THE MOVE TO SMART MOBILE PLATFORMS: IMPLICATIONS FOR ANTITRUST ANALYSIS OF ONLINE MARKETS IN DEVELOPED AND DEVELOPING COUNTRIES

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ABSTRACT

Online markets have changed as a result of people shifting massively from using one platform, personal computers and browsers, to another, comprising mobile devices and apps. These changes cover leading online players, consumer behavior, and products. The use of mobile apps, and the speed of change, vary between countries and in particular between countries based on their stage of development. Mobile app use is lower in developing countries, such as India, than in developed ones, such as the United States. However, as smart mobile phones with mobile broadband connections become ubiquitous among consumers in developing countries, mobile app use in these countries is likely to leapfrog the use of personal computers and browsers. As a result of the movement to smart mobile, the analysis of markets that might have made sense several years ago, does not today, and will make even less sense several years hence. These dramatic and unpredictable changes pose several issues for antitrust. They show that antitrust analysis that focuses on static markets is highly prone to error when it comes to dynamic online industries, that authorities risk making assumptions during investigations that are disproven by the markets soon after they have brought charges or decided a case, and antitrust remedies are prone to be ineffective or harmful because they are developed for markets during the investigation but are radically different by the time the remedies are implemented.

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I. INTRODUCTION AND SUMMARY

The rapid growth of smart mobile devices is changing online markets, and the nature of competition, drastically, around the world. The impact is apparent in developed countries. The introduction of fast and capacious mobile broadband networks in the early 2010s in countries such as the United States spurred the adoption of smart mobile phones for online activities. In the U.S. more than seventy-seven percent of adults had a smart mobile phone as of August 2015.[1] The average American spent more than an hour a day using their smart mobile phones mainly for online activities.[2] In the U.S., people spent fifty percent more time on their mobile phones than on their personal computers as of mid-2015; when on their mobile phones, they spent eighty-seven percent of their time using mobile apps compared with just thirteen percent of their time using a mobile browser as of June 2015.[3] That shift from using the personal computers and browser to using mobile devices and apps continues at a rapid clip.[4]

Already, smart mobile phones have led to immense changes in consumer behavior. People have their smart mobile phones with them most of the day and have come to depend on them for shopping, communication, entertainment, and more. These mobile devices are changing how people buy goods and services online and in physical environments, as reflected by the spread of ride-sharing

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[1] *comScore Reports August 2015 U.S. Smartphone Subscriber Market Share*, COMSCORE (Oct. 6, 2015), https://www.comscore.com/Insights/Market-Rankings/comScore-Reports-August-2015-US-Smartphone-Subscriber-Market-Share.

[2] This figure is across all US residents 18 and older regardless of whether they own a smart phone. Nielsen, *The Total Audience Report: Q2 2015* at http://s1.q4cdn.com/199638165/files/doc_presentations/2015/Total-Audience-Report-Q2-2015.pdf.

[3] *Id.*; Adam Lella et al., *The 2015 U.S. Mobile App Report*, https://www.comscore.com/Insights/Presentations-and-Whitepapers/2015/The-2015-US-Mobile-App-Report; comScore, Inc., SLIDESHARE, http://es.slideshare.net/comScoreInsights/the-us-mobile-app-report-comscore-53067374.

[4] Lella et al., *supra* note 3.

apps globally; how people communicate with each other as seen in the widespread use of diverse messaging apps; and how they consume entertainment as people adopt streaming music and video apps. For example, around sixty percent of the visits Americans made to websites on November 26, 2015—Thanksgiving Day—were from mobile devices.[5]

The move to smart mobile has resulted in significant changes in the competitive dynamics of the online economy. The increasingly widespread use of mobile apps has accelerated the growth of other companies, from publicly traded ones such as Facebook, which secures seventy-eight percent of its advertising revenue from mobile,[6] to startups such as Uber that rely entirely on mobile devices. Meanwhile, in the last five years Apple has vaulted to preeminence.[7] In developed countries such as the U.S. around two-thirds of online activity on mobile devices takes place on Apple's mobile devices using its iOS mobile software platform. Meanwhile, companies that were considered central to the online economy a few years ago, such as Yahoo's ad-supported web portal, have struggled to make the transition from the desktop to mobile.

The story in developing countries will be similar as they become wealthier and deploy faster mobile broadband networks. The penetration and adoption of advanced technologies is growing rapidly and will soon reach the critical levels necessary for igniting the smart mobile ecosystem. In India, for example, only fourteen percent of adults have smart mobile phones.[8] But this number represents a 121 percent increase between 2013 and 2015.[9] Only 5.5 percent of households were served by mobile operators that have fast enough broadband for most online activities in 2014, but that too is increasing rapidly—seventy-two percent from 2014 to 2015.[10] Indian telecom operators are expected to increase high-speed (3G and 4G) capacities over the next five years at a

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[5] Based on 180 million visits to over 4,500 United States websites on November 26, 2015, as reported by Adobe. Hiroko Tabuchi, *Black Friday Shopping Shifts Online as Stores See Less Foot Traffic*, NEW YORK TIMES (Nov. 27, 2015), http://www.nytimes.com/2015/11/28/business/black-friday-shopping-shifts-online-as-stores-see-less-foot-traffic.html?_r=0.

[6] Based on data for 2015 Q3. Facebook Inc., Quarterly Report (Form 10-Q) 40 (Sept. 30, 2015).

[7] Anuj Srivas, *The Rise and Rise of Apple,* THE HINDU (Feb. 1, 2015), http://www.thehindu.com/business/Industry/the-rise-and-rise-of-apple/article6845491.ece.

[8] *Internet Seen as Positive Influence on Education but Negative on Morality in Emerging and Developing Nations*, PEW RESEARCH CENTER (Mar. 19, 2015), http://www.pewglobal.org/2015/03/19/1-communications-technology-in-emerging-and-developing-nations/.

[9] Ambika Choudhary Mahajan, *Worldwide Active Smartphone Users Forecast 2014-2018: More than 2 Billion by 2016*, DAZEINFO (Dec. 18, 2014), http://dazeinfo.com/2014/12/18/worldwide-smartphone-users-2014-2018-forecast-india-china-usa-report/.

[10] Broadband Commission, *The State of Broadband 2015: Broadband as a Foundation for Sustainable Development* (Sept. 2015), http://www.broadbandcommission.org/documents/reports/bb-annualreport2015.pdf; Broadband Commission, *The State of Broadband 2014: Broadband for All* (Sept. 2014), http://www.broadbandcommission.org/documents/reports/bb-annualreport2014.pdf.

compounded annual growth rate of 125 percent.[11] Technology entrepreneurs and businesses are innovating towards this new reality. Technology start-ups such as OlaCabs (ride-sharing), Snapdeal (online retail), near.in (at-home fulfillment of local goods and services), and Paytm (financial payments) are examples of recent startups that exploit the capabilities of connected mobile devices to deliver services and goods efficiently to Indian consumers.

The online economy in India and other developing countries will look more like the U.S. and other developed countries but with an important difference: the ratio of mobile technologies and social computing to traditional computing with PCs and fixed broadband is likely to exceed the ratio in developed, more prosperous, economies. The penetration of personal computers and fixed broadband connections has been very low in poorer, but rapidly growing, countries because of their high cost and dependence on unreliable electricity and fixed Internet connectivity. Only eleven percent of Indian adults have personal computers, for example, compared to fourteen percent that have smart mobile phones and eighty-one percent that have smart or feature phones.[12]

In contrast, mobile devices are available over a wide spectrum of price points stretching to the very inexpensive, and are untethered from the burden of continuous electric power and fixed-line Internet connectivity. For instance, the online shopping site Snapdeal.com lists the 4G-capable Moto E phone running the Android 5 operating system for Rs. 6,500 (about half the price of the most inexpensive desktop-PC system), and most mobile operators provide voice and data service for a couple hundred rupees per month.[13] As a result, smart mobile devices will leapfrog personal computers in developing countries. In a few years, people in India, and other developing countries, will rely relatively more on smart mobile phones, and mobile apps, and less on personal computers and browsers than people in the US and other developed countries. Respected analysts and consulting firms forecast that the percent of adults with smart mobile phones will reach twenty-two percent in 2018, which is up from the current thirteen percent today.[14]

The growing size and significance of the online economy has attracted the interest of competition authorities, particularly over the role of large multi-national online platforms. The dramatic and continuing shift by online consumers and businesses to smart mobile devices has important implications for the

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[11]   Deloitte, *Indian Tower Industry: The Future is Data* 28 (June 2015), http://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-indian-tower-industry-noexp.pdf.

[12] PEW RESEARCH CENTER, *supra* note 8.

[13]   SNAPDEAL, http://www.snapdeal.com. A rupee equals about US0.015 or 1.5 cents as of November 29, 2015.

[14] Katie McMillan & Ellen Gowdy, *The Smartphone's Impact on Social Change*, SMASHING BOXES (Jan. 30, 2015), http://smashingboxes.com/blog/the-smartphones-impact-on-social-change.

analysis of online markets that would be prudent for competition authorities and courts to consider. The analysis of market definition and market power needs to account for rapid dynamic change resulting from the simultaneous change in consumer behavior, development of new technologies, entry of new players, and integration of online and offline markets.

The enormity of these changes is apparent just by comparing the state of online competition in 2015 versus 2005 in a developed country. Ten years ago, Google was the leading provider of online search on the web, Microsoft controlled desktop computing, four telecommunication giants exerted significant control over most aspects of mobile phones, Facebook was a nascent social network used mainly in colleges, and Amazon was an online retailer. Today, search has migrated to online marketplaces, with Amazon serving as a search engine in front of a giant electronic mall, and to social networks, where Facebook is greatly sought after for online advertising because it enables social search and recommendations. Apple and Google have become significant players in the mobile ecosystem, and mobile phones have eroded the sales of PCs and Microsoft Windows. Amazon has become a prominent vendor of cloud computing resources used by many of the websites and apps behind the online economy.

Given the pace of change, it is likely that the state of competition will be vastly different in 2020 than in 2015. Changes are likely to occur even more rapidly in fast-growing places like India. While India has lagged the U.S. and other developed nations in adoption and penetration of landline phones, fixed broadband Internet, and PCs—the old technologies—it has leapfrogged into mobile phones, mobile high-speed Internet, and mobile computing, suggesting that these newer technologies will be even more consequential than they have been in the U.S. in shaping competition in the online economy. Consequently, both market definition and market power analysis needs to be less rigid, analyze a broader range of competitive dynamics, and be more forward looking.

The move to smart mobile, and the disruptions that shift is causing to the online economy, creates four implications for antitrust analysis:

> 1) Changes in consumer behavior, online entry based on mobile apps, and increased competition between mobile app-centric and website-browser centric businesses, lead to crossing and overlap between previously-separate markets, and are likely to reduce the extent to which online providers possess market power.

2) Rapid changes in consumer behavior and online entry increase the likelihood of making mistakes in market definition and market power analysis. It has become increasingly difficult to predict the future even a few years ahead.

3) The rapid and unpredictable shifts in competitive dynamics, and technologies, caused by the shift to smart mobile make it more difficult to design remedies, which are effectively shooting at a moving target.

4) There is a greater likelihood of remedies having negative unintended consequences by, for example, limiting competition by incumbents against fast-moving entrants who quickly emerge as powerhouses. That is particularly the case during these times of intense disruptive innovation resulting from the move to using mobile apps.

As the online economy produces innovative new technologies, services, and business models, spurred by the move to smart mobile, it is vital that policy and antitrust analysis account for these four implications, in order to ensure that these innovations continue to improve the functioning of society, business, and the economy.

II. HOW MOBILE HAS CHANGED ONLINE AND OFFLINE MARKET BEHAVIOR

During the 2000s, mobile feature phones became ubiquitous around the world. They changed how people communicated with each other by untethering phones from fixed lines, by providing text messages, and by making it easy to take and share photos. Initially, these devices primarily served voice communication and a smattering of other features such as text messaging, music, and FM radio. This limited role of mobile devices was transformed around 2005 with the development of "smart" phones. This new generation of phones employs a full-blown operating system and has essentially unlimited capabilities, primarily because they enable end-users to install third-party application programs (or "apps"). Leveraging Internet standards and cloud computing, these small portable devices imported the full power of modern computing, through easy-to-use apps connected with powerful computers, software, and data over the Internet. Building on that foundation, the rapid spread of smartphones, starting around 2010, is having profound changes in every facet of the online economy.

A. Why the World Is Moving Rapidly to Mobile

Mobile computing is characterized by a business-technology-ecosystem. A high level of adoption and usage requires a combination of a massive user base, affordable yet highly capable hardware, fast data networks with affordable access

plans, and a large collection of useful services and applications. Four developments have resulted in the widespread use of mobile devices for online activities. In the first decade of the 2000s, mobile broadband technologies were developed that made it possible for mobile network operators to build mobile broadband networks that were fast enough for conducting online activities. These technologies included methods for making more efficient use of the wireless spectrum for transmitting data and chip technologies for mobile handsets that worked with the new mobile broadband standards and provided powerful computing devices. Although these mobile broadband networks didn't become widely available in developed countries until after 2010, it was apparent earlier in the 2000s that they would be forthcoming.

That anticipation led to the second major development. A number of technology companies started developing mobile phones that could provide online access as well as make basic phone calls. This required developing mobile handsets, mobile operating systems that could run those handsets and support applications, and applications that could make the handset particularly useful. Apple adopted a vertically integrated approach in which it produced both the mobile operating system (iOS) and handset (iPhone). Google focused on developing an open source operating system (Android), providing a standard hardware and software framework for third-party handset makers, and organizing the Open Handset Alliance (OHA) to produce mobile phones. Both approaches worked well. Apple launched the iPhone, based on the iOS operating system in June 2007. To help kick off the Android ecosystem, Google, working with HTC, introduced the HTC Dream phone based on the Android operating system in October 2008.

Mobile apps made available through "app stores" were central in the third development. Apple, Android, and other mobile operating system providers made it possible for developers to write apps that used the features and functions of the phone, including location-based services, and availed themselves of a connection to the Internet that was usually on so long as the phone was turned on. These mobile apps also enabled people to consume content on the app offline as well as online. The mobile operating system vendors then created "app stores" to provide a convenient way for developers to distribute apps to users and for users to obtain these apps. Consumers and developers saw the iOS and Android-based devices as superior to existing offerings from Blackberry, Microsoft, and Symbian. The positive feedback between consumer adoption and app development propelled Apple and Android mobile adoption. By June 2015, there were more than 1.5 million apps for the Apple iOS and 1.6 million apps for Android.[15] Consumers had downloaded more than 100 billion apps by June 2015.[16]

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[15] David Curry, *Apple iOS App Store Reaches 1.5 Million Apps*, ITPROPORTAL (June 15, 2015), http://www.itproportal.com/2015/07/15/apple-app-store-milestone; *Number of Available Android*

The fourth development was cloud computing, which went hand-in-hand with the development of faster mobile broadband. There are now 5.3 million server computers connected to the Internet.[17] Companies own or lease servers, on which they store the content that they make available to their customers and others. Together, these servers, which sit on the edge of the physical network of networks, are called the "cloud." They provide the computational resources and data for what people do on their personal computer and smart phones. As Internet speeds have increased, there is little difference between using an app on a mobile device connected to the cloud and using a software application installed on a hard drive on a PC. Lightweight apps, many of which can fit on a smart phone, can function as front-ends to elaborate software systems with extensive databases and deep algorithmic search. For instance, ride sharing services such as Uber use large amounts of historical data (such as traffic patterns and sharing patterns) as well as real-time data (such as traffic conditions and the location and preferences of riders) as the fuel for intelligent algorithmic search and optimization programs that produce ride-sharing allocations in real-time.

The rate of adoption of smart mobile devices in the U.S. accelerated with the rollout of faster mobile broadband. The number of mobile broadband subscriptions with speeds of 256 Kbps or more per inhabitant increased from 65.5 in 2011 to 97.9 in 2014.[18] Over those same years, Pew Research Center reports that the percent of people eighteen and older with smartphones increased from thirty-five percent to sixty-four percent.[19] Likewise, comScore reports that the number of people thirteen and older with smartphones increased from 98 million in the three months ending December 2011 to 182 million in the three months

Applications, APPBRAIN, http://www.appbrain.com/stats/number-of-android-apps; Jose Maria Delos Santos, *Top 5 Best Native Apps for Project Management*, PROJECT-MANAGEMENT.COM (Aug. 18, 2015), http://project-management.com/top-5-best-native-android-apps-for-project-management.

[16] Harrison Weber, *Apple's App Store Passes 100B Downloads and $30B Paid to Developers*, VENTUREBEAT (June 8, 2015), http://venturebeat.com/2015/06/08/apples-app-store-passes-100-billion-downloads.

[17] *June 2015 Web Server Survey*, NETCRAFT (June 25, 2015), http://news.netcraft.com/archives /2015/06/25/june-2015-web-server-survey.html.

[18] This number overstates the penetration rate of mobile broadband since some inhabitants have more than one mobile broadband subscription. *The State of Broadband 2015*, *supra* note 10; *The State of Broadband 2014*, *supra* note 10; Broadband Commission, *The State of Broadband 2012: Achieving Digital Inclusion for All* (Sept. 2012), http://www.broadbandcommission.org/ documents/reports/bb-annualreport2012.pdf.

[19] Aaron Smith, *Smartphone Adoption and Usage*, PEW RESEARCH CENTER (July 11, 2011), http://www.pewinternet.org/2011/07/11/smartphone-adoption-and-usage; Aaron Smith, *U.S. Smartphone Use in 2015*, PEW RESEARCH CENTER (Apr. 1, 2015), http://www.pewinternet.org /2015/04/01/us-smartphone-use-in-2015.

ending December 2015.[20] Figure 1 shows the rapid growth between 2007 and 2015 in the percent of American adults with a smart mobile phone.

Figure 1: Evolution of US Smartphone Ownership and Access to Mobile Broadband
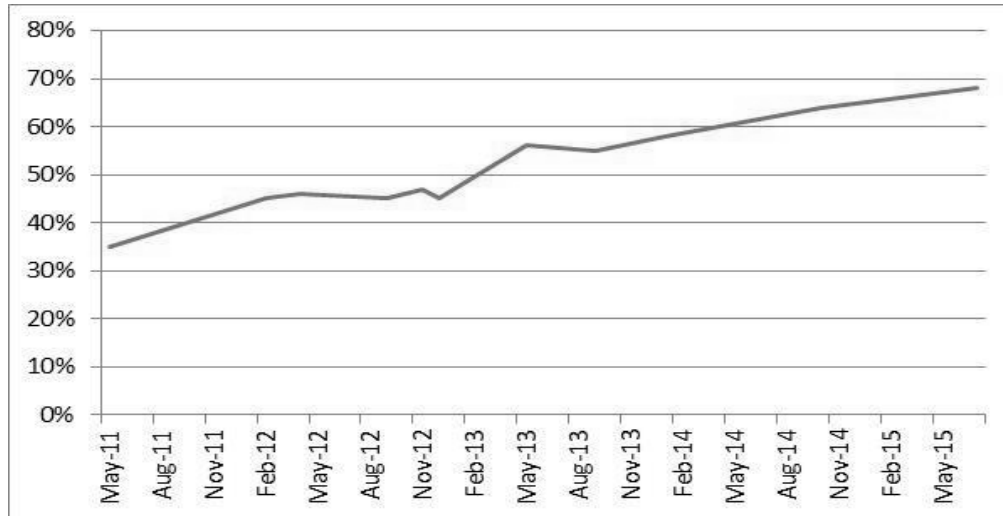
Sources: Pew Research Center, "Device Ownership over Time," July 2015, http://www.pewinternet.org/data-trend/mobile/device-ownership/.

Less prosperous, but now rapidly growing, countries are following a similar path. Until now, although mobile phones have become ubiquitous in developing countries, relatively few consumers use smart mobile phones—only about thirty percent of Indians who have mobile phones have smartphones.[21] Many of the people who do have smart mobile phones do not use them much for online access because their mobile network operators (MNOs) do not offer sufficiently fast, or cheap, mobile broadband. For instance, as 2014 Q4, the slower technology dominated data networks in India; high-speed data networks accounted for only eleven percent of unique mobile phone connections in India

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[20] *comScore Reports December 2011 U.S. Mobile Subscriber Market Share*, COMSCORE (Feb. 2, 2012), https://www.comscore.com/Insights/Press-Releases/2012/2/comScore-Reports-December-2011-US-Mobile-Subscriber-Market-Share; *comScore Reports December 2014 U.S. Smartphone Subscriber Market Share*, COMSCORE (Feb. 9, 2015), https://www.comscore.com/Insights/Market-Rankings/comScore-Reports-December-2014-US-Smartphone-Subscriber-Market-Share.

[21] Kishalaya Kundu, *HSBC: India Surpasses China in Premium Smartphone Sales*, ANDROID HEADLINES (July 11, 2015), http://www.androidheadlines.com/2015/07/hsbc-india-surpasses-china-premium-smartphone-sales.html.

vs. eighty-five percent in the US.[22] In India, one megabyte per second costs around $61, which makes it very expensive for the average person.[23]

Three phenomena in historically poorer but rapidly growing countries, however, are changing this situation rapidly. First, the MNOs are rolling out fast mobile broadband networks across those countries, and the cost of mobile broadband is declining for their residents. For mobile operators in India, cut-throat competition in the voice market where a preference for prepaid plans has driven the cost of calling below 50p per minute, provides an imperative to invest heavily in high-speed data networks and promote smartphones for data-intensive tasks such as entertainment, shopping, and multimedia communication. In India, for example, active mobile broadband subscriptions increased from 1.9 percent in 2011 to 5.5 percent in 2014 while telecom operators like MTS announced a price reduction of about 33 percent of its mobile broadband tariffs.[24] Second, as average incomes increase, as the price of smart mobile phones decline, and as mobile broadband become cheaper and faster, more people are adopting smart mobile phones similar to India. Third, with higher incomes and lower rates for mobile broadband, smartphone users have increased their consumption of mobile apps, data services, and mobile browsing.

B. How Mobile Changes Online Access

Before smart mobile devices became widespread, people used their personal computers to engage in online activities. In the U.S., and other developed countries, local cable and wired telecom companies extended wires to households and businesses that connected these households and businesses to the network of networks that comprise the physical Internet. By 2010, about 23.7 percent of American households had fixed broadband connections with speeds of 3 Mbps or more.[25] People then used a browser on their personal computer to access websites from personal computers at home or work. Starting with the birth

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[22] The slower networks are 2G and the faster ones are 3G and 4G. GSMA INTELLIGENCE, https://gsmaintelligence.com/data.

[23] Darrell M. West, *Digital Divide: Improving Internet Access in the Developing World through Affordable Services and Diverse Content*, CENTER FOR TECHNOLOGY INNOVATION AT BROOKINGS (Feb. 2015), http://www.brookings.edu/~/media/research/files/papers/2015/02/13-digital-divide-developing-world-west/west_internet-access.pdf.

[24] *The State of Broadband 2015*, *supra* note 10; *The State of Broadband 2012*, *supra* note 18; *MTS Drops Mobile Broadband Tariffs by up to 33 Percent*," TECH2 NEWS (Oct. 6, 2014), http://tech.firstpost.com/news-analysis/mts-drops-mobile-broadband-tariffs-33-percent-236836.html.

[25] National Telecommunications and Information Administration, *U.S. Broadband Availability: June 2010 – June 2012* (May 2013), https://www.ntia.doc.gov/files/ntia/publications/usbb_avail _report_05102013.pdf.

of the commercial Internet in the mid-1990s, online businesses developed websites that people could access from multiple browsers.

In retrospect, there were two major limitations to the "PC-fixed broadband-browser" model.

The first was the costs. The average price of a personal computer in 2010 with a typical suite of consumer software was $615 and the average annual cost of a fixed broadband connection was $828.[26] As of 2010, twenty-three percent of American households didn't have a personal computer and twenty-nine percent did not use the Internet primarily because they were poor households who could not afford it.[27] Other developed countries were in a similar position. PC and broadband penetration were much worse in poorer countries. In 2010, only 6.1 percent of Indian households had personal computers and only 8.5 percent had access to the Internet.[28] In fact, except for the wealthiest of citizens, the online revolution had not really touched the billions of people on Earth who were not fortunate to live in a developed country.

The second limitation concerns access to the online world. People were tethered to places that had fixed broadband connections. Increasingly, locations, such as airports and coffee shops, had "WiFi" that provided wireless Internet connectivity in their locations. But people generally did not have any connection to the Internet when they were out and about or even when they were wandering around their homes. Of course, given the excitement around availability of mobile telephony, these limitations were not center stage at the time.

Smart mobile phones with mobile broadband access changed this situation in fundamental ways. People got the equivalent of an Internet-connected personal computer in a tiny package that they could carry with them all the time. That increased both the time during the day, and physical places, where people could engage in online activity. The proliferation of mobile apps supported by the mobile operating systems provided innovative ways for developers to provide services to consumers. Location-based technologies enabled developers—through mobile apps or websites accessed from the browser—to provide services based on where the consumer was or wanted to go.

The adoption of smart mobile phones has resulted in a high density of Internet connections throughout physical space. Most of the people moving

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[26] Ben Worthen, *Rising Computer Prices Buck the Trend*, THE WALL STREET JOURNAL (Dec. 13, 2010), http://www.wsj.com/articles/SB10001424052748704681804576017883787191962; *International Broadband Data Report (Second)*, FEDERAL COMMUNICATIONS COMMISSION (May 20, 2011), https://www.fcc.gov/reports/international-broadband-data-report-second.

[27] Thom File & Camille Ryan, *Computer and Internet Use in the United States: 2013*, *American Community Survey Reports*, UNITED STATES CENSUS BUREAU (Nov. 2014), http://www.census.gov/content/dam/Census/library/publications/2014/acs/acs-28.pdf.

[28] *Key ICT Indicators, 2012*, OECD, http://www.oecd.org/sti/ieconomy/Final_6.a_PC%20Households_2012.xls; *India*, INTERNET WORLD STATS, http://www.internetworldstats.com/asia/in.htm.

around Manhattan by foot, car, or subway, for example, now have a smart mobile device and are online either actively, because they are using an app or browsing, or passively because they can receive alerts. A few years ago, most people could go online only if they were sitting at a computer at their home or, in some cases, their office.

Moreover, with new methods and standards for machine-to-machine communication, enormous amounts of computation and communication occurs without the active participation of the user. For instance, consider a smartphone user who has a Nike Running app, a Facebook account, an online calendar, and a Picasa photo account. For this user, a jog can automatically lead to a Facebook post, a camera picture is instantly communicated to a Picasa group or Instagram, and a calendar entry causes a mapping service to communicate the best travel route to the user's next meeting.

Not surprisingly, enabling most people to be connected most of the time, and using a plethora of apps, has had huge ramifications for people and businesses.

C. The Impact of Smart Mobile on How People Spend Their Time

Now that people can always be online, they go online more than they used to. Figure 2 shows the minutes a day that Americans spent online using personal computers or mobile devices from 2008 to 2015. The total number of minutes more than doubled from 150 minutes in 2008 to 313 in 2015. The proportion of this time spent on mobile increased from 12.7 percent in 2008 to 54.6 percent in 2015.

Figure 2: Daily Time Spent per Media Platform in Minutes, United States
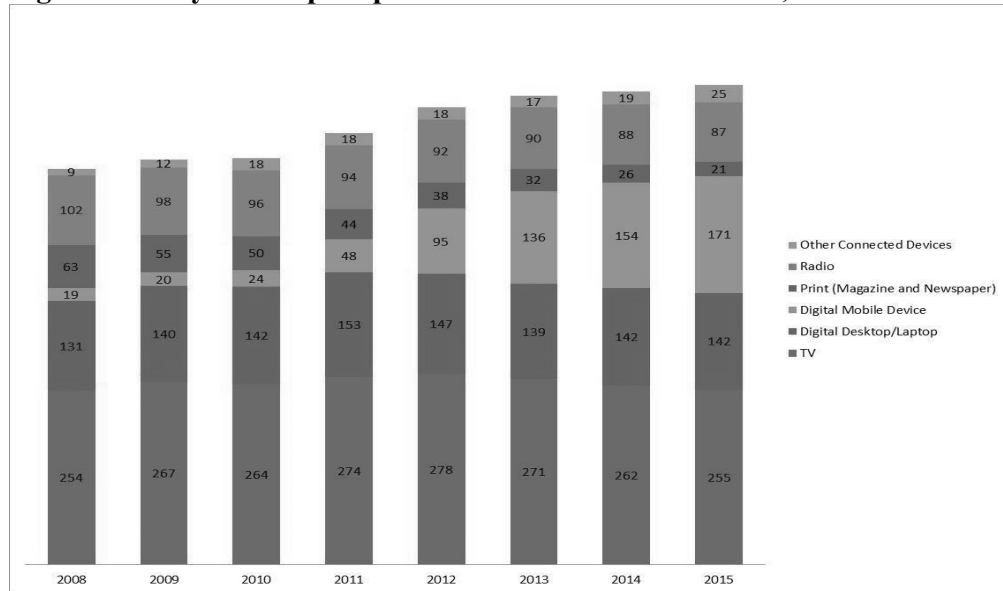
Source: David Pakman, "May I Have Your Attention, Please?" Medium, August 10, 2015, https://medium.com/life-learning/may-i-have-your-attention-please-19ef6395b2c3?curator=MediaREDEF#.2rwedr27o.

Note: This data is consistent with that from other sources, including Nielsen, "The Total Audience Report: 2015Q2 2015", http://s1.q4cdn.com/199638165/files/doc_presentations/2015/Total-Audience-Report-Q2-2015.pdf; eMarketer, "Mobile Continues to Steal Share of US Adults' Daily Time Spent with Media," April 22, 2014, http://www.emarketer.com/Article/Mobile-Continues-Steal-Share-of-US-Adults-Daily-Time-Spent-with-Media/1010782.

People typically rely on apps when they use their smart mobile phones. The typical smart phone user in the U.S. used about twenty-seven apps per month as of the 2014 Q4.[29] Table 1 shows the breakdown of how people spend their time. Importantly, smart mobile phones are really not used much as phones. Making phone calls and sending text messages account for only sixteen percent of the time. Of the time people spend online, ninety percent is spent using mobile apps and only ten percent is spent accessing websites using their browser.[30] The story is similar for smart mobile phone users in India.

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[29] *So Many Apps, So Much More Time for Entertainment*, NIELSEN (June 11, 2015), http://www.nielsen.com/us/en/insights/news/2015/so-many-apps-so-much-more-time-for-entertainment.html.

[30] Simon Khalaf, *Seven Years into the Mobile Revolution: Content is King . . . Again*, FLURRY INSIGHTS (Aug. 26, 2015), http://flurrymobile.tumblr.com/post/127638842745/seven-years-into-the-mobile-revolution-content-is.

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Table 1: Mobile Time Usage in the United States and India, 2015

	United States	India
Utility Features and Apps	33%	20%
Multimedia Apps	16%	12%
Games	11%	9%
Other	10%	9%
Web Surfing	9%	10%
Messaging	9%	2%
Phone Calls	7%	12%
Chat and VOIP	4%	26%

Source: Nielsen Informate, "International Smartphone Mobility Report," March 2015, p. 14.

D. Market Disruptions Resulting from the Move to Smart Mobile

The amount of time spent online shifted increasingly to mobile devices, the shift from using browsers to apps has, not surprisingly, disrupted many aspects of the online economy. Communication among people is moving swiftly to messaging apps, away from voice, text messaging, email, and browser-based methods. According to data from comScore, mobile apps accounted for fifty-two percent of the time spent using digital media while desktop-based digital media consumption took forty percent (mobile web browsing took up the remaining 8 percent).[31] People increasingly engage in social networking from apps on their mobile devices rather than using a browser from their personal computers. A report by BI Intelligence confirms that sixty percent of social media time is spent not on desktop computers but on smartphones and tablets.[32] Commerce is moving from people using their browsers on their personal computers in fixed locations to

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[31] Sarah Perez, *Majority of Digital Media Consumption Now Takes Place in Mobile Apps*, TECHCRUNCH (Aug. 21, 2014), http://techcrunch.com/2014/08/21/majority-of-digital-media-consumption-now-takes-place-in-mobile-apps; Adam Lella & Andrew Lipsman, *The U.S. Mobile App Report*, COMSCORE (Aug. 21, 2014), http://www.comscore.com/Insights/Presentations-and-Whitepapers/2014/The-US-Mobile-App-Report.

[32] Emily Adler, *Social Media Engagement: The Surprising Facts About How Much Time People Spend On The Major Social Networks*, BUSINESS INSIDER (Sept. 26, 2014), http://www.businessinsider.com/social-media-engagement-statistics-2013-12.

search, discover, and buy to using apps on mobile devices often while they are making shopping trips or just happen to be out and about.

The changes taking place in shopping illustrate how quickly and dramatically the move to smart mobile is changing the behavior of people and businesses. Smart mobile devices enable people to blend physical and online shopping, and retail stores are reacting to this change in consumer behavior. People can use specialized apps such as AroundMe to suggest where they should shop given their current locations, using retailer apps get notifications from stores they are near, and compare prices using apps such as PriceGrabber.

As a result, a significant amount of the activity surrounding the "path to purchase" for consumers is moving to mobile devices in developed economies. That is seen in a number of ways. Many Americans, and most "millennials"— those who are between roughly twenty and thirty-five years old in 2015—use smart mobile phones as part of their process of buying goods. According to Thrive Analytics, ninety percent of adults, and ninety-seven percent of millennials, use smart mobile phones as part of their typical shopping practices.[33] Advertisers are directing a significant amount of their spending to mobile devices. Facebook earned fourteen percent of its global advertising revenue from mobile in 2012 Q3.[34] As of 2015 Q3, it earned seventy-eight percent of its advertising revenue on mobile.[35] Consumers are not just using mobile to help in the search for and discovery of things to buy. Increasingly, they are consummating their purchases on mobile devices. Americans made fifty-seven percent of their online purchases from mobile devices in 2014 compared with virtually none before 2010.[36] As noted above, on Thanksgiving Day, November 26, 2015, around sixty percent of U.S. website visits were made from mobile devices in the U.S.[37]

Whereas online shopping was previously based on computers and web browsers, online commerce on mobile devices is largely conducted via apps that enable people to buy conveniently online or at physical stores. Several social networking and communication platforms that are used predominantly on mobile devices have transitioned from helping people discover and evaluate products to enabling people to buy products online. Twitter, for example, has integrated a

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[33] *Mobile Use Now Surpasses PC's When Searching for Local Information*, LOCAL SEARCH ASSOCIATION (Mar. 11, 2015), http://www.thelsa.org/lsa/press-center/mobile-use-now-surpasses-pcs-when-searching-for-lo-3080.aspx; *Millennials Using Smartphones to Shop*, DEFY MEDIA (Sept. 11, 2014), http://www.defymedia.com/2014/09/11/millennials-using-smartphones-store.

[34] Facebook Inc., Quarterly Report (Form 10-Q) 27 (Sept. 30, 2012).

[35] Facebook Inc., Quarterly Report (Form 10-Q) 40 (Sept. 30, 2015).

[36] David Murphy, *IBM: Christmas Day Sales Up 8.3 Percent, Mobile Purchases up 20.4 Percent*, PC MAGAZINE (Dec. 26, 2014), http://www.pcmag.com/article2/0,2817,2474217,00.asp.

[37] Hiroko Tabuchi, *Black Friday Shopping Shifts Online as Stores See Less Foot Traffic*, THE NEW YORK TIMES (Nov. 27, 2015), http://www.nytimes.com/2015/11/28/business/black-friday-shopping-shifts-online-as-stores-see-less-foot-traffic.html?_r=0.

"Buy Now" button as part of an effort to enable people to "have even more opportunities to discover and purchase products from the brands they love on Twitter."[38] Other platforms that are taking similar approaches include Facebook, Facebook Messenger, Pinterest, WeChat, and SnapChat.[39]

These changes in consumer shopping behavior are resulting in a revolution in retail.[40] Retail stores are developing "omnichannel" approaches that integrate physical stores, mobile apps, and websites to provide consumers with multiple choices of how to shop and buy.[41] Because consumers have more and better ways to make their purchase decisions, they increasingly go to a store only after making a decision to buy something there. Since they engage in less comparison shopping, foot traffic to stores is declining. Retailers are reducing the size of stores and reorganizing their businesses to cater to this change in behavior. More retailers are letting consumers order online—often with mobile—and pick up in store.

The latest step in this revolution is "hyperlocal" retail, where physical and online stores aim to provide instant gratification through same-day delivery, in some cases within a few hours of order placement. Hyperlocal retail is growing rapidly in both developed countries and developing countries, and is fueled by high-speed supply chains, highly localized data, and location-awareness due to mass adoption of mobile devices.

E. Smart Mobile and Competitive Dynamics of the Online Economy

The move to smart mobile is one of the major factors in a dramatic shift in the competitive landscape of the online economy. These changes in the competitive landscape are driven by a profound shift that combines technological

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[38] Nathan Hubbard, *More Ways to Sell Directly on Twitter*, TWITTER: BLOG (Sept. 30, 2015), https://blog.twitter.com/2015/more-ways-to-sell-directly-on-twitter.

[39] Harpreet Chhatwal, *Social Commerce Trends: The Net Set, Buyable Pins, Twitter Product Pages, and More*, OUT TO SEA (July 30, 2015), http://outtosea.co.uk/articles/social-commerce-trends-2015; Connie Chan, *When One App Rules Them All: The Case of WeChat and Mobile in China*, ANDREESSEN HOROWITZ (Aug. 6, 2015), http://a16z.com/2015/08/06/wechat-china-mobile-first.

[40] *See* DAVID S. EVANS & RICHARD SCHMALENSEE, MATCHMAKERS: THE NEW ECONOMICS OF MULTISIDED PLATFORMS Chapter 12 (forthcoming 2016).

[41] *Macy's Goes Omni-Channel*, THINK WITH GOOGLE (Oct. 2014), https://www.thinkwithgoogle.com/interviews/macys-goes-omni-channel.html; Capgemini Consulting, *Digital Leadership: An Interview with Angela Ahrendts, CEO of Burberry* (2012), https://www.capgemini.com/resource-file-access/resource/pdf/DIGITAL_LEADERSHIP__An_interview_with_Angela_Ahrendts.pdf; WARBY PARKER, https://www.warbyparker.com; Dennis Green, *Bonobos Is Opening Retail Stores – But You Can't Actually Take Any of the Clothes Home*, BUSINESS INSIDER (July 16, 2015), http://www.businessinsider.com/bonobos-opened-a-store-where-you-cant-physically-buy-anything-2015-7.

innovation and business strategy. With respect to market definition and competition, a crucial feature of smartphones is that they are based on full-fledged operating systems, on account of which consumers can install third-party apps at any time after acquiring the phone. This shift to operating systems has wrecked the prevailing pipe-model of mobile telephony, in which value and features came to consumers through a strictly linear chain comprising feature developers, phone manufacturers, and mobile operators.[42] The replacement of this linear model with a "platform" model has transformed the market, resulting in the demise of phone makers that could not keep up (such as Nokia), and drastically reducing the once considerable power of mobile network operators.

To get a sense of the change in competitive dynamics, it is useful to consider what has happened to several key players. The most dramatic change is that Apple has become the most valuable company in the world, largely based on its sales of iPhones. One could argue that Apple is really a manufacturer and, except for its digital music business, not a significant online player at all. That misses the essence of what Apple is and why it sells iPhones. The Apple iPhone, and its other mobile devices, are valuable primarily because they provide a platform for online activity. Apple's mobile operating system, iOS, and its App Store anchor a vast ecosystem of mobile applications. Although Apple accounts for fewer smartphone sales than Android, iPhones tend to be used much more for online activity while Android phones tend to be used much more for voice calls and text. In the U.S., for example, where Apple accounts for only about thirty-eight percent of the 2015 smartphone installed base, its users accounted for around sixty-two percent of the time spent on mobile and seventy-one percent of spending on mobile apps occurs on iOS-based devices.[43]

Another remarkable change involves Facebook. In 2010, Facebook was only six years old and two years away from its IPO. It was only two years before, in May 2008 that Facebook first accounted for more page views than MySpace, which was the leading social networking site during the mid-2000s. As of 2015, Facebook provides three of the ten most popular mobile apps as measured by downloads by American smartphone mobile media users.[44] Facebook itself is the most popular mobile app, Facebook Messenger is the third most popular mobile app, and Instagram, which Facebook owns, is the ninth most popular. Altogether, Facebook's apps account for thirteen percent of unique visitors on mobile phones

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[42] Sangeet Paul Choudary, *Why Business Models Fail: Pipes vs. Platforms*, WIRED (Oct. 2013), http://www.wired.com/insights/2013/10/why-business-models-fail-pipes-vs-platforms.

[43] Canalys, "Worldwide Smartphone/Mobile Phone Installed Base Forecasts (Consolidated)," June 2015; comScore, "Mobile Metrix," April 2015; App Annie, "Store Intelligence," June 2015.

[44] *comScore Reports August 2015 U.S. Smartphone Subscriber Market Share*, *supra* note 1.

according to a report by Forrester Research.[45] Facebook makes money by selling advertising that reaches people who visit its properties. According to eMarketer, Facebook's share of the U.S. mobile advertising revenues is expected to grow from 18.5 percent in 2014 to 20.3 percent by 2017. Meanwhile, Google's share of overall advertising revenues is projected to drop from 37.0 percent to 31.7 percent in the same period.[46]

Microsoft's fortunes online have faded since 2010, although it remains an immensely profitable firm as a result of its licenses for its Windows desktop and server operating system and its Office productivity app. In 2007, Microsoft was the second largest provider of operating systems for smart mobile phones with a 13.7 percent share of smart mobile phones; this share understates its importance because the leader was Symbian, which was not a good platform for app developers. It was widely expected by analysts that it would leverage its success on the desktop to mobile. Eight years later, as of July 2015, rather than being the leader Microsoft accounted for only about 2.7 percent of all smart mobile phone subscribers.[47] Moreover, Microsoft has virtually no presence as a mobile app provider—its worldwide share of mobile app downloads on Google Play and the iOS App Store is only one percent for free apps and three percent for paid apps, and its share of total mobile minutes in the United States for all of its properties is only one percent.[48]

Google remains a significant online player. Its various properties account for about twelve percent of the time people spend on smart mobile phones.[49] The company, however, faces a very different competitive environment on app-based smart mobile devices than it faced on the web-browser-based desktop. The heavy use of mobile apps, together with the natural use of voice on smart mobile phones, has opened up a new battleground for search. Apple, Google, and others are developing new methods of search that can canvass the vast amount of content being generated within mobile apps, which are not indexed by existing search engines, and new methods of interacting with the mobile device to conduct

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[45] Matt Kapko, *Facebook and Google Dominate Time Spent with Mobile Apps*, CIO.COM (July 2, 2015), http://www.cio.com/article/2943866/mobile-apps/facebook-and-google-dominate-time-spent-with-mobile-apps.html.

[46] Jack Marshall, Facebook to Boost Mobile-Ad Market Share, as eMarketer Reverses Forecast, The Wall Street Journal (Sept. 8, 2015), http://blogs.wsj.com/cmo/2015/09/08/facebook-projected-to-narrow-mobile-ad-gap-with-google-as-emarketer-reverses-forecast.

[47] comScore Reports July 2015 U.S. Smartphone Subscriber Market Share, comScore (Sept. 3, 2015), https://www.comscore.com/Insights/Market-Rankings/comScore-Reports-July-2015-US-Smartphone-Subscriber-Market-Share.

[48] App Annie, "Store Intelligence," June 2015; comScore, "Mobile Metrix," April 2015.

[49] Kapko, *supra* note 45; Sarah Perez, *Consumers Spend 85% Of Time On Smartphones In Apps, But Only 5 Apps See Heavy Use*, TECHCRUNCH (June 22, 2015), http://techcrunch.com/2015/06/22/consumers-spend-85-of-time-on-smartphones-in-apps-but-only-5-apps-see-heavy-use/#.jkexdnu:5bJy.

searches.[50] With the release of iOS 9 in September 2015, Apple redesigned Spotlight to include search results from content within apps, apparently in an attempt to steer users towards apps and away from websites.[51] Facebook recently launched search across postings on its properties, which are walled off from search engines and now include many mobile-based postings.[52]

While predicting the future is quite hazardous, the history of dynamic competition in the online economy, the rapid move from the PC-browser centric model to the smart mobile-app-centric model, and the surge of investment in mobile-app based startups, all suggest that 2020 will look dramatically different from 2015.

That is especially likely in historically poorer but now fast growing economies. What's happening in India, which will describe in detail next, is happening in many developing countries to varying degrees.

III. How Mobile Is Disrupting Online in Developing Economies—The Case of India

India's Internet population of 243 million (as of July 2014 and over 340 million by December 2015 according to http://www.internetlivestats.com /internet-users/india) is third largest in the world, after China with 642 million and the U.S. with 280 million.[53] The number of Internet users in India is expected to register exponential growth, reaching an estimated 500 million by 2017, making it the second largest population of Internet users. The economic impact of this growth is significant. In 2013, the Internet contributed 2.7 percent of India's

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[50] Natalie Burg, *Google and Apple Are in a War for the Future of Search*, CONTENTLY (Aug. 17, 2015), https://contently.com/strategist/2015/08/17/google-and-apple-are-in-a-war-for-the-future-of-search.

[51] Salvador Rodriguez, *Apple Inc.'s iOS 9 Spotlight In-App Search could Make Google Obsolete by Indexing Content From Every App You Own (And Some You Don't)*, INTERNATIONAL BUSINESS TIMES (Sept. 17, 2015), http://www.ibtimes.com/apple-incs-ios-9-spotlight-app-search-could-make-google-obsolete-indexing-content-2100836.

[52] Nick Statt, *Facebook is Unleashing Universal Search Across its Entire Social Network*, THE VERGE (Oct. 22, 2015), http://www.theverge.com/2015/10/22/9587122/new-facebook-search-all-public-posts.

[53] *Internet Users by Country (2016)*, INTERNET LIVE STATS, http://www.internetlivestats.com /internet-users-by-country. Other sources give somewhat higher estimates for the number of Internet users in India. Internet and Mobile Association of India (IMAI) & KPMG, *India on the Go: Mobile Internet Vision 2017*, (July 2015), http://rtn.asia/wp-content/uploads /2015/07/Report.pdf.

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GDP (USD 60 billion).[54] It is estimated to increase to over four percent of GDP by 2020 and employ nearly twenty-two million people.[55]

Beyond the contribution to GDP, the impact of the Internet in India is manifest in improved quality of life and empowerment of the country's citizens through greater and more diverse information consumption, improved access to government and essential services, and greater transparency in the delivery of these services. Indeed, the Government of India, through its "Digital India" campaign, has identified provisions of digital infrastructure, digital literacy of citizens,[56] and digitization of services as key priority areas for the government in the coming years. For India, though, online is now, and will be, centered on mobile.

A. Role of the Mobile Internet

The mobile Internet has led the exponential growth in the online economy in India. As shown in Figures 3a and 3b, wireless Internet has leapfrogged the wireline model. Mobile devices are the dominant ramp to the Internet in India with thirty-four percent of Indians accessing the Internet exclusively from mobile devices in 2014. As of March 2014, the PC penetration rate in India was five percent in contrast to seventy-five percent for mobile devices.[57] Not surprisingly, industry estimates[58] suggest that mobile Internet users comprised over sixty percent of the online population in 2014 and are expected to comprise seventy to eighty percent of the online population in 2018, representing a CAGR of 27.8 percent for the period 2014-2018.

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[54] Boston Consulting Group and IMAI, *India@Digital.Bharat: Creating a $200 Billion Internet Economy* (Jan. 2015), http://www.bcgindia.com/documents/file180687.pdf.

[55] McKinsey & Company, *Online and Upcoming: The Internet's Impact on India* (Dec. 2012), http://www.mckinsey.com/~/media/mckinsey%20offices/india/pdfs/online_and_upcoming_the_int ernets_impact_on_india.ashx.

[56] The National Digital Literacy Mission (NDLM) of the Government of India envisions imparting IT training to nearly 5.2 million persons in the country so as to enable them to actively and effectively participate in the democratic and developmental process and also enhance their livelihood.

[57] Ericsson, *Ericsson Mobility Report: On the Pulse of the Networked Society* (June 2015), http://www.ericsson.com/res/docs/2015/ericsson-mobility-report-june-2015.pdf.

[58] Avendus, *India's Mobile Internet: the Revolution has Begun* (Sept. 2013), http://www.avendus.com/media/1366/avendus_india_mobile_internet.pdf.

Figure 3a: Growth in Wireline versus Wireless Internet Connections
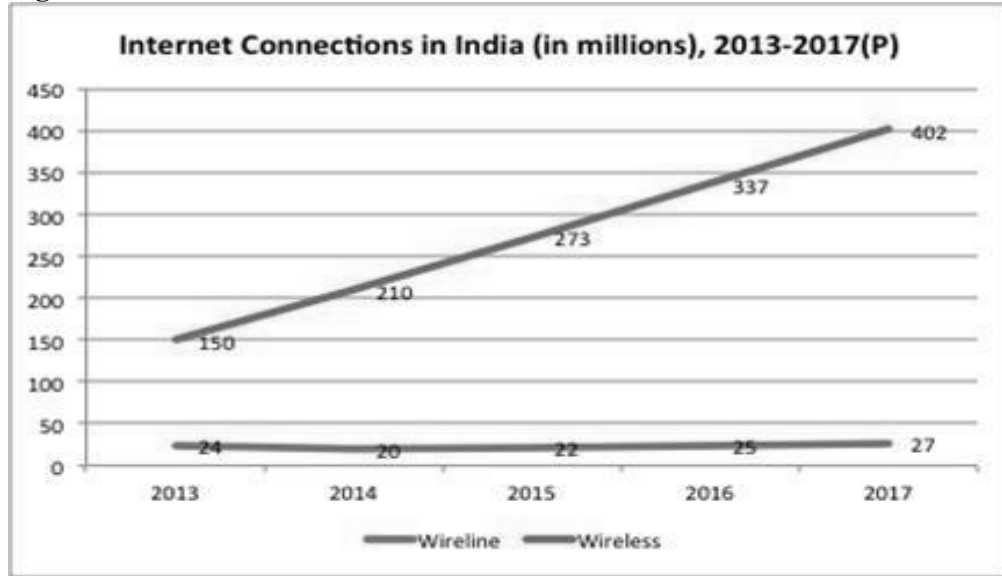
Source: Internet and Mobile Association of India (IMAI) and KPMG, "India on the Go: Mobile Internet Vision 2017," http://rtn.asia/wp-content/uploads /2015/07/Report.pdf.

Figure 3b: Growth in Mobile Internet Subscriptions
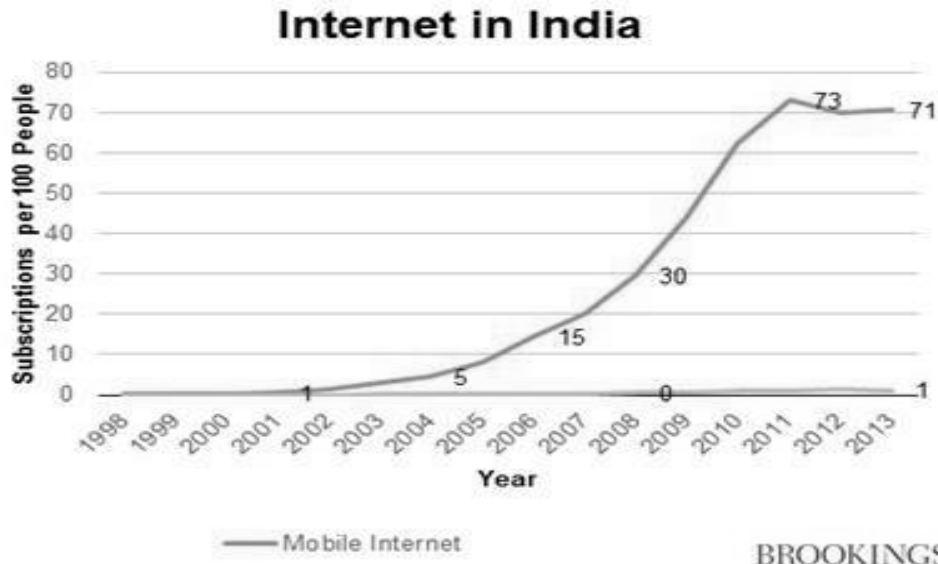
Source: Brookings (India), http://www.brookings.edu/blogs/techtank/posts/ 2015/03/18-mobile-technology-india.

At the heart of the growth in the mobile Internet population in India are two market factors, notably, growth in affordable smartphones and tablets, and

improved performance of network infrastructure of telecom operators at lower costs of ownership. As shown in Figure 4, smartphone sales in India have had very high growth over the last five years to render the country the third largest smartphone market in the world. Although the smartphone penetration rate in India is low at around nineteen percent, the growth rate in smartphone sales very high (The Economist Intelligence unit estimated 11% per quarter, or about 137% per year).[59] The equivalent growth in China during the same period is estimated at thirty-one percent. Remarkably, annual smartphone shipments increased almost ten-fold between 2012 and 2015. Helped by declining average selling prices, increased competition, and rising disposable incomes, the Indian smartphone industry is likely to sustain high growth levels.

Figure 4: Growth in Smartphone Shipments, 2009-2014
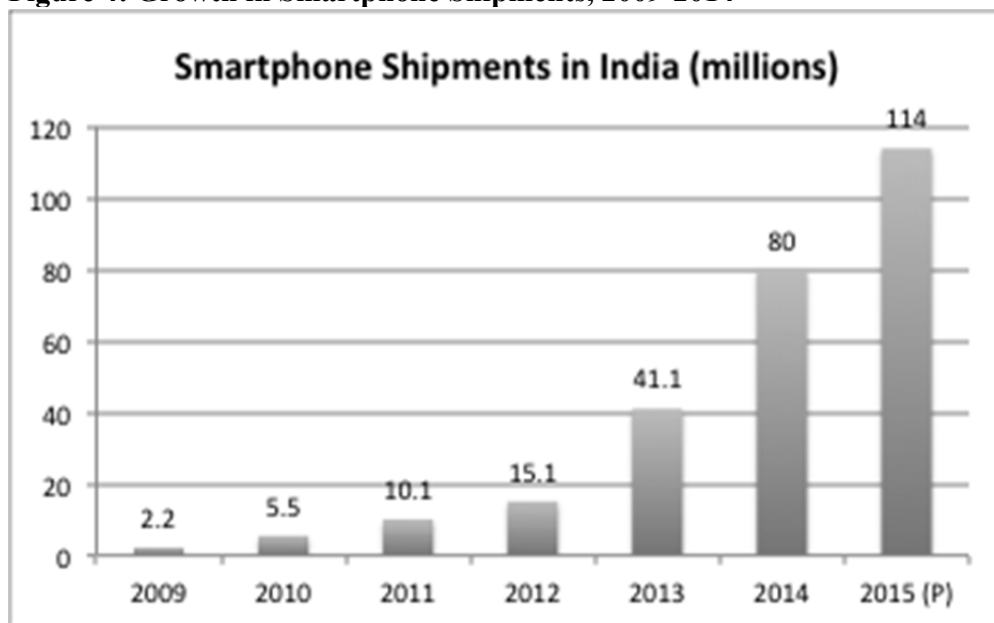
Source: International Data Corporation (IDC), KPMG

In addition to increasing smartphone sales, the upgrading network infrastructure and improved affordability of data services of telecom operators are key contributors to growth in mobile Internet in India. Government policies, including the National Telecom Policy of 2012 that seeks to achieve rural teledensity of one hundred by 2020 and permissible FDI of one hundred percent in the telecom sector, act as catalysts for investments in network infrastructure,

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[59] Rajat Agrawal, *Smartphone Shipments in India grew 229 Percent in Q3, 2013: IDC* (Dec. 3, 2013), http://www.bgr.in/news/smartphone-shipments-in-india-grew-229-percent-in-q3-2013-idc; http://www.eiu.com/industry/article/782421662/the-smart-growth-in-indias-phone-market/2014-10-27

especially in rural areas. While growth in rural connectivity is likely to occur through slow 2G technologies, the latter is on the decline in urban areas as an increasing number of customers migrate from slow 2G to faster 3G services.

McKinsey's Digital Consumer survey finds that nearly half of mobile users want to upgrade to a smartphone and a third of these will adopt 3G solutions giving them reasonably fast broadband. There were approximately eighty-two million 3G subscribers in India at the end of 2014, but this number is projected to grow at a CAGR of 61.3 percent to reach 284 million by the end of 2017.[60] The amount of 4G data traffic in India is also expected to grow at a CAGR of 176 per cent from 2014 to 2019.[61] The increased adoption of smartphones is correlated with growth in mobile Internet as well as increased revenues thereof since the average smartphone user spends almost twice the amount that an average mobile user does on mobile Internet.[62]

B. Key Online Players

As these trends suggest, mobile has become important for online activity in India. For instance, nearly forty-two percent of ecommerce sales occur through mobile devices in India compared with fifteen percent for the U.S. As shown in Figure 5 below, in 2014, leading Indian e-commerce companies, including Flipkart and Snapdeal, obtained more than seventy percent of their sales (measured by "gross merchandise value" (GMV)) from mobile devices as opposed to Chinese companies Alibaba.com and JD.com that derived forty to fifty percent of their sales from mobile devices. Similarly, more than ninety percent of Facebook's Indian users[63] and sixty percent of Amazon's Indian users[64] access it through mobile devices. The recent launch and explosive growth of Paytm, a digital payments company, is another catalyst for increasing Internet and mobile commerce in India.

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[60] FICCI & KPMG, *The Stage is Set: FICCI-KPMG Indian Media and Entertainment Industry Report 2014*, https://www.kpmg.com/IN/en/Topics/FICCI-Frames/Documents/FICCI-Frames-2014-The-stage-is-set-Report-2014.pdf.

[61] *VNI Mobile Forecast Highlights, 2014-2019*, CISCO, http://www.cisco.com/c/dam/assets /sol/sp/vni/forecast_highlights_mobile/index.html#~Country.

[62] McKinsey & Company, *supra* note 55.

[63] Ritesh Bendre, *90% of Facebook's 132 million users from India come from mobile phones*, BGR (Sept. 27, 2015), http://www.bgr.in/news/90-of-facebooks-132-million-users-from-india-come-from-mobile-phones.

[64] Ashwini Gangal, "*Over 60 Per Cent of our Traffic Comes Through Mobile*": Manish Kalra, Amazon India, AFAQS! (Aug. 28, 2015), http://www.afaqs.com/interviews/index.html? id=469_Over-60-per-cent-of-our-traffic-comes-through-mobile-Manish-Kalra-Amazon-India.

Figure 5: Share of Mobile Traffic of Leading E-Commerce Players in India
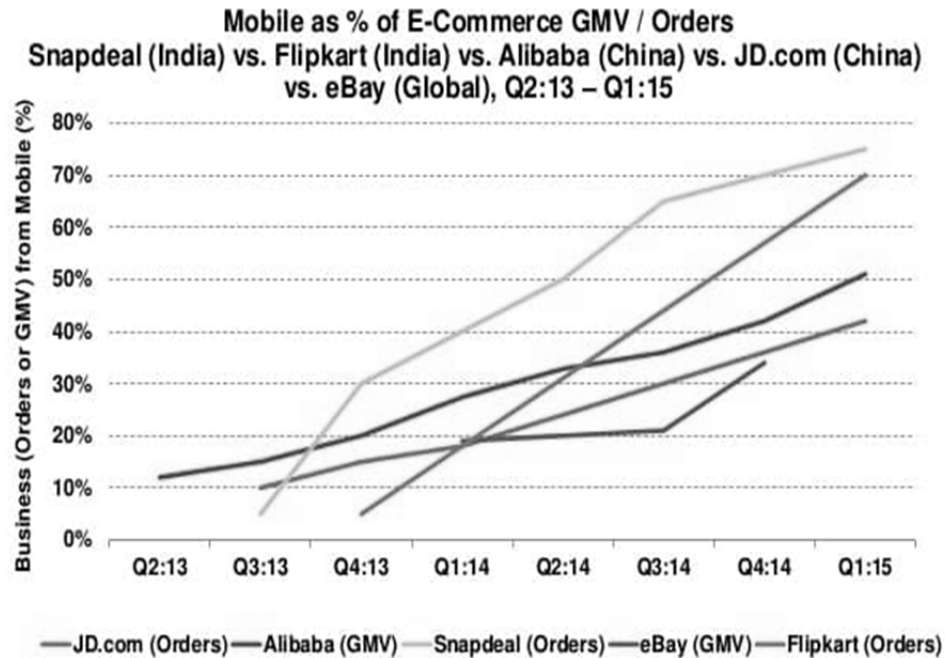
Source: Kleiner Perkins Caufield & Byers

The importance of the mobile Internet is reflected in strategies and investments of key online companies that are idiosyncratic to the Indian market. For example, leading online fashion retailer Myntra has adopted an app-focused strategy, noting that ninety percent of traffic and seventy percent of sales was coming from its mobile app. Conducting business via mobile apps enables the firm to leverage information on the consumer's location and social circle to provide customized product recommendations and timely promotions notifications. Some firms have given up on web commerce and focus exclusively on conducting business via apps. TrulyMadly, a dating and matchmaking site, Tiny Owl, a food delivery site, and RoomsTonite, an on-demand hotel booking platform, are all examples of fast growing Indian online firms that have shut down their websites, citing higher mobile traffic rates and superior conversion rates for mobile Internet customers in support of their strategy.[65]

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[65] Dipti Gore, *Why Is Indian E-Commerce Adopting Mobile Strategy & What It Means For Indian Consumers*, TECHSTORY (May 8, 2015), http://techstory.in/app-only-strategy.

Firms that have not adopted an app-only strategy have launched websites optimized for the mobile environment, in general, and slower 2G networks and areas with limited connectivity, in particular. For instance, in November 2015, Flipkart launched Flipkart Lite, a website optimized for mobile devices. The initiative was quickly replicated by its competitor, Snapdeal, which launched Snap-lite. Similarly, Facebook has developed Facebook Lite, a mobile website that uses less data, for India and other emerging markets. Google meanwhile has developed offline versions of YouTube and Maps that people can use on their mobile phones without consuming data and in places with poor coverage. Browser companies too have customized their offerings for the Indian mobile environment. UC Browser, which has more than fifty percent share of browsers in India, incorporates a slew of features to compress data, increase navigation speeds, and improve download quality, all of which are aligned with constraints in the Indian mobile environment, including dropped connections, poor availability, and slow network speeds.

The importance of the mobile Internet in India is also seen in the mobile focused business models that characterize entrepreneurial activity in the country. To illustrate, a sector that has witnessed significant start-up activity and investment is that of hyperlocal businesses that use geolocation awareness using the mobile phone to enable local offline services from anywhere, anytime. In just over the past six months, over 140 million dollars has been raised by this class of businesses and over twenty-eight funding deals closed. Zopper, shopping marketplaces, PepperTap and Grofers, grocery delivery firms, Swiggy, a food delivery service, and UrbanClap, a services marketplace, are all examples of start-ups in the fast growing hyperlocal space. Niche online marketplaces such as those in the furniture and decor category are going hyperlocal by partnering with offline stores for a commission-based model rather than building a network of designers, manufacturers, and logistics to create an online brand.[66] This category of business models is but an illustration of mobile-first start-ups that dominate online commerce in India and clearly establish mobile devices as dominant ramps to the Internet and digital activity in the country. This transformation will be facilitated by availability of mobile-based digital payment services such as Paytm, which received a $680 million investment from Alibaba and Ant Financial in September 2015.[67]

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[66] Payal Ganguly, *Startups Like Urban Ladder, Fab-Furnish Goes Hyperlocal, Partners with Offline Stores for Commission-Based Model*, THE ECONOMIC TIMES, http://economictimes. indiatimes.com/small-biz/startups/startups-like-urban-ladder-fab-furnish-goes-hyperlocal-partners-with-offline-stores-for-commission-based-model/articleshow/49574337.cms.

[67]   http://economictimes.indiatimes.com/industry/banking/finance/banking/alibaba-ant-financial-invest-about-680-million-in-paytm-up-stake-to-40/articleshow/49148651.cms.

C. Paths to Purchase in India

The increasingly widespread deployment of mobile Internet in India, relying on smart mobile phones, running apps, has important implications for buyer behavior and paths to product search, discovery and purchase. Several industry reports worldwide find that mobile apps, such as those from large retailers like Amazon and Flipkart, are used for search and discovery by people with mobile phones in place of using the websites, browsers, and search engines used in the desktop environment.[68] Indeed, a study by Criteo[69] finds that, worldwide, apps convert at a rate 3.7 times higher than mobile browsers in mobile commerce. Similarly, a study by xAd/Telmetrics[70] on mobile paths to purchase confirmed that mobile users in the U.S. that conduct retail research online finalize their decisions with help from sites like Amazon, establishing the latter as a top reference for smartphone users narrowing their retail decisions. The same study found that, of the time people spent on Amazon on their mobile phones, seventy-nine percent was spent using of apps versus twenty-one percent using the web as of 2012.

Preliminary data from India confirms these differential paths to purchase in Indian mobile commerce too. Figure 6, adapted from a 2013 Nielsen consumer survey, documents the "social" nature of the mobile Internet in India, where SMS, social networking, email, and instant messaging are the leading uses of smartphones.[71] Interestingly, the study finds that only fifteen percent of Indian smartphone users use the device to browse the web. This estimate is in contrast to the case of China and U.S., where the proportion of smartphone users who use the device to browse the web is seventy-five percent and eighty-two percent respectively. The findings of the Nielsen report confirm the limited role of the mobile web in Indian mobile commerce, and are consistent with those of other reports, which find that WhatsApp and Facebook are the most downloaded apps in the Indian context.[72]
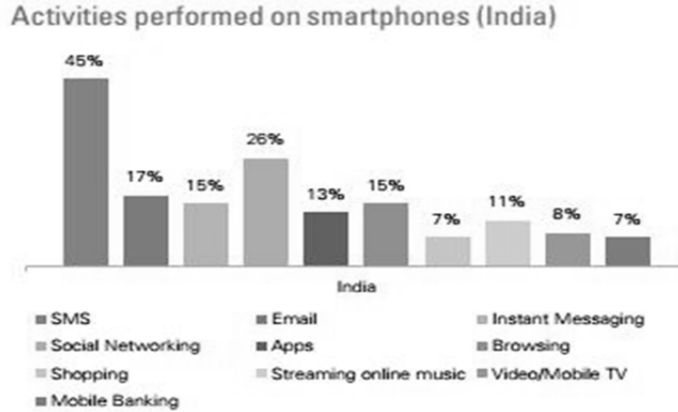
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[68] *E.g.*, xAd & Telmetrics, Mobile Path to Purchase: Understanding Mobile's Role in the Consumer's Path to Purchase – Retail Edition (2013), http://www.mmaglobal.com/files/casestudies/xAd_Mobile_Path_to_Purchase_Retail_FINAL.pdf.

[69] *State of Mobile Commerce Report*: CRITEO (2015), http://www.criteo.com/resources/mobile-commerce-report.

[70] xAd & Telmetrics, *supra* note 68.

[71] Nielsen, *The Mobile Consumer: A Global Snapshot* (Feb. 2013), http://www.nielsen.com/content/dam/corporate/uk/en/documents/Mobile-Consumer-Report-2013.pdf.

[72] *WhatsApp, Facebook Dominate Social Networking: TNS Study,* INDIA TECH ONLINE (Oct. 7, 2015), http://www.indiatechonline.com/it-happened-in-india.php?id=2011.

Figure 6: Distribution of Smartphone Activity by Proportion of Engaged Users

Activities performed on smartphones (India)

Source: Nielsen mobile consumer report, a global snapshot 2013

The buyer behavior discussed above is consistent with differential paths to purchases documented in Indian mobile commerce. As shown in Figure 7 below, mobile search drives a minimal component of the traffic to leading online retailers such as Flipkart, Snapdeal and Amazon; a bulk of the traffic to these sites is driven either directly through their app or through referrals. We expect that much like the U.S., where Amazon is a first stop for forty-three product of consumers for product search (compared with Google for thirty-four percent of users), as the share of sales made by online retailers increases in India, such direct and referral traffic will increase many fold relative to that driven through search.

Figure 7: Source of Traffic for Major Indian E-Commerce Platforms

Source: http://trak.in/tags/business/2014/06/04/top-10-indian-e-commerce-sites-comparison/.
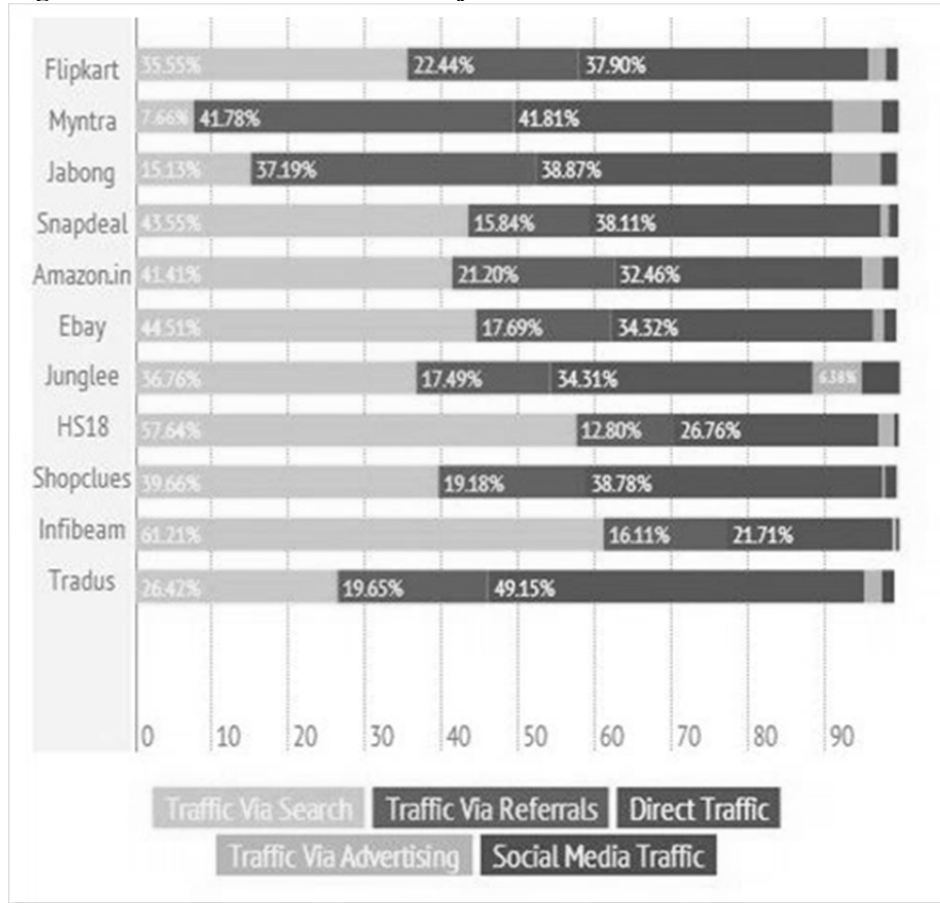
D. Evolution of Smart Mobile Ecosystem

Growth in the data services of Indian telecom operators, mobile content service providers, and most important, smartphone shipments is likely to drive accelerated adoption of the Indian mobile Internet in the future. A 2015 report by KPMG finds that smartphone sales in India are expected to grow at a projected CAGR of 53.8 per cent from 2013 to 2017, a growth rate that is significantly higher than that in other developed and developing markets. Further, while the high growth rate of smartphones in the Indian market has primarily been an outcome of domestic players that serve the low cost smartphone segment, it is expected that the country will also be a prime market for more high-end

manufacturers, notably, Apple. Recent reports[73] suggest that for the quarter ending June 2015, Apple grew at ninety-three percent (although off a significantly lower base). Apple has engaged in aggressive pricing and marketing strategies in India to stoke this growth. It has discounted the iPhone 4S and has introduced buybacks and upgrade offers for the new iPhone 6 and iPhone 6 Plus. It has also been offering discounts and increasing its retail presence through smaller-sized stores that target second and third tier cities in the Indian market.

Implications for Antitrust Analysis

Competition authorities in developed and developing countries should monitor the online economy. Businesses that rely on Internet connectivity to deliver goods and services are becoming increasingly important as they disrupt how physical goods and services are provided. Many global firms have emerged with leading positions in the online economy, and new ones are rising quickly. However, with this obligation to monitor the health of competition in this increasingly important part of the economy comes the responsibility to recognize the risks of intervention in the face of rapid disruptive innovation and perpetual flux.

The analysis of market definition and market power needs to recognize the impact of the move to smart mobile on demand-side and supply-side substitution. Changes in consumer behavior—in particular how people discover, search, and buy products; how people communicate with each other and with businesses; and how people consume content—have important implications for analyzing substitution between various online and offline services. Consumers also have access to many more options, in many more places, over a much greater space of the day than they had five years ago.

Consider something as simple as buying a new television. Ten years ago a typical consumer in the U.S. probably did a search on their computer at home, perhaps on a Saturday morning, of online sellers and in doing that might have seen some advertisements for physical sellers. That consumer may have bought from one of the online retailers or gone to some physical stores to see what they had to offer and to inspect some of the televisions available online. Today, a typical consumer could easily do this on the train on the way home or on their lunch break using their mobile device. They could search on Amazon, where the consumer could look at offerings from Amazon itself as well as many merchants that sell on Amazon Marketplace, or check out information on their social network. If they went to physical stores they could use their mobile phone to compare prices, using Amazon, Google, or various price comparison apps, and decide based on this, while they are standing at the physical store, to buy online

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[73] Gulveen Aulakh, *Apple Reaps a Bumper Harvest, iPhone Q3 Sales Grew 93% in India,* The Economic Times (July 23, 2015), http://articles.economictimes.indiatimes.com/2015-07-23/news/64773018_1_iphone-idc-india-tim-cook.

or at the store. Increasingly, people can also use various apps to find a television, then decide to either buy it online or pick it up at the store.

Competition authorities also need to consider how the move to smart mobile and the development of cloud computing has altered the supply-side of the equation. De novo entry is far easier and cheaper as a result of the ability of entrepreneurs, as well as established firms, to develop apps for mobile phones, which rely primarily on the cloud-based delivery of services and data analytics, and distribute them globally to billions of people easily. The move to smart mobile has, moreover, enhanced opportunities for entry and disruptive innovation. For example, the rapid rise of Facebook as a powerhouse in mobile advertising, challenging Google, has resulted from the fact that Facebook was able to develop a highly successful mobile app and the fact that smart mobile is a much better platform for social communication since people can use it all day anywhere.

The extent to which demand-side and supply-side substitution affect the analysis of market definition and market power is ultimately an empirical matter that needs to be addressed on a case-by-case basis. The move to smart mobile, along with other rapid changes in the online economy, however, introduces new considerations and expands the range of demand-side and supply-side substitutes that should be considered for that analysis. Functional approaches to market definition and market power, which rely on comparing the detailed features and functions offered by products, are also increasingly less reliable. Consumers and businesses use the features and functions of apps, and mobile technology, in new and creative ways that result in apps, which appear very different, being used to accomplish the same purpose. For instance, they both use mobile payment apps to facilitate online purchases.[74]

Market definition and marker power analysis also needs to recognize that the move to smart mobile is changing the competitive environment very rapidly and in unpredictable ways, as discussed above. For many areas of the online economy in developed countries, the set of significant players one would have identified as demand or supply-side substitutes in 2010 is very different from the set one would identify in 2015 or the set of players one would have identified in 2005. An analysis based on information in 2005 would not have identified mobile-based advertising as a competitive to web-based advertising and would not have anticipated that a year-old company, such as Facebook, would become one of the largest online advertising companies. Likewise, in 2010, few would have predicted the extent to which messaging apps such as WhatsApp and

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[74] *Infographic: Consumer Adoption of Mobile Payments*, Application Developers Alliance, http://www.appdevelopersalliance.org/infographics/consumer-adoption-of-mobile-payments; Sam Madden, *How Mobile Payment Apps are Energizing Business that Live on Cash Flow*, Entrepreneur (Nov. 19, 2014), http://www.entrepreneur.com/article/239604.

WeChat would obtain massive global user bases and provide strong substitutes for other methods of communication.

That means that the analysis of market definition and market power needs to be forward looking to anticipate what is likely to happen. This will affect the ability and incentive of firms to engage in abuse of dominance since the ability to predict the evolution of competition has proven to be extremely difficult, and will become more so as the smart mobile disruption continues. This point is especially true in developing countries such as India because the online economy is developing much more rapidly, from low levels, as mobile broadband and smartphones reach critical levels.

The move to smart mobile, and the considerations discussed supra, has four major implications for antitrust analysis. In each case, competition authorities should exercise greater caution and not adopt a laissez-faire approach.

First, apparent market power may not reflect real or durable market power because changes in consumer behavior in response to new technologies and the entry of new mobile apps are likely, based on past experience, to provide strong competitive constraints. It is increasingly easy to develop new mobile apps to attack market inefficiencies, including that resulting from market power. Previously separate markets easily cross and overlap as digital technologies lead to convergence. These changes expose market leaders to competition from new players who speedily achieve huge penetration, as well as to powerful players in adjacent markets.

Second, rapid changes in consumer behavior and entry increase the likelihood of making mistakes in the analysis of market definition and market power. In static markets with well-defined differences between firm's competition authorities can make judgments based on known facts with great confidence. In markets undergoing disruptive innovation, as is occurring in the online economy generally but particularly as a result of the move to smart mobile, market relationships are fluid and are changing rapidly.

Third, there is a greater likelihood of remedies having negative consequences. Since the future competitive landscape is unknown, there is a lower chance that any intervention designed based on current knowledge will fix a problem that cannot be envisioned today. Restraints on an incumbent firm that is perceived to have abused a dominant position, for example, could prevent that firm from challenging even more powerful entrants or other incumbents. Competition authorities face a particular risk of negative consequences from remedies sought by companies that have incentives to slow down fast-moving innovative rivals.

Fourth, these same considerations make it difficult to design remedies, or other interventions, to correct perceived abuses of dominance. A remedy that looks sensible from a backward looking perspective may make no sense in a few years, or possibly a few months, after it has been put into place. The move to

smart mobile, for example, is at an extremely early stage even in developed countries. Three years ago people were still spending far more time on their PCs than on their mobile devices. There is no reason to believe that anyone can predict what the world will look like in another three years. Anyone designing interventions needs to keep the limits of their knowledge in the face of disruptive innovation firmly in mind.

These implications, however, cannot be overstated. Competition authorities need to examine abuse of dominance allegations on a case-by-case basis. They should not stand down when it comes to the online economy. They should monitor this important sector of the economy vigilantly. There may well be situations in which targeted interventions are warranted. At the same time it would make no sense to ignore the fact, which is apparent to most people who use smart mobile phones in their daily lives that the online economy is undergoing massive flux and that competition authorities must be mindful of that in their analysis.