the developing world through public-private partnerships.²⁹ Since 2000, over 167 blended finance facilities have been used to mobilize over \$31 billion, with \$9.1 billion raised just in 2017.³⁰ Similarly, the global investment activity of development finance institutions has also boomed, with total investments jumping from \$10 billion in 2002 to \$72 billion in 2015.³¹ In 2017, developing economies received over \$671 billion in foreign direct investments, a ten-fold jump from the mid-1990s when most of the developing world had just opened up markets for international trade and investment.³² As the fourth industrial revolution continues to unfold and disrupt current economic trends, these powerful development tools must be wielded to mitigate the risk of disruption, spur innovation, and create new and adaptive economic models.

The financial sector takes into account that every investment involves risk. The culture of risk-taking is more prevalent in western economies where protective institutions tend to be stronger, while investors and bankers often find emerging economies to have intolerable risk levels. Increasing risk tolerance and strengthening institutions so they are able to protect investments can facilitate greater private capital inflows and spur innovation. As investments are primarily post-risk assessment resource allocations, access to reliable and verifiable information becomes an integral part of making this happen. A challenge in many developing countries is limited access to critical data, and what data exists can be unreliable. Investors—especially those that support technology and innovation—often localize their processes and make a concerted effort to respond to the information deficit challenge meaningfully. Facilitating the collection of more and better data for investors is thus a good way

27. Gavin E.R. Wilson, “There’s a \$2.5 Trillion Development Investment Gap. Blended Finance Could Plug It,” World Economic Forum (WEF), July 18, 2016, <https://www.weforum.org/agenda/2016/07/blended-finance-sustainable-development-goals/>.

28. Daniel F. Runde, “Congressional Testimony on Public-Private Partnerships in Foreign Aid: Leveraging U.S. Assistance for Greater Impact and Sustainability,” CSIS, July 12, 2016, <https://www.csis.org/analysis/public-private-partnerships-foreign-aid-leveraging-us-assistance-greater-impact-and>.

29. World Bank, “Infrastructure and Public-Private Partnerships,” World Bank Group, April 5, 2018, <http://www.worldbank.org/en/topic/publicprivatepartnerships/overview#1>.

30. Daniel F. Runde, Conor M. Savoy, and Aaron N. Milner, *Blended Finance and Aligning Private Investment with Global Development* (Washington, DC: CSIS, March 2018), https://csis-prod.s3.amazonaws.com/s3fs-public/publication/180313_Savoy_BlendedFinance_Web.pdf?oSIJoKLxku_odK1cyFix_DHeRoKunpuc.

31. Daniel F. Runde, Dirk Willem te Velde, Conor M. Savoy, Paddy Carter, and Alberto Lemma, *Development Finance Institutions Come of Age: Policy Engagement, Impact, and New Directions* (Washington, DC: CSIS, October 2016), https://csis-prod.s3.amazonaws.com/s3fs-public/publication/161021_Savoy_DFI_Web_Rev.pdf.

32. UN Conference on Trade and Development (UNCTAD), *World Investment Report 2018: Investment and New Industrial Policies* (Geneva: United Nations, 2018), https://unctad.org/en/PublicationsLibrary/wir2018_en.pdf.

for institutions to promote quality investments and thereby mitigate risks associated with the fourth industrial revolution. As local talents have deep networks in their communities and a clear understanding of local market nuances, investors can alleviate the risk on their returns by recruiting them and leveraging their skills to manage their assets.

Technology companies assume greater risk by design. For the technology sector, risk-taking is not only a part of the innovation process, but it is also a characteristic that is at the heart of the sector's entrepreneurial spirit. The willingness to take risks makes this community innovative but also inherently disruptive.³³ Therefore, a universal regulatory architecture for data integrity, privacy, protection, and security becomes an essential requirement in new technology platforms, one that could mitigate the more negative aspects of disruption. The absence of such a regulatory architecture has already undermined credibility and trust in vital institutions of democracy.³⁴ By providing the technology sector with an ethics-centered institutional framework, these forces of innovation can be held accountable and be harnessed to create a virtuous cycle of economic development, investment, and innovation. This could, in turn, spur technology firms to be more proactive and thoughtful about their own ethics and values. The problem, typically, with instituting such a framework is that technological change happens much faster than institutional change. This is why such a framework must be at broader, higher levels, offering much more flexibility to technology companies within set protocols. Organizations like the Federal Communications Commission (FCC) and the Securities and Exchange Commission (SEC) in the United States, as well as the European Commissioner for Competition, are examples of institutions that perform specific regulatory functions with minimal government intervention, designed to let markets regulate themselves between certain guardrails. The structural design and functioning of these organizations can offer insights into what an ethics-centered institution can look like. Substituting institutions for personalized, individual-driven models can often fail to mitigate risk and, instead, create a "zero-sum" environment while failing the innovation ecosystem entirely. The best-case scenario is to conceive a framework that incentivizes technology firms to understand and appreciate the value of institutions, even if the current form of regulation needs better adaptive capacity.

Creating the Enabling Environment

The advent of emerging technologies like mobile banking, blockchain, and autonomous vehicles, offers both an exciting future and a new set of challenges for developed and developing countries alike. Some of these new technologies have enabled developing countries to leapfrog traditional financial and civil systems. Many East African nations no longer have to build conventional 'brick and mortar' banks as mobile banking and payment systems have empowered people to bank their earnings remotely and make payments in real-time. Doing so has lifted nearly 200,000 people out of poverty in Kenya

33. Christine Bader, "The Risks and Responsibilities of Tech Innovation," *MIT Sloan Management Review*, June 10, 2014, <https://sloanreview.mit.edu/article/the-risks-and-responsibilities-of-tech-innovation/>.

34. Vanita Kohli-Khandekar, "Facebook-Cambridge Analytica Now Raises Questions about Regulation, Privacy," *Business Standard*, March 28, 2018, https://www.business-standard.com/article/opinion/facebook-cambridge-analytica-row-raises-questions-about-regulation-privacy-118032701205_1.html.

alone.³⁵ Lessons for creating the enabling environment for innovation to thrive – like seen in the East African banking sector – draws from much of the same lessons of the broader enabling environment literature, especially the need for institutions (and, in this case, international development donors) to adopt “context-specific, strategic approaches to [catalyze] private investment.”³⁶

However, policymakers and stakeholders continue to grapple with two dilemmas specific to creating an enabling environment around increasingly disruptive innovations: (i) how can innovation, an uncertain and unpredictable phenomenon, be regulated without discouraging innovators, and, (ii) can an ethical and safe regulatory framework be created without debilitating the innovation ecosystem? As this report attempts to analyze the roles and responsibilities of various stakeholders in ensuring an accountable and enabling environment for innovation, questions on the constitutionality and legality of many technologies in public life will continue to arise. To that end, the inferences drawn here do not strive to settle the debates themselves; instead we present a coordinating framework to operationalize the partnership between the various stakeholders and help legislators and constitutional courts exercise their sovereign authorities and address context-specific versions of these key questions themselves.

Regulations—and the legislative foundations upon which they rest—are not always constraining and restrictive. In fact, oftentimes regulations are welcomed by the private sector. The creation of the Federal Reserve Bank in the United States, in the aftermath of the 1907 Bankers’ Panic, is a quintessential example of how representatives of the private (banking) sector and public officials can cooperate to create a regulatory body that enables greater economic growth and development while safeguarding public interests.³⁷ An ideal and enabling legislative environment provides a legal basis for the level playing field and for regulating the more disruptive elements of technological disruption while also using its power to encourage partnerships that crowd in the more positive elements. Governments, especially in the developing world, can use partnerships with innovators to address the demands and pressures of a restless population seeking economic opportunities. While the state must avoid picking winners and losers in the economy, it can leverage its authorities and convening power to give a boost to specific innovations and/or industries with more profound socioeconomic impacts, addressing the challenges surrounding inequality, education, health care, and democratic institutions adequately.

REGULATING THE SHARING ECONOMY

An article in the *Minnesota Journal of Law, Science & Technology*, published in 2015, highlighted the tension between regulators and innovative

35. Kieron Monks, “M-Pesa: Kenya’s Mobile Money Success Story Turns 10,” CNN, February 24, 2017, <https://www.cnn.com/2017/02/21/africa/mpesa-10th-anniversary/index.html>; Rob Matheson, “Study: Mobile-Money Services Lift Kenyans out of Poverty,” MIT News, December 8, 2016, <http://news.mit.edu/2016/mobile-money-kenyans-out-poverty-1208>.

36. Cecilia Caio, “The Enabling Environment for Private Sector Development: Donor Spending and Links to Other Catalytic Uses of Aid,” *Development Initiative*, March 14, 2018, <http://devinit.org/post/enabling-environment-private-sector-development/>.

37. Chairman Ben S. Bernanke, “The Crisis as a Classic Financial Panic” (speech at the Fourteenth Jacques Polak Annual Research Conference, Washington, DC, November 8, 2013), <https://www.federalreserve.gov/newsevents/speech/bernanke20131108a.htm>.

hospitality and transportation enterprises such as Airbnb and Uber.³⁸ The two companies are classic examples of multi-billion-dollar enterprises born out of technological innovation. However, given their size and disruptive impact on the hospitality and transportation markets, regulators seek to hold new service providers to the same regulatory frameworks as incumbents.

State authorities are applying these regulations to protect the interests and welfare of their constituents—who are also consumers—from fraud, illegal, and unsafe practices. They argue that these broad objectives were in place long before these innovative enterprises arrived on the scene. However, many tech leaders find such regulations to be backchannel tactics for the losers of disruptive innovation to sustain inefficient cartelization (e.g., taxi companies) in traditional economic sectors (e.g., transportation).

Innovation ecosystems thrive when ideas are exchanged across broad and diverse networks of people and institutions. With few exceptions (*see* The Curious Case of China), robust innovation ecosystems fail to take root in societies where journalists, researchers, scholars, and students are subject to laws that constrain their movement and access to information. The asymmetric information theory posits that economic transactions become inefficient (and eventually fail) when one of the parties possesses greater knowledge than the other, though credible arguments can be made to the contrary.³⁹ Oftentimes innovation thrives in conditions of asymmetric information. As long as the critical information was not obtained through illegal means, such asymmetry presents market opportunities for innovators. In reconciling these competing visions, most would agree that more robust idea flows (e.g., getting people with great ideas to interact and collaborate on generating even more creative solutions), information flows (e.g., improved ability to judge risks and identify barriers to innovation), and networks to enable idea and information flows are beneficial to the broader innovation ecosystem as well as to individual innovators. Economies aspiring to boost innovation should promote and, where appropriate, facilitate free speech, free thought, free association, and free expression.

THE CURIOUS CASE OF CHINA

The Chinese model of growth and development has long puzzled political economists, many of whom have argued that free and democratic societies (which China is not) are a necessary precondition to enjoy economic growth.⁴⁰ One possible reason can be that the Chinese economy has been able to sustain growth and innovation due to the government's ability to influence investments in the private sector while deeply embedding itself into society. This atmosphere has

38. Sofia Ranchordas, "Does Sharing Mean Caring? Regulating Innovation in the Sharing Economy," *Minnesota Journal of Science and Technology* 16, no.1 (2015): 414, <https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1356&context=mjlst>.

39. Lauri Auronen, *Asymmetric Information Theory and Applications* (Helsinki University of Technology, 2003), <https://pdfs.semanticscholar.org/cdc1/10d48cfa54659f3a09620d51240f09cf1acc.pdf>.

40. Amartya Sen, "Democracy as a Universal Value," *Journal of Democracy* 10 no. 3 (1999): 3-17, https://www.unicef.org/socialpolicy/files/Democracy_as_a_Universal_Value.pdf.

also affected foreign companies to a greater extent; with the government engaging in preferential treatment toward national companies, China has crowded out much external competition. Additionally, the Chinese regulatory regime has also bent certain internationally accepted norms concerning its currency policy and trade practices. Even though countries like Taiwan and South Korea enjoyed similar models of state-driven economic growth, they eventually embraced transparent political and market institutions.

While the jury remains out, many expect this relative period of stability to be short-lived and unsustainable. Scholars argue that the efforts undertaken by the Chinese state have created a distorted set of incentive structures that allow many Chinese companies to take bold, and ultimately unsustainable, risks with their businesses. Economists and analysts are increasingly concerned that rampant corruption in local urban bodies, poor lending practices in banks, and declining profits of state-owned enterprises are all adding to an increased likelihood for a sharp economic downturn.⁴¹

When creating an enabling environment, political leadership matters. Sustaining that environment requires protection from politics. Unfortunately, much of the developing world is plagued with institutions that lack the checks and balances needed to contain impulsive and ever-changing political actors from undermining the freedom of, for example, universities and academic institutions. With state-funded public universities constituting the principal portion of the higher education system in many developing countries, political leaders find it easier to coerce, intimidate, and manipulate scholars and students from freely pursuing learning and research opportunities, undermining academic freedom and stifling innovation. Such efforts might be seen as creating short-term political continuity, but in reality, limit longer-term innovation-led economic growth. Universities and academic institutions in Hungary, India, Niger, Nigeria, Pakistan, Sierra Leone, Turkey, and Venezuela, whose combined population of 1.9 billion makes them home to one-fifth of the global population, have reported some of the highest numbers of incidents of curtailed academic freedom, almost certainly stunting innovation along with it.⁴²

Enlightened political leadership realizes that a strong and independent civil society benefits the innovation agenda. A robust civil society and active philanthropic players are central to building the trust-based relationships, increasing the welfare, and enabling the meaningful partnerships necessary for a proper enabling environment. Above all, the rule of law is fundamental to making economies more attractive for innovation and investments. Nations that turn to authoritarianism erode the rule of law and increase political and operating risk. Despite seeing tremendous growth since the 1990s, the

41. Yukon Huang, "China's Economy Is Not Normal. It Doesn't Have to Be," *New York Times*, March 13, 2018, <https://www.nytimes.com/2018/03/13/opinion/china-economy-corruption.html>; Paul Hodges and Daniël de Blocq van Scheltinga, "China's Lending Bubble is History," *Financial Times*, May 22, 2018, <https://www.ft.com/content/45bd8052-59dc-11e8-bdb7-f6677d2e1ce8>.

42. Scholars at Risk, *Free to Think: Report of the Scholars at Risk Academic Freedom Monitoring Project* (New York: Reuters, 2017), <https://www.scholarsatrisk.org/wp-content/uploads/2017/09/Free-to-Think-2017.pdf>.

freedom for philanthropists to engage in communities around the world is beginning to face severe constraints primarily in the form of foreign exchange controls and regulations on capital flows.⁴³ Of the countries engaging in such tactics, many have questionable human rights records. These countries – often fearing global exposure of activities of dubious legality that could lead to the further loss of legitimacy to their political regimes – restrict the ability of foundations and organizations to financially support civic programs and invoke their right to maintain of fiscal sovereignty and political independence.

The financial sector has been a long-time and loud advocate for a better enabling environment for private investment. With bankers and investors mindful of the risks that innovations pose to their ventures, they can hedge their risks by financing new human talent, upgrading their information sources, and increasing their pool of capital. However, since no amount of hedging can guarantee zero loss to investments, the financial sector relies on regulatory protections of the developed states to minimize liability, address solvency issues, and pre-emptively avoid liquidity crises. Emerging market economies seldom offer such protections with some developing countries even doing the opposite e.g., instituting punitive measures against bankers and entrepreneurs engaged in lending and borrowing perceived to be “too risky.”⁴⁴ To fully commit themselves to the innovation economy, creditors and investors seek bankruptcy codes that do not resemble a modern “debtors’ prison,” but instead give them the institutional buffer needed to explore new opportunities and innovative ideas. Economists, however, have cautioned against making bankruptcy codes overly creditor-friendly.⁴⁵ Buoyed by creditor-friendly bankruptcy codes, banks would be more inclined to lend to leveraged firms regardless of the firm’s potential for failure, limiting the incentives of firms to pursue innovation.

A critical and under-appreciated aspect of creating an enabling environment to encourage innovation is labor mobility. With 258 million international migrants, the mobility of human capital around the world has reached historical and unprecedented levels, contributing \$613 billion in global remittances.⁴⁶ Nearly two-thirds of all the migrants live in just 20 countries.⁴⁷ The United States best exemplifies the payoffs of large-scale migration. Historically known as a “nation of immigrants,” the United States continues to welcome tens of millions of people. In 2017, over 50 million immigrants were residing in the country, a number that is rivaled by no other country. In part because of its historically welcoming migration policies, the United States is home to technology hubs from Silicon Valley in California to the Research Triangle Park in North Carolina and financial powerhouses from New York to Dallas and beyond. Thriving entrepreneurs and

43. Hudson Institute, *The Index of Philanthropic Freedom 2015* (Washington, DC: Hudson Institute, 2015), <https://s3.amazonaws.com/media.hudson.org/files/publications/2015.06.15IndexofPhilanthropicFreedom2015.pdf>.

44. “UAE Bankruptcy No Longer Leads Straight to Prison,” *Financial Times*, March 22, 2017, <https://www.ft.com/content/050720c0-e248-11e6-9645-c9357a75844a>.

45. Viral V. Acharya and Krishnamurthy Subramanian, “Bankruptcy Codes and Innovation,” New York University, September 18, 2008, http://pages.stern.nyu.edu/~sternfin/vacharya/public_html/acharya_subramanian.pdf.

46. World Bank, “International Migration at All-Time High,” World Bank Group News, December 18, 2015, <http://www.worldbank.org/en/news/press-release/2015/12/18/international-migrants-and-remittances-continue-to-grow-as-people-search-for-better-opportunities-new-report-finds>; World Bank, “Record High Remittances to Low- and Middle-Income Countries in 2017,” World Bank Group News, April 23, 2018, <http://www.worldbank.org/en/news/press-release/2018/04/23/record-high-remittances-to-low-and-middle-income-countries-in-2017>.

47. UN Department of Economic and Social Affairs, *2017 International Migration Report* (New York: UN, 2017), http://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/MigrationReport2017_Highlights.pdf.

inventors, many of whom are first- or second-generation immigrants, can be found in every state.

The full potential of cross-border human skills mobility has yet to be exploited by most countries. Indeed, restrictive migration policies threaten to limit cross-border innovation and entrepreneurialism. While developing countries like Bangladesh, Brazil, India, Nigeria, and Indonesia struggle to find economic opportunities for their youth population due to a range of structural inefficiencies, other countries like Japan, Italy, Germany, Finland, and Greece have rapidly aging populations and are in need of younger labor. Limitations on movement thus have a profound effect on developing and developed country workforces and, by extension, the broader innovation economy.⁴⁸ Migration is increasingly taking place between and among developing countries (e.g., South Asian innovators become entrepreneurs in sub-Saharan Africa), creating a need for better bilateral and internationally-accepted migration norms. Improved avenues for legal and regular migration, especially for those filling known gaps in the innovation space, would assuage the demographic pressures felt by countries and contribute to shared economic gains.

Adequate infrastructure is critical to enabling innovation-led economic growth. For developing countries, the lack of functional and quality infrastructure remains one of the most significant stumbling blocks to creating a successful enabling environment. Globally, there is a \$15 trillion infrastructure investment deficit, with developing countries bearing responsibility for much of that gap.⁴⁹ Access to regular and dependable sources of electric power continues to remain a challenge for every fifth person on the planet.⁵⁰ Over half of Africa's population and one-fourth of Asia's population live in the dark, even as the two regions hold three-fourths of the world's human resources. Similarly, more than half the planet lives without internet connectivity, while just over one-eighth of the global population has a fixed broadband subscription.⁵¹ These individual data points reveal the grim reality that failure to invest in infrastructure could be the single most significant challenge for emerging market economies striving to make real progress in science, technology, and innovation.

Creating an enabling environment means understanding the goals of other stakeholders. The technology community, given its fast pace and culture of disruption, mostly sees institutions and regulations as inhibiting, or at least taxing, its ability to innovate, anchoring it to the requirements imposed by outdated frameworks. Emerging technologies often exist in uncharted territory, making it difficult for governments to gauge the appropriate level of regulation. Regulate too little, and the risk of economic and societal shock rises tremendously. Overregulate, and the opportunity for transformative innovation is missed. A balancing act is needed to regulate the unknown without

48. PTI, "India has World's Largest Youth Population: UN Report," *The Economic Times*, November 18, 2014, <https://economictimes.indiatimes.com/news/politics-and-nation/india-has-worlds-largest-youth-population-un-report/articleshow/45190294.cms>; Christina Freeland, "The Problems of a Graying Population," *New York Times*, July 29, 2011, <https://www.nytimes.com/2011/07/29/world/americas/29iht-letter29.html>.

49. Global Infrastructure Hub, "Global Infrastructure Outlook," *Global Infrastructure Hub*, <https://outlook.gihub.org/>.

50. Todd Lindeman, "1.3 Billion are Living in the Dark," *Washington Post*, November 6, 2015, <https://www.washingtonpost.com/graphics/world/world-without-power/>.

51. World Development Indicators, "Fixed broadband subscriptions (per 100 people)," World Bank, <https://data.worldbank.org/indicator/IT.NET.BBND.P2>.

destroying the incentive to innovate. Adaptive, broader regulations are needed that can change pace and provide wide guardrails within which there is a lot of flexibility.

Wider guardrails, better piloting of technology- or industry-specific regulations, and sharing lessons learned may help address this disconnect. However, even when the goals of the technology community are properly understood, developing countries often struggle with the challenge of governance, afflicted by an overwhelming legislative agenda compounded by partisan gridlocks and the resulting policy paralysis. On the other side, the technology community, itself seldom constant in makeup, finds the consistent absence of technical expertise among policymakers as burdensome, inhibiting, and standing in the way of progress. While the technology industry is correct in expecting more from the regulatory authorities, it must also recognize that there is a reciprocal relationship between itself and the government. Consequently, any adopted regulatory framework must be malleable and adaptive.⁵² The framework should focus less on the technology itself, and more on standardized, broader procedures that are calibrated to hold the innovators in the community accountable while creating an ecosystem capable of keeping pace with change. Technology companies often do not see themselves as partners with the government, or even passengers on the same road to a better future. For the fourth industrial revolution to have a positive outcome for the maximum number of people and states, this must change.

The goals and expectations of the academic and philanthropic communities and the financial and technology sectors from the fourth industrial revolution are vastly divergent. These key constituent groups also have dissimilar perceptions of their roles in mitigating the risks of disruptive innovation and their relationship with the state in creating an enabling environment. Considering these differences, it is clear that the task of mobilizing stakeholders, and coordinating with policymakers, to invoke the full power of institutions remains an ambitious ordeal. Fortunately, given their historical significance, institutions continue to retain some ability to steer stakeholders and constituent groups in the private sector, serving alternatively as facilitator, administrator, and/or regulator. In doing so, institutions can enable the type of engagement that is vital to addressing the following three areas (discussed in detail in the following chapters) which, set against the fourth industrial revolution, present some of the most significant challenges and opportunities to innovation-led economic growth:

URBANIZATION-DRIVEN INEQUALITY

As the world continues to witness unprecedented population growth and rapid urbanization, it is critical for stakeholders to recognize that rapid urbanization will become a permanent reality. Though there are many opportunities presented by urbanization, this ongoing phenomenon can easily exacerbate socioeconomic problems. These include the disproportionate development of urban centers at the expense of rural economies as well as a more pronounced economic stratification within urban communities. Other manifestations of this inequality can be found in the form of human capital deficits and the

52. "A Short Introduction to 'Planned Adaptive Regulation'," International Risk Governance Council, November 19, 2015, https://www.irgc.org/wp-content/uploads/2015/12/A_short_introduction_to_Planned_Adaptive_Risk_Regulation-19Nov15.pdf.

erosion of the social contract. In this regard, stakeholders must acknowledge the impending need to redesign the resource allocation model to ensure equitable and inclusive growth, transforming cities into powerhouses for innovation. Governments and public institutions, in particular, must facilitate the emergence of innovation-oriented urban networks while being mindful of rural economic needs.

DEFICIT OF SKILLED HUMAN CAPITAL

Given the centrality of human capital to innovation, new partnerships between the academic and technology communities are needed to prepare workers for the various sectors of the innovation economy. The developing world faces a comparative shortage of human resources capable of translating investments in underexplored economic sectors into innovation-led economic growth. Many developing country innovators leave for Europe, the United States, or regional hubs like Singapore and Dubai. Those that stay home often lack the education and skills needed to succeed. Institutions and stakeholders must recalibrate their skills development strategies and ensure that this deficit is addressed in a meaningful and timely manner.

EROSION OF THE SOCIAL CONTRACT

Stakeholders in the academic, finance, philanthropic, and technology worlds must realize there is low public confidence and trust in institutions. As part of rebooting the innovation agenda, there is a need for a reinvention of the social contract that exists between people and the state. Recent manipulations of technology, in particular the nefarious manipulation of social media, have placed real strains on this contract.⁵³ Existing socioeconomic structures are undergoing radical transformations, as evidenced by diminishing opportunities for decent work without a college degree, the expanding scope of the ‘gig economy’ that makes the resource allocation process more efficient, and the inevitable automation of various sectors of the economy that were previously labor-intensive. These transformations are expected to yield long-term sustainable growth while imposing painful, short-term costs upon individuals that promise to challenge public confidence and trust in institutions even further. The widespread reaction to such costs can range from minimal—e.g., certain public institutions fail to deliver on their operational responsibilities—to catastrophic—e.g., political regimes collapse causing chaos, unrest, mass protests, and fundamental challenges to democracy. Contemporary models of employer-based benefits and other elements of the social safety net that were originally conceived in the twentieth century are increasingly unable to meet the expectations of the innovation economy.⁵⁴

53. Niall Ferguson, “Social Networks Are Creating a Global Crisis of Democracy,” Harvard Kennedy School Belfer Center, January 19, 2018, <https://www.belfercenter.org/publication/social-networks-are-creating-global-crisis-democracy>.

54. Senator Mark Warner, “Economic Impacts of Globalization and Technological Disruption,” CSIS, April 20, 2018, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/182304_Economic_Impacts_Globalization_Keynote.pdf.

2 | All Innovation is Not Created Equal

KEY POINTS

- Much of the rapid population increase in the developing world will be concentrated in megacities and urban centers. This growth will bring economic stratification within urban communities, while reinforcing the divides and inequalities between urban and rural communities.
- Through much of the twentieth century, national institutions were able to exercise their broad-reaching powers to make sweeping policy changes. As populations continue to grow, economically and geographically, local and sub-national governments could enjoy greater trust and support, thereby expanding their authority and role in addressing technological disruption and other major challenges to economic development.

During the latter half of the twentieth century, many developing countries adopted either the import-substitution industrialization model or the export-led industrialization model to rebuild their post-war and post-colonial economies.⁵⁵ The strategy at the heart of both models was to prioritize domestic production and develop strong manufacturing and agricultural sectors through centralized state-driven economic planning executed by public sector entities and state-owned enterprises. National governments of most countries utilized their agencies to drive science, technology, and innovation policies. When this model of policymaking was at its peak usage during the post-war and post-colonial eras of the 1950s, less than one-third of the world's population (less than 1 billion people) lived in urban communities.⁵⁶

A recent United Nations (UN) study shows that 54 percent of the global population presently lives in urban centers.⁵⁷ By 2050, that number is expected to reach 66 percent, with a majority residing in developing countries in Africa and Asia. Push-and-pull factors stemming from manufacturing-driven industrialization shaped urbanization in the twentieth century. However, the World Bank reports that disruptive technological forces such as artificial intelligence and automation are chipping away at the conventional

55. Nell Dias Karunaratne, "Export Oriented Industrialization Strategies," *Intereconomics* 15, no. 5 (September/October 1980), <https://www.econstor.eu/bitstream/10419/139697/1/v15-i05-a03-BF02924575.pdf>.

56. UN, "Urbanization: Facts and Figures," United Nations, <http://www.un.org/ga/Istanbul+5/booklet4.pdf>.

57. UN, "World's Population Increasingly Urban with More than Half Living in Urban Areas," United Nations, July 10, 2014, <http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html>.

modes of urban employment in many developing countries, leaving migrant workers subject to the vagaries of the informal economy.⁵⁸ Many migrants lack a meaningful safety net to address their social welfare needs.

With increasing urbanization, human capital is being drawn from thousands of geographically scattered rural communities and coalescing into a few hundred high-density urban centers and megacities.⁵⁹ Through adequate investment and the right structural conditions, these human resources can transform cities and urban centers into engines of rapid economic growth and development. But in the absence of such investment and structural conditions, this widespread rural-to-urban migration is resulting in pools of problems and has the capacity to give rise to pandemics, extreme poverty, increased strain on deteriorating infrastructure, and environmental pollution. These problems have broader sociopolitical implications, leading to social unrest, the weakening of public institutions, and further erosion of social contract. Massive internal migration to cities is also impacting rural communities as rural poverty levels grow and agricultural practices are modified and disrupted.

National governments, which were once better able to resolve development issues through the use of institutions, find it increasingly difficult to do the same in recent years due to a change in the development landscape. With globalization and technological advancement, countries are able to pursue greater bilateral and multilateral cooperation with one another and establish mechanisms to address some issues like climate change, financial crisis, immigration, and trade. But there are several other development challenges including education, healthcare, and infrastructure, the resolution of which has become more challenging for national governments given the exponential growth in population in many developing countries. Thus, national governments must now divest more power to sub-national institutions and into decentralized policymaking mechanisms. Sub-national governments, which have greater control over their institutions, can collaborate closely with communities, pursue long-term, data-driven solutions to development challenges caused by urbanization, and secure resilient economic and social structures.

Access to Higher Education

No conversation on urbanization, innovation, and economic development is complete without addressing the issue of access to education in both rural and urban areas. Quality education provides skills for development, increased wages, and upward socioeconomic mobility for urban dwellers. Indeed, scholars and proponents of modernization theory have long argued that urban communities tend to be more aware than rural communities of the political and economic rights that would equip them with the skills to pursue opportunities that would, in turn, raise their quality of life.⁶⁰

58. "Trouble in the Making? The Future of Manufacturing-Led Development," World Bank Group, September 20, 2017, <https://www.worldbank.org/en/topic/competitiveness/publication/trouble-in-the-making-the-future-of-manufacturing-led-development>.

59. U.N. Population Division, "World Urbanization Prospects: The 2018 Revision," United Nations, <https://population.un.org/wup/Publications/Files/WUP2018-KeyFacts.pdf>.

60. Seymour Martin Lipset, "Some Social Requisites of Democracy: Economic Development and Political Legitimacy," *The American Political Science Review* 53, no. 1 (March 1959): 69-105, https://scholar.harvard.edu/files/levitsky/files/lipset_1959.pdf.

With continued rapid urbanization, the demand for higher levels of investment into the establishment of new academic institutions will also increase. However, such institutional investment will likely only reinforce the existing attraction that cities have as hubs of new economic opportunities and employment prospects. Internal migration patterns will continue as a result of these new urban institutions, triggering greater demand for urban development. Cities will require more housing, jobs, and institutions, culminating in an unsustainable cycle of rural-to-urban migration to accommodate this population growth. It will also leave the remaining inhabitants of the rural communities vastly underserved.

The rationale for policymakers to ensure that rural communities enjoy access to education and opportunities for human development, on par with the urban masses, is two-fold. First, despite the large-scale movement to urban centers, only a minority of the global population will inhabit megacities that have human settlements greater than one million people. At the same time, a significant proportion of humanity does—and will continue to—live in rural areas. By 2050, 3.1 billion people will continue to be geographically distributed across the planet with limited access to the physical infrastructure and digital connectivity more regularly associated with urban areas. Disregarding the needs of such a significant proportion of the population will undermine the broader goal of innovation-led economic growth. Secondly, much of the global agrarian economy rests upon rural communities, so the successful development of the rural and agricultural sector has a symbiotic effect on global food markets and food security. For urban populations to eat, rural populations must produce. Institutions designing education and skills development policies must incorporate the priorities of rural communities to facilitate inclusive, sustainable, and innovation-centered economic growth. Managing the balance between the development of urban *and* rural communities, with the fourth industrial revolution as the backdrop, will be an opportunity and challenge for stakeholders.

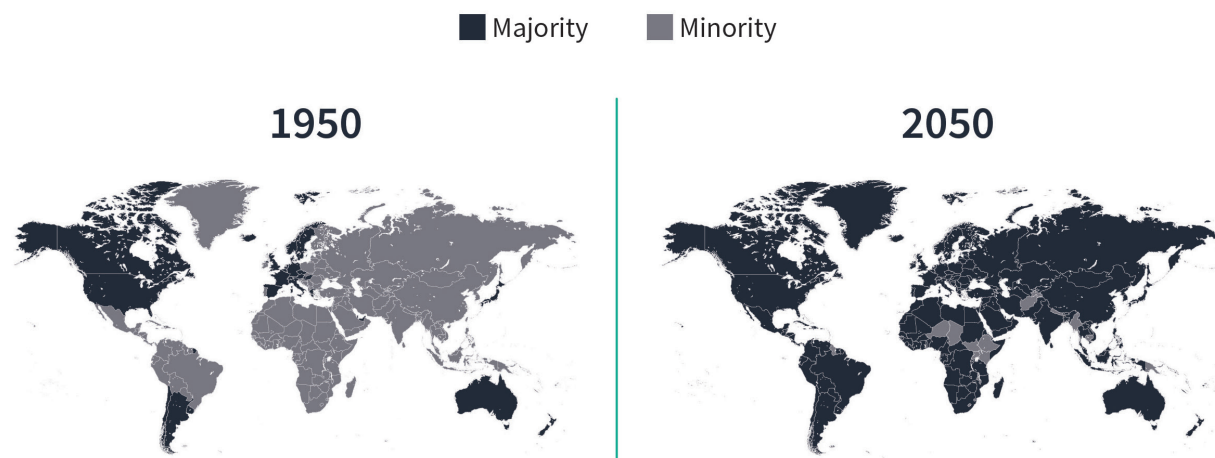
Leveraging Local Financial Resources and Financial Inclusion

The expected human population growth over the next few decades will cause emerging market economies to seek several trillion dollars' worth of investment that will go towards developing and upgrading their foundational institutions. These institutions sustain emerging market economies' economic life and assist them in meeting the benchmarks of the UN's sustainable development goals (SDGs). After establishing the SDGs, the UN convened a 2015 conference in Addis Ababa on financing for development, realizing the need for a new framework beyond official development assistance. The Addis Ababa framework underscored the need to mobilize capital markets, taxes, and savings at local levels.⁶¹ The framework also revealed that vast pools of money are under-utilized, or often left untouched, by both donor and recipient countries that seek to achieve economic development. A 2013 International Monetary Fund (IMF) report found that developing countries were capable of leveraging nearly \$54 trillion in investments, stored in the form of domestic bank assets, bonds, and equities and amounting to 20 percent of the global share of domestic

61. UN Department of Economic and Social Affairs, *Addis Ababa Action Agenda of the Third International Conference on Financing for Development* (New York: United Nations, 2015), https://sustainabledevelopment.un.org/content/documents/2051AAAA_Outcome.pdf.

assets.⁶² Additionally, by mobilizing these financial resources, local administrators and institutions would enjoy greater fiscal and administrative autonomy, allowing them to have a more targeted and sustainable adaptation of policies. In the United States, North Carolina and Utah have historically been examples of how sub-national entities can directly shape state-level science, technology, and innovation policies to the benefit of local communities.⁶³

COUNTRIES *WITH A* MAJORITY URBAN POPULATION



Source: *The Rapid Growth of Urban Population* (Data from Our World in Data, produced by Oxford Martin Programme on Global Development, University of Oxford).

Firms and corporations have long since recognized the power of local capital and have strategically altered their business models and leveraged their corporate social responsibility funds to launch initiatives that will, in turn, create new markets and business opportunities. Emerging market economies in Africa, expected to double their populations to nearly 2.5 billion people by 2050, have benefited greatly from these initiatives.⁶⁴ The multinational financial services industry is a quintessential example of a sector where businesses and philanthropies combine their efforts to realize both development and business objectives, including as many people and businesses as possible into the formal financial sector. The more activist among the financial and philanthropic communities created the concept of “impact investing” to give priority to both social and financial returns when selecting investment targets. Many of these investors see emerging

62. IMF, *Global Financial Stability Report: Risk Taking, Liquidity, and Shadow Banking—Curbing Excess while Promoting Growth* (Washington, DC: International Monetary Fund, 2014), <https://www.imf.org/external/pubs/ft/gfsr/2014/02/pdf/text.pdf>.

63. Dee Shore, “North Carolina Invests in World-Class Plant Science Research,” NC State University News, March 16, 2016, <https://cals.ncsu.edu/news/north-carolina-invests-in-world-class-plant-science-research/>; Office of Legislative Research and General Counsel, “Selected Highlights of the 2018 General Session,” Utah State Legislature, March 9, 2018, <https://le.utah.gov/~2018/SelectedHighlights2018.pdf>.

64. Just five African countries (Democratic Republic of Congo, Ethiopia, Nigeria, Tanzania, and Uganda) will hold 20 percent of the global population, per the *African Development Bank*; UN, “World Population Projected to Reach 9.8 Billion in 2050, and 11.2 Billion in 2100 – Says UN,” UN News, June 21, 2017, <https://www.un.org/sustainabledevelopment/blog/2017/06/world-population-projected-to-reach-9-8-billion-in-2050-and-11-2-billion-in-2100-says-un/>.

markets as opportunities to help build solutions while creating profitable ventures. Some of the largest multinational corporations (e.g., MasterCard and Visa) have partnered with think tanks and non-profit organizations to formulate data-driven solutions to challenges in financial inclusion and the modernization of economic infrastructure in rural areas.⁶⁵ These partnerships have dual goals: first, to secure financial inclusion in an increasingly digital developing world and facilitate accelerated and more significant economic growth; and second, to claim the first-mover advantage in the financial services market.

New Technologies Can Positively Impact Urban and Rural Communities

Developing countries struggle with economic informality (over 61 percent of the global economy currently operates in the informal sector), which causes multiple governance and economic challenges.⁶⁶ Urbanization, especially in its early phases, is a principal contributor to the informal economy.⁶⁷ However, in the absence of stable economic development, the informal sector becomes entrenched in inefficient (and often unsustainable) modalities in the long-term. The gains of operating in an informal economy are apparent in the form of non-taxable revenues for entrepreneurs or the absence of any incentive to comply with authorities and regulations. However, the ability of the informal economy to function outside the state purview also limits their ability to seek state-assistance, leaving them more vulnerable to market disruptions. New technologies are disrupting the status-quo and are playing a catalytic role in converting the informal economy into the semi- (but still better) regulated gig-economy.

Developing countries struggle with economic informality, which causes multiple governance and economic challenges.

Recent changes in India's commercial transportation sector offer some insights.⁶⁸ For decades, commercial drivers who provided transportation services through taxicabs and autorickshaws worked in an environment where enforcement of regulations, if they existed at all, were lax and drivers effectively worked informally.

The costs of this model were real, as the taxicab market remained an oligopoly, whereby a few big players had control of the market. New players found it impossible to break into the market while commercial drivers (who were predominantly migrants from the rural parts of the country with limited skills marketable in urban settings) were employed under unfair terms and depressed wages. Finally, the lack of market competition left service providers with few incentives (if any) to seek and incorporate customer feedback into their operational models.

However, the advent of mobile-based ride-hailing applications (e.g., Ola and Uber) has quickly and firmly pushed the entire commercial driving market into the more formal gig

65. "The Partnership," The Mastercard Foundation Partnership for Finance in a Digital Africa, <https://www.financedigitalafrica.org/about/>; "Rwandan Farmers to Reap Digital Payment Rewards," VISA, <https://usa.visa.com/visa-everywhere/global-impact/rwandan-farmers-to-reap-digital-payment-rewards.html>.

66. ILO/Vijay Kutty, "Nearly Two-Thirds of Global Workforce in the 'Informal' Economy - UN Study", *UN News*, April 30, 2018, <https://news.un.org/en/story/2018/04/1008562>.

67. Ceyhun Elgin and Cem Oyvut, "Lurking in the Cities: Urbanization and the Informal Economy," Bogazici University, http://www.econ.boun.edu.tr/public_html/RePEc/pdf/201310.pdf.

68. Ravi Agrawal, "The Hidden Benefits of Uber," *Foreign Policy*, July 16, 2018, <https://foreignpolicy.com/2018/07/16/why-india-gives-uber-5-stars-gig-economy-jobs/>.

economy, in the process nearly eliminating previous economic inefficiencies and providing more and better regulation for service providers. The typical driver in India who relies on ride-hailing services for employment is expected to earn anywhere between \$5,000 and \$12,000 annually, putting commercial drivers among the top quintile of earners in the country. Disruptive technology pushed out actors in the informal sector, brought the sector under the state purview, and managed to raise the income level of an entire class of urban blue-collar workers.

The rise in smartphone usage has had a profound effect in democratizing the power of new technologies for the benefit of rural communities. Sparsely populated and often facing connectivity and infrastructure issues, rural areas have been able to leverage new digital platforms to unlock significant economic potential.⁶⁹ Mobile phone-based banking systems have empowered millions residing in African countries, for example, to better utilize modern financial services across the continent.⁷⁰

Beyond the innovative use of smartphones, technology firms have used powerful tools like artificial intelligence, data analytics, and the internet of things (IoT) to improve the quality of health services provided in remote and rural settings.⁷¹ Innovation also extends to the use of blockchain as the platform for recording transactions and off-grid energy systems as sources of power, which serve as sustainable models for rural electrification that overcome the cost and efficiency challenges previously posed by centralized, often state-administered, power grids.⁷² Advanced technological tools like geographic information systems (GIS) have been utilized by developing countries to improve tax collection, streamline postal services, map areas of aid relief, and propel economic growth in the private sector.⁷³

SMART CITIES

One of the more popular and widely anticipated ideas, born from the technological promises of the fourth industrial revolution, is the concept of a smart city. A smart city is widely accepted to be a model of urban planning that relies upon new technologies extensively to solve critical challenges surrounding urbanization. Smart cities rely upon various forms of digital, electronic, and information and communication technologies like artificial intelligence, blockchain, geospatial technology, internet of things (IoT), and sensors to integrate various components and services offered by the city and thus collect ample amount of data. This data

69. Ndubuisi Ekekwe, "How Digital Technology is Changing Farming in Africa," *Harvard Business Review*, May 18, 2017, <https://hbr.org/2017/05/how-digital-technology-is-changing-farming-in-africa>.

70. Mutsa Chironga, Hilary De Grandis, and Yassir Zouaoui, "Mobile Financial Services in Africa: Winning the Battle for the Customer," *McKinsey & Company*, September 2017, <https://www.mckinsey.com/industries/financial-services/our-insights/mobile-financial-services-in-africa-winning-the-battle-for-the-customer>.

71. Bernie Monegain "Lifespan Taps GE Healthcare for Data Analytics to Improve Patient Experience and Slash \$182 Million?" *Healthcare IT News*, December 13, 2017 <https://www.healthcareitnews.com/news/lifespan-taps-ge-healthcare-data-analytics-improve-patient-experience-and-slash-182-million>.

72. "Why Bitlums?" *Bitlums*, <https://bitlums.com/>; "Beyond the Grid," USAID, <https://www.usaid.gov/powerafrica/beyondthegrid>.

73. Neema Sumari, Ernest Kira, and Zhenfeng Shao, "Challenges and Opportunities for the Advancement of GIS Education in TANZANIA," *Journal of Education and Practice* 8, no. 8 (November 2017): 67-75, https://www.researchgate.net/publication/320829980_Challenges_and_Opportunities_for_the_Advancement_of_GIS_Education_in_TANZANIA.

is then analyzed and used to map consumption patterns among the residents of the city, which is then used to improve the quality of these services. As cities and urban centers come under increasing pressure to cater to a rapidly growing population, local officials have begun to take steps to explore this model of urban planning and are seeking new partnerships with the technology industry.

3 | The Development of Human Resources

KEY POINTS

- Cultivation of skilled human capital will be a cornerstone of innovation-led economic growth. With the fourth industrial revolution transforming the economic landscape of many developing countries, institutions and stakeholders must revisit the current approaches to education and skills development and increase their emphasis on subjective skills that transcend disciplines.
- Institutions can leverage capital and talent, from local and diaspora networks transcending borders, to finance new initiatives in this sector.

No economy can fully embrace innovation and modernize without the requisite human capital. No idea, no matter how good, can move through the innovation ecosystem without the right people to move it. Transitioning to a knowledge-based economy is difficult, especially without a trained workforce, and stakeholders from the academic, finance, philanthropic, and technology communities need to invest strategically, and at times collectively, to prepare people for the innovation-driven, knowledge-based economies of the future. Recognizing this, the World Bank has declared education as an engine for tremendous economic growth and development.⁷⁴ Moreover, as many emerging market economies slowly industrialize, technological forces like artificial intelligence, automation, and machine learning put millions at risk of losing their jobs. For instance, the World Bank expects 85 percent of Ethiopian workers to lose their jobs, while 77 percent of China's labor market is vulnerable to automation.⁷⁵ Even developed countries like the United States are not immune from the impact of the fourth industrial revolution. The U.S. trucking industry, which employed 3.5 million people as drivers in 2017, is expected to lose 25,000 jobs each month, with the possibility of 1.5 million truckers losing

74. The World Bank, *World Development Report 2018 – Learning to Realize Education's Promise* (Washington, DC: World Bank, 2018) <https://openknowledge.worldbank.org/bitstream/handle/10986/28340/211096ov.pdf>.

75. PTI, "Automation threatens 69% jobs in India: World Bank," *The Hindu*, October 5, 2016, <https://www.thehindu.com/business/Industry/Automation-threatens-69-jobs-in-India-World-Bank/article15427005.ece>.

their jobs by 2030 as a direct result of increased automation.⁷⁶ If left unprepared for these massive job losses, developed and developing countries alike will undoubtedly experience widespread shocks to their social, political, and economic systems.

The full potential for innovation in an economy will not be realized unless workforce development programs are gender-sensitive and inclusive. At least \$28 trillion in economic gains is left unrealized due to the impediments posed to women by numerous structural and cultural barriers.⁷⁷ The fourth industrial revolution offers opportunities to overcome such obstacles and achieve gender parity in workforce development; not just because it is morally right, but because it is also economically right.

Towards a Sustainable Higher Education System

The current model of higher education has been around for several decades, if not centuries, and has produced exceptional scholars, scientists, and innovators who have gone on to advance the quality of human life. However, as many developing countries deal with younger populations in need of meaningful work and with the rapid pace at which technology is changing, the conventional higher education system could prove to be insufficient or even unsustainable in the long-run.⁷⁸ In some industrial sectors, the obsolescence rate of technology is higher than the production rate of graduates, thus making them uncompetitive (and often in debt) even before they enter the workforce. Moreover, developing countries have the added challenge of addressing the acute shortage of higher education institutions. The result of this has been a proliferation of private universities, many of which do not conform to internationally accepted quality standards and, despite promises made to prospective students, raise concerns over the economic prospects of graduates.

In some industrial sectors, the obsolescence rate of technology is higher than the production rate of graduates, thus making them uncompetitive (and often in debt) even before they enter the workforce.

Kenya's higher education system presents a good example of this phenomenon. In just under a few decades, Kenya's national higher education sector expanded rapidly and is being replicated across the continent. The number of institutions grew from only one state-run university in 1970 (the University of Nairobi) to

an astounding 71 institutions in 2017, with more than half of those established through private investments.⁷⁹ Unsurprisingly, the rate of growth of student enrollment also

76. Anita Balakrishnan, "Self-Driving Cars Could Cost America's Professional Drivers up to 25,000 Jobs a Month, Goldman Sachs Says" CNBC, May 22, 2017, <https://www.cnbc.com/2017/05/22/goldman-sachs-analysis-of-autonomous-vehicle-job-loss.html>; Tim Dickinson, "Death of the American Trucker: Will Automated Trucking be Trump's Greatest Betrayal of His Blue-Collar Base?", *Rolling Stone*, January 2, 2018, <https://www.rollingstone.com/politics/features/death-of-the-american-trucker-w514802>.

77. Jonathan Woetzel, Anu Madgavkar, Kweilin Ellingrud, Eric Labaye, Sandrine Devillard, Eric Kutcher, James Manyika, Richard Dobbs, and Mekala Krishnan, "How Advancing Women's Equality Can Add \$12 Trillion to Global Growth," McKinsey & Company, September 2015, <https://www.mckinsey.com/featured-insights/employment-and-growth/how-advancing-womens-equality-can-add-12-trillion-to-global-growth>.

78. Justin Yifu Lin, "Youth Bulge: A Demographic Dividend or a Demographic Bomb in Developing Countries?", *World Bank Group*, <http://blogs.worldbank.org/developmenttalk/youth-bulge-a-demographic-dividend-or-a-demographic-bomb-in-developing-countries>.

79. Rosemary Kagundu and Simmy M. Marwa, "Quality Issues in Kenya's Higher Education Institutions," *Council for the Development of Social Science Research in Africa, JHEA/RESA* 15, no. 1 (2017): 23-42, https://www.codesria.org/IMG/pdf/2-_quality_issues_in_kenya_s_higher_education_institutions-.pdf?9030/2986e21db05c5445e-4040c9a7ce3f4596b808e05.

matches the pace of establishment of new universities. Per Kenya's National Bureau of Statistics, the country tripled its gross enrollment figures from 142,000 to 450,000 in just six years, from 2009-10 to 2014-15. Such rapid expansion raised quality concerns, with the Kenyan government recognizing the danger of this expansion, leading to the emergence of "teaching shops" that prioritize routinized learning over innovation, risk-taking, scientific progress, and practical skills.⁸⁰

Even as the demand for higher education increases, and despite the emergence of new institutions, universities around the world are facing the broader challenge of recruiting competent and qualified faculty. One way to address this problem is to invest in building research-centered universities and by extension, invest in researchers themselves. By design, universities that are centered on research departments are better positioned to prepare their graduates for a rapidly evolving and innovation-driven economy. Universities need to prioritize investments in research and development that could attract world-class academics and researchers who ultimately drive innovation. Scaling up this model in the developing world will prove difficult due to the limited access to financial resources.

The strain on resources is not limited to the supply side nor is it localized to the developing world. In 2015, only 41 percent of students in the United States graduated from college on time.⁸¹ Meanwhile, private non-profit universities have an on-time graduation rate of 34 percent. The cost of undergraduate education for those graduating later than four years increases by 40 percent, as compared to the cost of a student completing their coursework in the stipulated four-year period.⁸² The reasons for late graduation range from the lack of adequate guidance and out-of-class academic support structures to changes in academic major or university. At the center of this problem are the students, who find themselves facing a competitive, and seemingly impenetrable, job market post-graduation. In the absence of a meaningful academic support system, they are unable to navigate the broad range of options and identify the career path that will bring the most success. Academic institutions remain slow to respond to this problem, even as the economy continues to evolve and as new technological platforms become more prevalent. Universities have an opportunity to play the role of a counselor and a guide, focusing on job placement rates as much as graduation rates and more direct partnerships with the private sector and other job creators. Through a more robust engagement with the technology firms and the private sector at-large, and by better using their data on the performance of past graduates, universities can help students make strategic choices and optimize the shared benefits of both the school and the student.

Rebooting the traditional model of higher education could thus mean flipping from primarily four year, isolated on-campus experiences to programs that are well-integrated with secondary-level institutions (or schools) and simultaneously providing real-world work experience to the median learner. Off-campus apprenticeships and on-the-job training

80. Ishmael Munene, "Kenya's Universities are in the Grip of a Quality Crisis," *The Conversation*, February 16, 2016, <https://theconversation.com/kenyas-universities-are-in-the-grip-of-a-quality-crisis-54664>.

81. National Center for Education Statistics, "Fast Facts: Time to Degree," Institute of Education Sciences, <https://nces.ed.gov/fastfacts/display.asp?id=569>.

82. Nika Anschuetz, "Breaking the 4-Year Myth: Why Students are Taking Longer to Graduate," *USA Today*, December 16, 2015, <https://www.usatoday.com/story/college/2015/12/16/breaking-the-4-year-myth-why-students-are-taking-longer-to-graduate/37409747/>.

programs, when mandated as one of the degree requirements, allow prospective job-seekers to prepare themselves for the realities of the job market and to gain from experiential learning. Finally, without eliminating face-to-face teaching modules entirely, universities and schools can leverage modern technology to maximize the number of channels available for rapid and mass-scale information dissemination. Open and distance learning institutions in the United Kingdom, India, and other Commonwealth countries have led the way on that front.⁸³

Moreover, policymakers around the world have placed greater emphasis on the need to cultivate skills in the field of science, technology, engineering, and mathematics, more commonly referred to as STEM. The underlying rationale for such an emphasis is that, by increasing the number of STEM-trained workers in the market, economies can augment their capacity to innovate. Such expectations, however, overlook the fact that innovation is an amalgamation of both social and technical skills. While seeking to strengthen the technical capabilities of the workforce, policymakers have neglected (and sometimes undermined) the value of holistic academic coursework that gives due emphasis to social science and vocational skills. As technical tasks are more automated, businesses and employers increasingly value skills pertaining to social, emotional, and cognitive development such as teamwork, digital literacy, time management, critical thinking, problem-solving, and emotional judgment. A recent study contended that globalization, digital disruption, and demographics (namely an aging population) are the forces that incentivize firms to invest and adapt soft skills into their personnel recruitment models.⁸⁴

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Leveraging Networks for Capital and Talent

Diaspora communities have played an influential and instrumental role in financing human capital development in their countries-of-origin, whether through formal philanthropic or business activities or via remittances that pay for student fees. The volume of global remittances has expanded

more than six times from \$150 billion in 2002 to nearly \$613 billion in 2017.⁸⁵ Nepal, Haiti, and Kyrgyzstan are quintessential examples of countries that generate roughly one-third of their GDP from personal remittances.⁸⁶ Furthermore Indian, Pakistani, and Mexican diaspora groups have sent home over \$111.2 billion in personal remittances in

83. "The Open University (homepage)," The Open University, <http://www.open.ac.uk/>; "India Gandhi National Open University (homepage)," Indira Gandhi National Open University, <http://ignou.ac.in/>; "Commonwealth of Learning (homepage)," Commonwealth of Learning, <https://www.col.org/>.

84. Deloitte Access Economics, "Soft Skills for Business Success: Building Australia's Future Workforce," Deloitte, May 2017, <https://www2.deloitte.com/au/en/pages/economics/articles/soft-skills-business-success.html>.

85. OECD, "International Migrant Remittances and their Role in Development," *International Migration Outlook*, (OECD, 2006), <https://www.oecd.org/els/mig/38840502.pdf>; "Record High Remittances to Low- and Middle-Income Countries in 2017" World Bank, <https://www.worldbank.org/en/news/press-release/2018/04/23/record-high-remittances-to-low-and-middle-income-countries-in-2017>.

86. World Development Indicators, "Personal remittances, received (% of GDP)," World Bank, <https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS>.

2016.⁸⁷ Though it is difficult to ascertain what portion of global remittance flows goes to education, it is reasonable to assume that school fees make up a sizeable percentage.

Bilateral and multilateral agencies like the U. S. Agency for International Development (USAID), the International Organization for Migration (IOM), and the International diaspora Engagement Alliance (IdEA) have organized business plan competitions for U.S.-based diaspora entrepreneurs and sent skilled professionals and volunteers back to home countries for capacity building and personnel training.⁸⁸ The African Foundation for Development (AFFORD) in the United Kingdom has also launched initiatives to spur growth in Latin American, African, and Asian small and medium enterprises.⁸⁹ These initiatives are an important source of financing for human capital development.

Despite lower costs than international consultancies, high travel and expenditure costs have prohibited many nongovernmental organization initiatives from scaling to the size they would need to be to have a transformative impact, and U.S. diaspora residents often face legal challenges when attempting to invest in their countries of origin.⁹⁰ One way to address this problem is through the use of diaspora bonds, which are under-utilized sovereign debt instruments that enable governments of home countries to access greater development finance capital by tapping into the wealth of their diaspora populations who have settled in more developed countries.⁹¹ Only five African countries—Ethiopia, Ghana, Kenya, Nigeria, and Rwanda – have issued diaspora bonds, in addition to countries like India, Israel, and the Philippines that have had a successful experience in sourcing investments from its emigrated population.

Nonetheless, mobilization and accumulation of capital solve only a part of the problem. Investors and capital markets find that a lack of talent, capable of fostering nascent economic models on the ground, as one of the most significant risks to secure returns on their investments. The research team found that capability within the finance community was predominantly restricted to graduates of premier elite schools. It is not difficult to understand the rationale behind the financial sector concentrating its focus on the talent produced by a handful of premier academic institutions. Elite schools signal to recruiters that the talent they have to offer is among the creamiest in the pool, given the competitive screening process that is in place as a result of their prominent brands. Elite schools are at the heart of a cycle that reinforces the strength of the alumni-graduate network, and risk missing out on the very kind of unforeseen talent that understands disruptive innovation well.

This model of recruitment needs to be intentionally and systematically replaced with a more sophisticated one, where a more extensive rubric of skills supplements academic credentials. A few corporations have already begun to redesign their overall recruitment

87. World Development Indicators, “Personal remittances, received current US\$),” World Bank, <https://data.worldbank.org/indicator/BX.TRF.PWKR.CD.DT>.

88. Kate Hooper and Madeleine Sumption, *Reaching a “Fair Deal” on Talent: Emigration, Circulation, and Human Capital in Countries of Origin* (Washington, DC: Migration Policy Institute, February 2016), <https://www.migrationpolicy.org/sites/default/files/publications/TCM-Emigration-FairDeal-FINAL.pdf>.

89. Ibid.

90. Ibid; Alexander Dixon, “Diaspora Impact Investing 2.0,” World Bank Group, January 26, 2015, <http://blogs.worldbank.org/peoplemove/diaspora-impact-investing-20>.

91. Cyrus Rustomjee, “Issues and Challenges in Mobilizing African Diaspora Investment,” *Center for International Governance Innovation*, no. 130, April 2018, <https://www.cigionline.org/sites/default/files/documents/PB no.130.pdf>.

and learning and development strategies and are using algorithms and analytical systems to boost the levels of talent productivity and retention.⁹²

Human Capital Demands Drive Technology and Philanthropy Strategies

The incentive structures of the academic and financial sectors gear them to be more cautious and – occasionally – hesitant as responders to technological disruptions. At the same time, the technology sector has rooted itself in a culture of calculated risk-taking that has allowed it to be one of the drivers of innovation. The philanthropic community is perceived to have the potential to play the role of a pioneer for bold and untested projects, investing and committing to long-term projects.⁹³ The attributes of these two stakeholder groups present an opportunity for greater collaboration to address the gaps that exist in human capital development.

Presently, governments and public sector institutions are struggling to build trust and social capital with their constituents as they are increasingly unable to meet public expectations.⁹⁴ This global problem is more acute in the developing world, where a rules-based governance model is yet to be firmly institutionalized. Consequently, the public sector is failing to make sufficient investments to mitigate the challenges and threats posed to the current models of human resource development. The philanthropic community, which continually thinks about longer-term interventions and broad transformation, is often left to play this investment role even though philanthropy can never truly operate at a scale that would replace public institutions as the principal custodian of social harmony and welfare.⁹⁵

For the technology community, the stakes are high and the threats imminent. Many of the major firms in this sector are experiencing disruptions in real time and need high-quality people to navigate the changes. This makes their interest in seeing a workforce prepared for the incoming disruptions far higher compared to any other stakeholder. Often agnostic to the elite-school-signaling prevalent in the finance community, the technology sector frequently finds itself investing aggressively in new technologies, people, and platforms that find hidden talent and innovations. The internet-based digital platforms that have emerged in recent years are examples that demonstrate the force and capacity carried by the sector in opening up new channels of information sharing.⁹⁶ As the technology sector has the greatest incentive to empower the trainers of new talent and higher-order thinking skills in the workforce, it has led the academic community (and has even collaborated with them) to create platforms which have enabled teachers and trainers to improve and expand their skills.

92. Scott Keller and Mary Meaney, “Attracting and Retaining the Right Talent”, McKinsey & Company, November 2017, <https://www.mckinsey.com/business-functions/organization/our-insights/attracting-and-retaining-the-right-talent>.

93. National Institute of Standards and Technology, “Innovation Results from Intelligent Risk Taking and a Supportive Environment,” U.S. Department of Commerce, May 2012, <https://www.nist.gov/baldrige/innovation-results-intelligent-risk-taking-and-supportive-environment>.

94. Economist Data Team, “Declining Trust in Government is Denting Democracy,” *The Economist*, January 25, 2017, <https://www.economist.com/graphic-detail/2017/01/25/declining-trust-in-government-is-denting-democracy>.

95. David Callahan, “As Government Retrenches, Philanthropy Booms,” *New York Times*, June 20, 2017, <https://www.nytimes.com/2017/06/20/opinion/jeff-bezos-bill-gates-philanthropy.html>.

96. RM, “Reddit—Democratizing Online Content,” HBS Digital Innovation and Transformation, March 26, 2018, <https://digit.hbs.org/submission/reddit-democratizing-online-content/>.

4 | Rethinking the Social Contract

KEY POINTS

- The ongoing technological revolution is creating perennial “winners and losers,” with some people perceiving themselves to be locked out of gains in the new economic order. While exacerbating inequality within the society, this phenomenon also leads to greater levels of distrust of perceived elites, experts, and institutions.
- Decline in trust levels and erosion of the social contract can be contained by institutions through civic engagement and education. To that end, new technologies can be strategically leveraged but should not be used to supplant community-centered institutions.

Political systems with resilient and robust institutions provide stability to social order, a precondition to sustained economic growth and development. Alternatively, the likelihood of societies to experience protests, revolts, and uprisings increases in political systems where norms are uncertain, unclear, and not institutionalized. This breakdown of social order exacerbates market risks and drives away fresh capital and investment. Stable institutions provide a coordination mechanism for different factions in society competing for political capital to attain economic benefits. These institutions often emerge because of a compromise between the leaders of competing factions, which determine the power-sharing arrangements among them and outline the “rules of the game.” However, compromises are only effective if there is enough social capital to enforce, support, and sustain them. In other words, networks in a society that are built on a relationship of cooperation and trust are critical, without which institutions will lack legitimacy.

GENESIS OF INSTITUTIONS

Many modern institutions can trace their genesis to political pacts that were made at the end of prolonged periods of bloodshed or violence. For instance, after the Glorious Revolution, the British Parliament enacted the English Bill of Rights in 1689 which established its supremacy in the British political order, limiting the scope and powers of the monarch. Similarly, both the United States Constitution and the French Declaration of the Rights of Man and of the Citizen were adopted in 1789, in the aftermath of the American and the French revolutions. The institutions

and norms that emerged from these documents, like representative democracy, an independent judiciary (and subsequently, the birth of the judicial review), and protection of civil liberties have become fundamental pillars supporting the idea of self-governance, inspiring new countries and republics even today.⁹⁷

These institutions often emerge because of a compromise between the leaders of competing factions, which determine the power-sharing arrangements among them and outline the “rules of the game.” However, compromises are only effective if there is enough social capital to enforce, support, and sustain them.

In recent decades, people living in many of the world’s established democracies have witnessed a steady decline in overall trust in their institutions, causing increased partisanship and polarization.⁹⁸ At the same time, authoritarian leaders in non-democratic countries, concerned about the increasing feeling of popular resentment, have been taking pre-emptive measures to consolidate their grip on power and close the political space.⁹⁹ The common link between these two

situations is the growing discontent among the people that is attributed to the lack of capacity of governments—and institutions writ large—to uphold the social contract. Three successive waves of disruption caused this discontent.

The Three Waves of Disruption to the Social Contract

The first wave was one of globalization, a phenomenon that was supported by market liberalization and privatization. Following the emerging market economic crises in the 1980s and 1990s and the fall of the Soviet Union, developing countries undertook significant reforms to change their fiscal and monetary policies.¹⁰⁰ These changes were made under the aegis of major international financial institutions like the IMF and the World Bank, which provided aid packages to reforming nations to resolve their economic and fiscal crises. The reforms were principally aimed at eliminating unproductive subsidies to state-owned enterprises, restrictive trade tariffs, and currency manipulation efforts that had been around since the 1930s and 1940s. The result of these reforms was that many of the countries were able to jumpstart their economies, unlock the potential of their private sector, expand their footprint in global trade, and boost global capital inflows.¹⁰¹ However, the overall economic gains made by emerging markets during this period were unequally distributed, increasing

97. *Marbury v. Madison*, 5 U.S. 137, <https://www.law.cornell.edu/supremecourt/text/5/137>.

98. Niall McCarthy, “Which Countries Have the Most and Least Confidence in Their Governments? [Infographic],” *Forbes*, July 13, 2017, <https://www.forbes.com/sites/niallmccarthy/2017/07/13/which-countries-have-the-most-and-least-confidence-in-their-governments-infographic/#1d89d331652d>; Pietro S. Nivola, *Thinking about Political Polarization* (Washington, DC: Brookings, January 2005), <https://www.brookings.edu/research/thinking-about-political-polarization/>; Mohamed A. El-Erian, “How Political Polarisation is Crippling Western Democracies,” *World Economic Forum*, May 12, 2015, <https://www.weforum.org/agenda/2015/05/how-political-polarisation-is-crippling-western-democracies/>.

99. Kenneth Roth, “The Dangerous Rise of Populism: Global Attacks on Human Rights Values,” *Human Rights Watch*, 2017, <https://www.hrw.org/world-report/2017/country-chapters/dangerous-rise-of-populism>.

100. Moises Naim, “Fads and Fashion in Economic Reforms: Washington Consensus or Washington Confusion?,” *IMF*, October 26, 1999, <https://www.imf.org/external/pubs/ft/seminar/1999/reforms/Naim.HTM>.

101. Oleska Shvets, “Something Special about the 1990s?” *World Bank Group*, <http://www1.worldbank.org/prem/lessons1990s/Chap3special90s092104rw.pdf>.

economic and income inequality.¹⁰² At the same time, these reforms permanently altered the state-society relationship as governments cut back social spending, broke up powerful labor unions, and ended the politics of clientelism that was sustained by inflated social welfare spending and state patronage. The massive and unequal economic growth and the changed relationship between the popular class and the political elites has left a significant portion of society (including those who have sought welfare from the state in the past) vulnerable to the shocks of economic cycles.

Globalization facilitated the second wave of disruption: the advancement of new technologies and the internet through which the conventional digital and electronic frontiers were pushed. During this time, global economic powers forged new free trade agreements and relaxed their immigration requirements to make the flow of goods, capital, and people more seamless than ever and enabling the private sector to function as a group of multinational corporations. The impact of this was the massive outsourcing of business operations. Once confined to a few megacities in the western hemisphere, these jobs were now sent to suburban economies in the developing world, resulting in the emergence of the business processes outsourcing industry in India and the Philippines and the automotive industry in Mexico.¹⁰³ The structural changes brought about by the second wave also allowed for high skilled individuals to migrate to key technology hubs like the Silicon Valley or financial centers such as London.¹⁰⁴ This evolution of the international labor market allowed developing countries to expand their middle class and increase the living conditions of its people. In the meantime, the advanced, industrialized nations were beginning to witness a slow decline of the strength of the middle class.

The third wave of disruption was the 2008 financial crisis. The global recession accelerated the globalization- and technology-driven disruptions, permanently altering the face of the world economy. The crisis cost millions of people their jobs and forced governments around the world to spend trillions of dollars from their public exchequers to bail out critical sectors of the economy.¹⁰⁵ Some in the economy were more affected than the rest, and even though the world headed towards recovery, the disruption to the social contract resulting from the financial crisis has never been adequately addressed.¹⁰⁶ For instance, ten years after the recession, the least educated class of workers who lost their 'blue-collar' jobs continue to face economic hardship.¹⁰⁷ Meanwhile, taxpayer-funded

102. Christoph Lakner and Branko Milanovic, "Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession." World Bank Group, December 2013, <https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-6719>.

103. PriceWaterhouseCoopers, *The Evolution of BPO in India* (PWC, April 2005), <https://www.pwc.in/assets/pdfs/evolution-of-bpo-in-india.pdf>; Don Lee, "The Philippines has Become the Call-Center Capital of the World," *Los Angeles Times*, February 1, 2015, <http://www.latimes.com/business/la-fi-philippines-economy-20150202-story.html>; Thomas H. Klier and James Rubenstein, "Mexico's Growing Role in the Auto Industry Under NAFTA: Who Makes What and What Goes Where," *Economic Perspectives* 41, no. 6 (Federal Reserve Bank of Chicago: 2017), <https://www.chicagofed.org/publications/economic-perspectives/2017/6>.

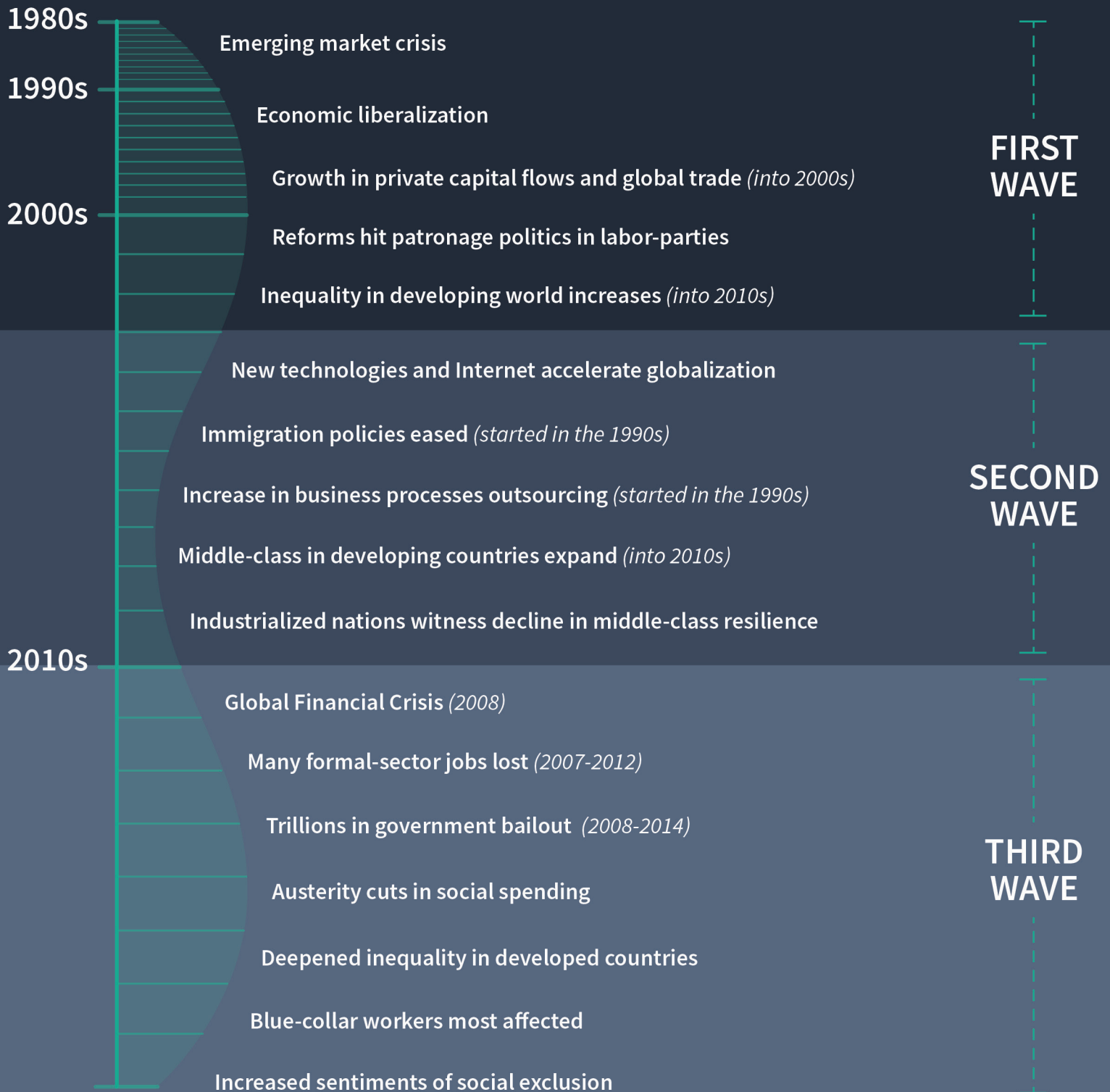
104. Farhad Manjoo, "Why Silicon Valley Wouldn't Work Without Immigrants," *New York Times*, February 8, 2017, <https://www.nytimes.com/2017/02/08/technology/personaltech/why-silicon-valley-wouldnt-work-without-immigrants.html>.

105. "Impact of the Economic Crisis on Employment and Unemployment in the OECD Countries," OECD, <http://www.oecd.org/els/emp/impactoftheeconomiccrisisonemploymentandunemploymentintheoecdcountries.htm>.

106. Martin Wolf, "The Global Economic Recovery is Real but Fragile," *Financial Times*, April 17, 2018, <https://www.ft.com/content/532f1142-4163-11e8-93cf-67ac3a6482fd>.

107. Nelson D. Schwartz and Ben Casselman, "Workers Hardest Hit by Recession Are Joining in Recovery," *New York Times*, August 3, 2018, <https://www.nytimes.com/2018/08/03/business/economy/july-jobs-report-2018.html>.

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stimulus packages in Germany, Greece, Latvia, Spain, the United Kingdom, and several other European countries strained their public finances and triggered massive cutbacks in overall social welfare spending. These reductions reinforced and deepened inequality and poverty while exacerbating sentiments of social exclusion.¹⁰⁸

Throughout this evolution of the international political economy, policymakers in the West invested little time and resources in addressing the gaps in the social safety net. The current model of the welfare state emerged in response to the economic depression during the 1920s and 1930s and is therefore suited to respond to the fundamental welfare protections sought by a workforce that was primarily composed of industrial and farm workers.¹⁰⁹ Such a workforce composition no longer exists in the twenty-first century, and the safety net's capacity to address the welfare needs of the modern workforce remains woefully inadequate. This explains the decline of popular trust and confidence in public institutions. The decline will only worsen as the forces of the fourth industrial revolution continue to displace millions of people from their jobs.

Leveraging Education to Rebuild Trust

Modern political and economic systems were founded on the principles of rational choice theory, whereby access to knowledge and information is integral for rationality to prevail and for the systems to be efficient.¹¹⁰ An undereducated and uninformed workforce is incapable of hedging its financial risks, and investing in necessary skills, and remains unprepared for the incoming economic disruptions. In this regard, academic institutions and universities enjoy substantial convening power and can serve as a repository of knowledge and learning for communities at-large. However, universities have themselves been operating in an environment where public confidence in higher education has been in decline. The reasons surrounding the decline of public confidence in higher education are different between emerging markets and industrialized economies.

With the former, one can see the trust deficit playing out in a society that is deeply suspicious of liberal arts and views it as a luxury for the wealthy and privileged. The opportunity cost to pursuing a liberal arts-centered college degree in the developing world is an education that is more grounded in vocational training and yields a more direct path to a job with steady income.¹¹¹ In that context, there is a general misgiving that the discipline has limited earning potential. The consequence of such distrust and misgiving is the misalignment of education and economic policies that produce millions of vocationally-trained college graduates who lack the critical-thinking and problem-solving skills needed for economies that are undergoing radical changes.

108. David Stuckler, Aaron Reeves, Rachel Loopstra, Marina Karanikolos, and Martin McKee, "Austerity and Health: the Impact in the UK and Europe," *European Journal of Public Health* 77, no. 4 (October 2017): 18-21, https://academic.oup.com/eurpub/article/27/suppl_4/18/4430523.

109. Raj M. Desai, "Does the Developing World Need a Welfare State to Eliminate poverty? Some Insights from History," Brookings, July 30, 2015, <https://www.brookings.edu/blog/future-development/2015/07/30/does-the-developing-world-need-a-welfare-state-to-eliminate-poverty-some-insights-from-history/>.

110. Mark P. Petracca, "The Rational Choice Approach to Politics: A Challenge to Democratic Theory," *The Review of Politics* 53, no. 2, Spring 1991.

111. David E. Bloom and Henry Rosovsky, "Why Developing Countries Should Not Neglect Liberal Education," *Liberal Education* vol. 89, no. 1 (Winter 2003), <https://www.aacu.org/publications-research/periodicals/why-developing-countries-should-not-neglect-liberal-education>.

With the industrialized economies, the crisis of public confidence in higher education has manifested due to underlying economic problems – and only recently has it become a partisan issue.¹¹² The declining rate of return on investment in increasingly expensive college education has led sections within the population to question the value of higher education itself. In an era where globalization and disruptive technologies are making labor markets increasingly competitive, this distrust can create a perfect storm that can lead to exacerbated sentiments of social exclusion and create new socioeconomic tensions among millions of blue-collar workers, whose increased resentment against elites could lead to the rise of demagogues and populists.¹¹³ In both cases, institutions and universities must see the value in reducing the elitism of the education system while also making it more pragmatic and useful.

On a global level, transnational social ties have been strengthened through academic experiences such as study-abroad programs (limited to a few semesters) as well as full-time academic programs. Emerging market countries like China, India, and Vietnam have expanded their capacity to facilitate access to international education for its youth population since the 1990s.¹¹⁴ However, the primary source of expenditures for nearly two-thirds of the cost of education remains personal and family funding, with fewer than 20 percent of the cost being covered by scholarships.¹¹⁵ While the inflow of capital from middle-class families in developing countries boosts universities' endowments, this model of financing discriminates against talent coming from economically weaker classes and poorer families, given their limited financial capacity. Given the vital roles played by high-skilled immigrants and diaspora in both their host and their native countries, this trend should not only be sustained but expanded. Furthermore, to avoid reinforcing class divisions and potentially institutionalizing social inequality, universities have an opportunity to expand their international scholarship opportunities while recruiting talent.

Renewing the Social Contract Through Civic Engagement

In his two widely-acclaimed bestsellers, *Making Democracy Work* and *Bowling Alone*, renowned political scientist Robert Putnam underscores the centrality of civic engagement to build trust-based networks, accrue social capital, and forge resilient institutions.¹¹⁶ Incidentally, the nonprofit world houses some of the more vibrant groups of institutions where the full potential of communities is realized through civic engagement. This potential is often translated into individual contributions and donations to support underprivileged members of the society.

112. Peter D. Eckel and Lara Couturier, "Toward Higher Ground: Reclaiming Public Confidence in a Competitive Environment," *OECD*, 2008, <http://www.oecd.org/site/eduimhe08/41218043.pdf>; Hannah Fingerhut, "Republicans skeptical of colleges' impact on U.S., but most see benefits for workforce preparation," Pew Research Center, July 20, 2017, <http://www.pewresearch.org/fact-tank/2017/07/20/republicans-skeptical-of-colleges-impact-on-u-s-but-most-see-benefits-for-workforce-preparation/>.

113. Alice Gast, "Universities are not ivory towers. Here's the role they can play today," *World Economic Forum*, January 28, 2018, <https://www.weforum.org/agenda/2018/01/why-universities-need-to-win-back-trust/>.

114. Places of Origin," Institute of International Education, <https://www.iie.org/Research-and-Insights/Open-Doors/Data/International-Students/Places-of-Origin>.

115. "Primary Sources of Funding," IIE, <https://www.iie.org/en/Research-and-Insights/Open-Doors/Data/International-Students/Primary-Source-of-Funding>.

116. Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon & Schuster, 2000); Robert D. Putnam, *Making Democracy Work: Civic Tradition in Modern Italy* (Princeton: Princeton University Press, 1993).

The world of philanthropy and the nonprofit sector are supported through two distinct types of organizational support: corporate philanthropy and individual or community-based charities and giving, the latter having a dominant role. In 2017, philanthropic commitments in the United States amounted to \$410 billion, with \$286.6 billion (or 70 percent of all donations) coming from individual contributions.¹¹⁷ 31 percent of all donations were sourced through contributions made to faith-based institutions. The high volume of funds raised by faith-based institutions corresponds the high levels of trust enjoyed by them, even as overall trust in other key institutions continues to decline.¹¹⁸ The volume of philanthropic commitments is more than ten times the official U.S. foreign aid budget the same year, which stood at \$33.59 billion.¹¹⁹

Philanthropies can be complementary and supportive to public institutions. In 2017, over 42 percent of all donations made towards global philanthropy in the United States went directly into education, healthcare, and other human services that secured the basic social safety net. In the absence of a centralized system, these contributions are spent with greater precision and respond to the challenges of the community more resourcefully, while eliminating much of the administrative costs.

Philanthropies can be complementary and supportive to public institutions.

Finally, philanthropic institutions have a role that goes beyond supplanting fiscal resources. Their unique operational model builds towards the development of trust-

based networks which is critical for building social capital. The convening power wielded by small, community-centered organizations (mainly along the lines of diaspora, faith, and schools) allows for deeper engagement among individuals, fostering mutual trust and empathy between different social groups and classes. As digital technology continues to revolutionize the nature of the relationship between the individual and the society, the society-at-large must remain vigilant about its potential pitfalls. Even though new technologies make the day-to-day executive functions of individuals more autonomous, convenient, and efficient, a more significant concern surrounding the effect of reduced civic engagement remains.

Building Credibility by Enforcing Accountability: The Case of Blockchain

The emergence of new technologies such as blockchain has raised expectations of a powerful revolution, particularly in the financial world. Blockchain, which has been around since the late 2000s, is part of any mainstream conversation on financial innovation. Blockchain technology, most commonly as associated with cryptographic currencies, functions as shared, decentralized digital ledgers that record unalterable economic transactions. This technological platform enables banks, governments,

117. Charity Navigator, "Giving Statistics," Charity Navigator, <https://www.charitynavigator.org/index.cfm?bay=-content.view&cpid=42>.

118. "Confidence in Institutions," Gallup, <https://news.gallup.com/poll/1597/confidence-institutions.aspx>.

119. Daniel F. Runde, "Global Philanthropy and Remittances and International Development," (testimony before the Senate Foreign Relations, Subcommittee on Multilateral International Development, Multilateral Institutions, and International Economic, Energy, and Environmental Policy, May 3, 2017), [https://www.foreign.senate.gov/imo/media/doc/050317_Runde Testimony_REVISED1.pdf](https://www.foreign.senate.gov/imo/media/doc/050317_Runde%20Testimony_REVISED1.pdf).

and individuals to perform exchanges that are more efficient, more secure, and more transparent than current processes.

The distributed networks of blockchain have also brought the costs of banking and information interchange down significantly, as the physical support structures and teller reviews become increasingly irrelevant for the verification and administration of transactions, and the overall functioning of the banking system. The technology presents real incentives for residents of developing nations with large unbanked populations and traditionally low levels of trust in institutions to move to digital banking services. At the same time, even as this new mode of exchange promises a world where trust in institutions and human oversight are supplanted by auto-verified transactions, its effect on democratic governance remains unclear, and policymakers remain suspicious of elevating the technology to mainstream governance. Given the vitality of trust-based networks, technology should be used to hold intermediate actors (such as bureaucrats, public officials, and representatives) accountable and to preserve the state-society relationship, not get rid of the actors altogether.

SMART CONTRACTS

As the blockchain technology becomes increasingly common around the world in the form of digital currencies, a new application of the technology, smart contracts, is making its presence felt in the markets. Smart contracts allow people to execute and verify trades that involve not just money, but property titles, shares, or other valuable items without the use of a middleman. Smart contracts establish both the protocol surrounding a given agreement (not unlike the way a traditional contract does) and sets up an enforcement mechanism such that the obligations of the agreement are met. Financial derivatives, insurance premiums, breach contracts, property law, credit enforcement, financial services, legal processes, and crowdfunding agreements are some of the many financial and commercial transactions that can be made using smart contracts. Even more creative uses have been suggested like how weather data will be proactively used to trigger conditions and rules to begin issuance of capital for claims. Smart contracts have enormous potential in eliminating government waste and bureaucratic hurdles as they optimize the tax collection process and the disbursement of social welfare programs. There is a strong potential for blockchain to dramatically transform how people interact with their governments and exchange goods and services.

Conclusion | The Way Forward

The challenges presented by the fourth industrial revolution are dire and significant. Institutions will stand near the front lines, seeking to turn challenges into opportunities. In doing so, institutions will have to be resolute and should proactively engage with the stakeholders of the innovation economy.

When considering its roles and responsibilities, institutions should reflect upon the following:

- Are institutions prepared to set wide guardrails for the science, technology, and innovation community and provide them with a flexible, ethics-centered framework for innovation? If so, what are those guardrails?
- Are institutions collaborating with a wide range of partners and stakeholders when attempting to mitigate risks and to create an enabling environment for private sector-led innovation?
- Are institutions working to ensure that the key platforms propelling people into the innovation economy, such as education and entrepreneurship, are accessible to those most affected by the fourth industrial revolution?

To make sure economic development models lessen the negative effects of urban growth, institutions and stakeholders should consider the following questions:

- What are the bottlenecks to ensuring parity in education and skills development between rural and urban communities? Can institutions leverage new digital technologies to better connect learners with instructors?
- Can cities and urban centers that have access to quality infrastructure be reestablished as innovation districts or opportunity zones?
- How can institutions monitor and track their efforts to level the playing field, as they attempt to mitigate the risk of inequality and economic stratification driven by rapid urban growth in the developing world?

Finally, as institutions work with stakeholders to rethink their approach to human capital development and reinvigorate the social contract, they need to consider the following:

- How can a nation ensure that schools, universities, and employers invest in social, emotional, and cognitive development of people, from early childhood to lifelong learning? Are such investments maximizing people's overall potential to compete in a post-fourth industrial revolution economy?
- While technology creates opportunity and often offers elegant solutions to discrete problems, it also has the potential to create overarching problems. How can the existing social safety net model be replaced such that the new version is more adaptive and absorbs the shocks of technological disruptions?

In a fourth industrial revolution that is changing the relationship between states and societies, institutions must think critically about their role. Institutions have a crucial role to play in enabling the private sector-driven, knowledge-based, and innovation-led economies needed to benefit from technological change rather than suffer from it. To do so, they need to understand this role and ask tough questions about how their interventions ultimately do less harm and more good.

Annex A

List of Entities Consulted for this report

Bayes Impact

Blackbox

Bluemont Labs

Bpifrance

Brookings Institution

Center for Effective Global Action

Chestnut Street Ventures

Cloudflare

CSIS Technology Policy Program

Digital Impact Alliance at the United Nations Foundation

EastWest Institute

Federal Reserve Bank of New York

Fission Ventures

Ford Foundation

Gates Foundation

Global Solutions Summit

Go Global NC

Goldman Sachs

Halo Industries

*International Finance Corporation
(The World Bank)*

JPMorgan Chase

KPMG

Lion Tree

Menlo College

National Academies of Sciences

Office of the Director of National Intelligence

Omidyar Network

Pearl Law Group

Robinhood Markets Inc.

Salesforce

Skipcard

Socos Labs

Tractable

United States Department of State

United Nations Development Programme

*United States Agency for
International Development*

World Bank Group

About the Project Directors

Daniel F. Runde is senior vice president and holds the William A. Schreyer Chair in Global Analysis at CSIS where he focuses on challenges and opportunities coming from the developing world. He has been at the forefront of issues including development finance, the future of the World Bank, good governance, fighting corruption the trade and aid nexus, and taxes in developing countries (“domestic resource mobilization”). Mr. Runde is widely recognized as one of the architects of the “BUILD Act,” which created a new U.S. development finance institution.

Mr. Runde has advised several governments including the United States, Denmark, South Korea, and Japan as well as the World Bank and United Nations on wide series of foreign policy and development issues. He has testified numerous times before the U.S. Congress, and the Australian and Canadian parliaments. Mr. Runde recently convened a bipartisan Task Force co-chaired by Senators Young and Shaheen on the future reorganization of the State Department and the U.S. Agency for International Development (USAID) for maximizing our soft power influence. He currently serves as the Chair of the Advisory Council of Voluntary Foreign Assistance (ACVFA), the policy advisory board for USAID and the U.S. government on foreign assistance matters. He currently serves on the board of the International Foundation for Electoral Systems (IFES) and the Foundation Board for Ashesi University in Ghana.

Mr. Runde writes and speaks extensively on global development issues. Mr. Runde is a contributor at TheHill.com. Mr. Runde has been a contributor at Forbes.com and often contributes to Foreignpolicy.com. He was a member of the World Economic Forum’s Global Agenda Council on the United States. Previously he held senior positions at the World Bank Group (the International Finance Corporation) and USAID. Earlier, he worked at Citibank’s commercial banking arm in Argentina and began his career at Alex Brown & Sons (an investment bank) in Baltimore, MD. He holds the Officer’s Cross of the Order of Isabel la Catolica, a Spanish civil order that recognizes service that has benefited Spain. In 2010, Mr. Runde was named one of “40 under 40 in International Development in Washington” by the Devex Group. He is a life member of the Council on Foreign Relations and the Bretton Woods Committee.

David S. Spiro is the senior director for Learning, Energy, and Environment for Development at RTI International. In this role, he focuses on the leadership, management, and delivery of impactful development interventions around the globe. He also contributes to a team of RTI researchers and practitioners that focus on exploring issues

and trends around technology development, economic disruption, and innovation-led economic growth. Mr. Spiro previously served as RTI's director of international strategy and initiatives for Asia, where he focused on long-term growth and diversification of RTI's regional presence and portfolio while also supporting the further development, coordination, and integration of broader international growth initiatives. From 2011 to 2016, Mr. Spiro served as RTI's Asia Regional Office Director, based in Indonesia. He provided overall leadership and management of the corporate operations team, serving a \$300 million portfolio of programs. In this role, he represented RTI regionally in all aspects of program development and expansion in the Asia region.

Mr. Spiro is a career professional in international development who has worked as the country director in Indonesia for RTI and in Nepal for Helen Keller International. In these roles, he created and drove country strategies to develop evidenced-based programming across the health, education, agriculture and governance sectors. He recently relocated to the United States after 13 years living and working abroad. Mr. Spiro is a graduate of Colby College and the Fletcher School of Law and Diplomacy at Tufts University.

About the Authors

Dr. Jeffrey M. Alexander is senior manager for Innovation Policy in the Innovation Economics Program at RTI International. He has over 25 years of experience in conducting in-depth analyses of high-technology markets, tracking and evaluating R&D strategies and policies, and advising governments and firms on technology program funding and implementation. Dr. Alexander has conducted evaluations of innovation programs and policies of U.S. government agencies such as the National Science Foundation, the National Aeronautics and Space Administration, and the Department of Energy, as well as nonprofit organizations and foreign governments. He also provided advice on innovation policy and promotion efforts to national government agencies in Asia, Europe, and the Middle East. His research articles are published in *Research Policy*, *Research Evaluation*, *The Journal of Technology Transfer*, and *Technovation*. Dr. Alexander holds a PhD in technology and management from The George Washington University School of Business, and a BA in international relations from Stanford University, where he completed the honors program in science, technology, and society.

Sara E. Lawrence is the program director of economic development at RTI International. She brings 18 years of experience helping people and places develop strategies, analyze data, and assess promising practice for economic development. Her technical specialties include innovation ecosystems, industry diversification, and entrepreneurship for broad-based development. She effectively interacts across all sectors—business, education, nonprofit, and government—to design and evaluate programs with action-specific solutions unique to the community of focus. Ms. Lawrence translates research into practice across a variety of settings as demonstrated by her experience working in 20 U.S. states and 12 countries spanning four continents. Before joining RTI, Ms. Lawrence was the manager of policy initiatives at the Institute for Emerging Issues at North Carolina State University, where her work focused on the intersection of economic development, public policy, and leadership engagement. Ms. Lawrence holds a MRP in City and Regional Planning from the University of North Carolina at Chapel Hill and a BA in Political Science from the University of Georgia.

Sundar R. Ramanujam is a research assistant with the Project on Prosperity and Development at CSIS. His current research focuses on the impact of innovation in the development of emerging markets and on private sector engagement in international development, particularly on issues of global access and growth in the energy sector. He

has an avid interest in understanding the role of constitutions and courts in shaping the rule of law and the political economy, with a comparative focus on Asia and Latin America. Before joining CSIS, he worked for the well-known political scientist Donald L. Horowitz at the National Endowment for Democracy. Mr. Ramanujam received undergraduate training as an electrical engineer from Shiv Nadar University in India and holds an MA in democracy and governance from Georgetown University.

Erol K. Yayboke is deputy director and senior fellow with the Project on U.S. Leadership in Development (USLD) and Project on Prosperity and Development (PPD) at CSIS. His specific research interests include U.S. foreign assistance, the role of the private sector in the developing world, good governance, migration, forced displacement, development economics, and innovation-led economic growth. Previously, he served in several capacities with the Hillary Clinton presidential campaign and was a program/research manager on the Evidence for Policy Design (EPoD) team at the Center for International Development at Harvard University's Kennedy School of Government. Mr. Yayboke also has long-term field experience working for organizations (Global Communities, Save the Children, and AECOM International Development) in Iraq, Afghanistan, South Sudan, and the Somali Region of Ethiopia, serving in various senior country and project management roles. He is a member of the board of directors for the Andi Leadership Institute for Young Women, a Washington, D.C.-based nonprofit. Mr. Yayboke holds an MPA from the LBJ School of Public Affairs at the University of Texas at Austin and a BBA in international business also from the University of Texas at Austin.

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CSIS | CENTER FOR STRATEGIC &
INTERNATIONAL STUDIES

1616 Rhode Island Avenue NW

Washington, DC 20036

202 887 0200 | www.csis.org

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LITTLEFIELD**

Lanham • Boulder • New York • London

4501 Forbes Boulevard

Lanham, MD 20706

301 459 3366 | www.rowman.com

