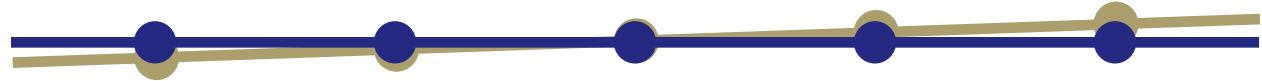# Will the Spread of Digital Technologies Spell the End of the Knowledge Divide?

Deepak Mishra

Lead Economist, World Bank;

Co-director, 2016 World Development Report on Internet and Development

Prepared for the 2015 Brookings Blum Roundtable

Digital technologies can help in expanding and democratizing knowledge by evenly spreading it between the developed core and the developing peripheries. Evidence suggests that digital technologies are in fact helping to expand knowledge, but are not succeeding in democratizing it. That is, digital technologies are helping to bridge the digital divide (narrowly defined), but are insufficient to close the knowledge divide. Democratizing knowledge is more than a matter of connectivity and access to digital devices. It requires strengthening the "analog foundations" of the digital revolution—competition, education (skills), and institutions—that directly affect the ability of businesses, people, and governments to take full advantage of their digital investments.[1]

Democratization or divergence?

Digital technologies hold enormous potential for accelerating economic development. More households in developing countries own a mobile phone than have access to electricity or clean water. The number of Internet users has more than tripled within a decade, from 1 billion in 2005 to an estimated 3.5 billion at the end of 2015. It is widely expected that the rapid diffusion of technology can democratize development; ideas and information that were exclusively available to the rich and the elites can now be accessed by most people, including the poor. This would not only make development more efficient, but also more inclusive. Developing countries can even leapfrog, benefiting disproportionately from adopting disruptive practices.

Digital technologies are facilitating the expansion of global knowledge, but not necessarily in democratizing it. The rapid diffusion of digital devices and greater Internet access have led to an explosion of data and information around the world. The growing popularity of social media, digital platforms, and the data revolution are accelerating this process. Nevertheless, knowledge

and its ensuing benefits are disproportionately accruing to those who are already wealthy, better educated, and well-connected. To some extent, this is to be expected, since technologies tend to benefit those who are best equipped to take advantage of them.
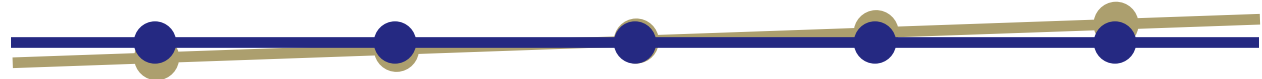
Democratizing knowledge requires not only increasing access to digital technologies, but also equipping everyone to make effective use of them. It entails strengthening the analog complements to digital investments by strengthening regulations that ensure efficient use of technology by businesses, by adapting workers' skills to the demands of the new economy, and by having accountable institutions that empower the citizens. Continued investment in technology without corresponding improvement in complements could, therefore, be self-defeating, because it would contribute to greater divergence rather than greater democratization.

Digital transformations, digital divides

The speed of diffusion of digital technologies is unprecedented. It took 160 years after the invention of steamships for Indonesia to reap their benefits, 60 years for Kenya to have electricity, and only 15 years for Vietnam to introduce computers. The average diffusion lag is 17 years for personal computers, 13 years for mobile phones, and five years for the Internet, and is steadily falling for newer technologies.[2]

The world is more connected than ever before. On average, eight in 10 individuals in the developing world own a mobile phone. Internet use lags behind but has tripled since 2005. More than 90 percent of firms in high-income OECD countries used a broadband Internet connection during 2010–2014, up from 79 percent during 2006–2009. The increase was even greater for developing countries, with the share in lower-middle-income countries up from 39 percent to 68 percent. Governments, which are sometimes viewed as technologically retrograde, have been its most enthusiastic adopters. By 2014, all 193 United Nations member states had national websites, 101 of which enabled citizens to create personal online accounts, 73 of which enabled citizens to file income taxes online, and 60 of which enabled citizens to register businesses online. For the most common core government administrative systems, 190 countries had automated financial management systems, 178 had customs, 159 had tax, and 148 had digital identification schemes.

Digital technologies have grown quickly, but they are by no means universal. Worldwide, nearly 6 billion people do not have broadband, 4 billion do not have Internet access, nearly 2 billion do not use a mobile phone, and half a billion live outside areas with a mobile signal. Digital divides persist within countries across gender, age, income, and geography. In Africa, 18 percent of men report using the Internet compared to 12 percent of women. Gaps are even larger between youth (20 percent) and people older than age 45 (8 percent). Similarly, small firms in developing

countries are less connected than large firms in advanced countries. The use of e-government is also highly uneven; citizens in the bottom 20 percent of income in the least-connected European Union country are 45 times less likely to use e-services than those in the top 20 percent of income in the most-connected EU country. Within countries, greater e-government use by individuals is correlated with age, education, gender, and location.
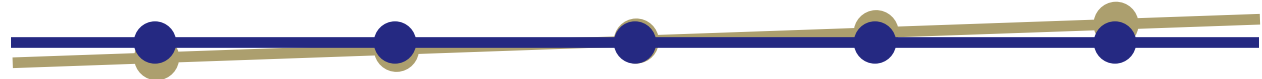
More important, research shows the limited effectiveness of connectivity in reducing information inequality, and that sometimes connectivity reinforces the older patterns of information exclusion.[3] For example, there are more contributions to Wikipedia from Hong Kong than from all of Africa combined, despite the fact that Africa has 50 times more Internet users than Hong Kong. Similarly, there are more Wikipedia articles written about Antarctica than any country in Africa or South America.[5] The amount of information published on the web, and its origin, often corresponds to what one sees in the offline world, as well. For instance, 85 percent of the user-generated content indexed by Google comes from the United States, Canada, and Europe. In fact, the information produced and consumed in the digital world has little bearing on the number of users of digital technologies.

The enablers

For knowledge to be generated and applied, the increased access to digital devices needs to be complemented with their effective use. This can happen through innovative applications of digital technologies, which are the enablers of the digital economy. I discuss three of them here.

Social media. Social networks are fundamental to human society, and digital technologies have accelerated their formation. More than one-fifth of the world population is now believed to be a member of one or more social media platforms. They have been credited with facilitating economically beneficial interactions, channeling users' behavior in ways that are consistent with development, providing a platform for information and dissemination during natural disasters and emergencies, and encouraging political mobilization and social change. For example, research shows that in Nigeria, social media supported microfinance by facilitating information flow to the poor and small business owners. Some analysts think that social media played a critical role in recent events such as the Arab Spring and Occupy Wall Street, and thereby were instrumental in spreading democratic ideas, although many remain skeptical of such arguments.

There is still much to learn about the role social media can play in development. While a source for innovative ideas, social media also remain conduits for gossip, slander, misinformation, abuse, and crime. One important lesson is that the impact of social media on development seems to be highly context specific. Variation in access to technology, education, and broader sociopolitical

context matters. For instance, there is evidence that people in more authoritarian countries are less likely to forward (for example, retweet) information.

The data revolution. The world's technological capacity to compute and store information has grown at an exponential rate. In harnessing this data explosion for development, attention focuses on two overlapping innovations: "Big Data" and "Open Data." Big Data are voluminous and fast and they come from myriad sources—from satellites to sensors and from clouds to crowds. Open Data are those that are freely and easily accessible, machine-readable, and explicitly unrestricted in use. Governments are, or could be, the most important source of Open Data. Exuberant estimates of the current and potential economic value of Big Data and Open Data range from hundreds of billions to trillions of dollars per year.

Yet sustained, impactful, scaled-up examples of Big Data and Open Data in developing countries are still relatively rare. Most Big Data are in private hands—large telecom and Internet companies—which are reluctant to share it for fear of jeopardizing customer privacy or corporate competitiveness. Public agencies, too, are reluctant to share data, even when they have large public benefits. For example, of countries surveyed by the Open Data Barometer, one-third of the high-income countries and 85 percent of developing countries had made little or no progress in opening map data. Reasons public agencies are reluctant to share data include lack of technical skills, inadequate resources, and unwillingness to expose data to scrutiny. Effective demand for Open Data may also be weak, as shown by Kenya's Open Data Initiative, which, despite a promising beginning, has lost steam.

Digital platforms. The most visible manifestation of digital technologies is the emergence of a platform economy—loosely defined as a digital medium that lets others connect to it—with far-reaching consequences. This is affecting a growing number of industries including retail, banking, transport, energy, and public service delivery. Digital payment platforms can promote financial inclusion, giving access to financial services to many of the approximately 80 percent of poor adults who were excluded from the formal financial sector. Evidence shows that in Niger, realized time savings for each payment is equivalent to an amount that would feed a family of five for a week. The users of M-Pesa, a mobile money service, are better able to absorb income shocks compared to non-users; and a study in Bolivia, Peru, and the Philippines found that texted reminders increased savings by 16 percent. Similarly, digital identification systems hold the potential to provide identity to the nearly 2 billion people who lack an official form of identification.

Like all great opportunities, digital platforms also come with risks. What makes online systems easy to use for customers also makes them susceptible to cybercrime. In the financial sector, the entry of nontraditional players poses new challenges for policy, regulation, and supervision. The

ease of transferring funds across the globe, often anonymously using means such as cryptocur-rencies, might increase illicit financial flows. Similarly, there are concerns about lack of privacy and misuse of data involving digital ID platforms, which partly explains why many advanced economies have not adopted them.

Strengthening the analog foundations of the digital revolution

Despite great expectations and frequent claims, new technologies have generated great headlines but modest benefits at the aggregate level.[5] Many of the benefits of the rapid diffusion of global knowledge have yet to materialize. Firms are more connected than ever before, yet global pro-ductivity growth is stagnating rather than surging. The world of work is becoming increasingly technology intensive, yet average real wages are languishing and the share of middle-paying jobs is shrinking. Schools are getting wired, but the standard learning outcomes are barely improving. While the number of nominal democracies is on the rise, the share of elections that are considered "free" and "fair" is steadily declining.

To explain why digital technologies have been less successful in delivering on their promise, we need to understand how technology and its complements interact (see figure).[6]
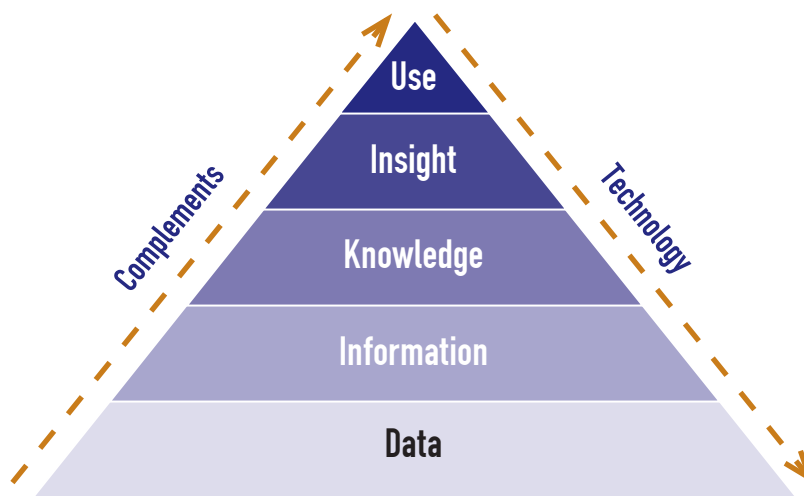
Source: Coveo (2013)

Knowledge creation is a multilayered process,[7] with each stage consisting of two broad parts—one part amenable to automation, the other less so. Digital technologies can make routine, transac-tion-intensive tasks, such as data collection and information dissemination, dramatically cheaper, faster, and more convenient. But as we go up the triangle, curating knowledge, distilling insights, and applying them in real life requires capabilities that involve human intelligence, discretion, and judgment, which we will call the "complements" to technology. The right combination of tech-

nology and complements is needed to make the development process more efficient and inclusive. As technology rapidly spreads, the gap between technology and regulations, skills, and institutions will continue to widen. Closing this gap is an imperative to further expand and democratize global knowledge.

---

1 This brief draws on the work being done by the World Bank team preparing the *World Development Report 2016 on Internet for Development.* For more information on this project, visit http://www.worldn\bank.org/en/publication/wdr2016.

2 See Comin 2014. The Evolution of Technology Diffusion and the Great Divergence,

3 See Graham and Foster 2014. Geographies of Information Inequality in Sub-Saharan Africa.

4 See Mayer-Schonberger and Graham 2011. Geographies of the World's Knowledge.

5 Nobel laureate Paul Krugman recently wrote that "The whole digital era, spanning more than four decades, is looking like a disappointment. New technologies have yielded great headlines, but modest economic results." Many others, including Robert Solow, Robert Gordon, and Larry Summers, have expressed reservation about the large aggregate impact of digital technology ().

6 "Closing the digital divide will not suffice to close the knowledge divide, for access to useful, relevant knowledge is more than simply a matter of infrastructure – it depends on training, cognitive skills and regulatory framework geared towards access to contents" (*UNESCO World Report* 2005, p. 22).

7 Coveo 2013. Measuring Return on Knowledge in a Big Data World.