

GSR-16 Discussion paper

THE RACE FOR SCALE: MARKET POWER, REGULATION AND THE APP ECONOMY

Work in progress, for discussion purposes

Comments are welcome!

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CONTENTS

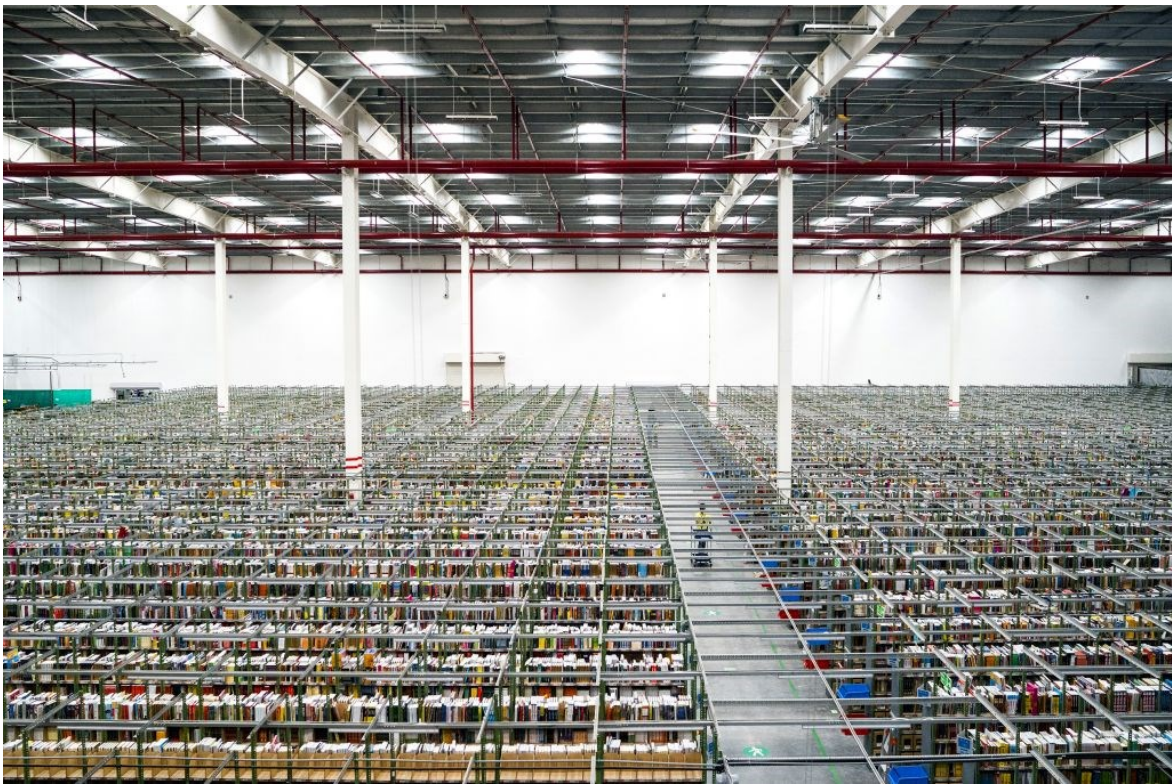
1	EXECUTIVE SUMMARY	5
2	BACKGROUND AND DEFINITION	11
2.1	What is the app economy?	11
2.2	Defining the app economy and its ecosystem.....	14
3	THE APP ECONOMY VALUE CHAIN AND THE GLOBALISATION OF APP DEVELOPMENT .	18
3.1	The structure of the app economy.....	18
4	THE ECONOMICS OF DISRUPTION.....	26
4.1	Transactions costs	26
4.2	Modes of digital disruption	27
4.3	Potential benefits of app disruption.....	31
4.4	The race for scale and the future of market power	33
5	MEASURING THE BROAD ECONOMIC IMPACTS OF THE APP ECONOMY.....	38
5.1	What is the significance of the app economy?.....	38
5.2	ICT disruption is wide-spread and ongoing: apps accelerate the process.....	38
5.3	The productivity paradox	40
5.4	Challenging traditional industry structures and definitions	42
5.5	The Value Chain and Consumer Surplus Method.....	43
5.6	Capital Value Method.....	47
5.7	Productivity Method	48
5.8	Value of time method	49
5.9	Commentary on potential measurement methodologies	50
6	REGULATING THE APP ECONOMY.....	51
6.1	Introduction	51
6.2	Preconditions for the development of platforms.....	53
6.3	Addressing Government, regulator and key stakeholders	54
6.4	The debate on optimal regulatory approaches	55
6.5	Exploring key regulatory questions for the ICT sector.....	58
6.6	Recommended approaches to regulation of the app economy	70
7	APPENDIX A: DATA FOR THE APP ECONOMY	72
7.1	Comparative global data	72
7.2	Europe.....	74
7.3	USA.....	77
7.4	Canada	80
7.5	India	82

7.6	Australia	84
7.7	Indonesia.....	87
7.8	Belarus	88
7.9	Brazil.....	89
8	APPENDIX B: THE LARGE APP ECONOMY PLAYERS	90
8.1	Introduction	90
8.2	Global Market Titans.....	90
8.3	Market disrupters.....	91
8.4	Regional Market Exemplars.....	92
8.5	Conclusions related to the case studies	92
	APPENDIX C: OECD BASE EROSION AND PROFIT SHARING ('BEPS') REFORMS	93
A.1	Introduction	93
A.2	Background	93
A.3	The Project.....	94
A.4	Final recommendations.....	94
A.5	Digital economy-specific recommendations	95
9	APPENDIX D: COMPANY CASE STUDIES	96
B.1	Introduction	96
B.2	Airbnb.....	96
B.3	Alibaba	97
B.4	Apple.....	99
B.5	Facebook.....	100
B.6	Flipkart	102
B.7	Google.....	103
B.8	iSignthis	104
B.9	LINE	105
B.10	Netflix.....	106
B.11	Skype.....	108
B.12	SocietyOne	110
B.13	Tencent	111
B.14	Uber	112

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Amazon's 280,000-squarefoot fulfillment center in Hyderabad.



Photograph by Benjamin Lowy for Fortune Magazine (see <http://fortune.com/amazon-india-jeff-bezos/>)

1 EXECUTIVE SUMMARY

THE BIRTH OF THE APP ECONOMY

On 9 January 2007, Steve Jobs held up the new iPhone in front of the Apple faithful in the Moscone Centre, San Francisco and thereby launched the app economy. In that year, the biggest company in the world by a comfortable margin was Petrochina. ExxonMobil was next, followed by Microsoft. Microsoft was the only technology company in the top ten.

In 2015, Apple was the biggest company in the world (and had been for over two years) and Alphabet (Google), Microsoft, Amazon and Facebook jostled for other top ten positions over the year.

In 2007, Microsoft, the only pure technology company in the top ten publically traded companies, was worth 8.9 per cent of the value of the top ten. By 2015 *60 per cent* of the value of the top ten were technology companies. This is eight years of dramatic industrial change with tremendous economic and social impact. Economic transformation of this speed and scale are rare indeed.

A core element of the brief for this paper is to develop a “proposed qualitative and quantitative economic methodology to analyze the contribution of ICT digital services and apps to the economies of developed and developing countries” which will then lead to strategic dialogue and recommendations to assist policy makers and regulators to define policy frameworks and other tools for collaborative regulation to foster an enabling environment conducive to socio-economic growth, while maintaining a level playing field among all market players, promoting innovation and maximizing consumer benefits and affordable ICTs.

A NEW PHASE OF ICT DEVELOPMENT

The app economy, over the top services and the sharing economy are all new names for a set of phenomena that represent a new episode of growth of the global ICT industry. This growth is based on the rapidly approaching ubiquity of handheld computing devices, increasing wireless bandwidth, the maturation of cloud computing services and the ongoing development of mobile operating systems and their associated apps.

The app economy is best understood as a new industry or subsector of the ICT industry. For the purposes of this paper, the app economy is defined as *the sum of all economic activity, products and services, required to deliver app functionality to end users via mobile broadband services*. Until recently, this revolution has been a developed world phenomenon, but now it is well established in the developing world, primarily in China, but increasingly in India, South-East Asia, Africa, and other developing regions.

This new industry segment is itself a potentially important source of economic and social development as it creates new companies and new jobs. But potentially even more importantly in emerging economies, the widespread availability of smart devices will enable greater levels of access to a wide range of services and information that would otherwise be unachievable. This access to services and information will create new

markets and new economic opportunities and this can be expected to significantly accelerate economic development in these countries. The app economy will also drive ongoing productivity gains across all industries.

Currently, 'sharing economy' platforms often exist in regulatory grey areas operating outside the scope of the specific regulations that apply to their industry, and current competitors. Such is the speed of the broadband and smartphone revolution that collaborative business models were not anticipated by regulators, and therefore there were no applicable rules.

THE ECONOMICS OF THE APP ECONOMY

Yet, these new markets can be seen as the perfectly natural economic consequence of falling transactions costs and greater efficiencies enabled by lower cost access to information and digital services. The disruption that is occurring is driven by the same fundamental economic forces as the industrial revolution spurred by the introduction of electricity in the Twentieth Century – new technologies spur new innovation and industrial applications, business models change and new businesses and corporations displace the incumbents. The Austrian economist, Joseph Schumpeter, described this process by which new technologies and new businesses disrupt and displace old ones as 'creative destruction'.

While the development of the app economy can be characterised as a new phase in the ongoing development of ICT, it also has important distinctive elements. Because the primary consumer access point for apps is the smartphone rather than the personal computer, the app economy has far greater reach than its PC-based predecessor.

Smartphones and tablets are cheaper than computers, they are more personal and there are more of them, they have longer life batteries which means they can viably be used in emerging economy villages and recharged from unreliable electricity grids or from renewable sources – they are a more viable means of connectivity for those on low incomes. With this increased reach comes a bigger user base and this leads to an important economic characteristic of the app economy – its enormous economies of scale.

App companies are building software and hardware systems that span nations or even the globe. As each app company acquires a new user, its costs per unit fall and its competitive position improves. App companies are in a '*race for scale*' which has led (or has to the potential to lead) to a series of monopolies or near monopolies occupying various market niches. Critically, it is not only economies on the production side that drive the race for scale. App markets are also driven by *network effects*. Network effects mean that app systems become more valuable to every user when the total number of users increases – one of Facebook's greatest attraction to new users is that it has the greatest number of users. App systems such as Uber and AirBnB are more attractive to users the greater the number of drivers or rooms available, and more users attract more drivers and rooms. This is a 'virtuous circle' that drives the growth of the biggest players.

Thus, network effects can exacerbate the problems associated with market power. This is true, not only of the app players, but also true of the app ecosystem giants: Apple and

Alphabet. In these app ecosystems, more users attract more developers, which generates more apps. Since the big app players and the app ecosystem providers are globe-spanning companies, their market power challenges those of the traditional companies that they are disrupting. The geographic reach of these traditional players may be restricted to regional or national boundaries.

The sheer speed of the changes that have occurred in less than a decade has made the disruption of traditional industries very visible and it is therefore not surprising that there have been calls to protect incumbent players. It is worth emphasising that businesses in almost every industry must constantly deal with technological changes and innovation, and this ongoing process seldom generates calls for government intervention and protection against the forces of technological change. In sectors where there has been a tradition of relatively heavy regulation, however, the calls for regulatory responses are more understandable. Over time, through historical and political processes, some industries have developed quite complex and comprehensive regulatory structures that are designed, ultimately, to protect the interests of consumers and citizens. Disruptive new players tend not to be subject to such regulation and this leads to claims that the idea of a level playing field for all industry participants has been violated. This situation has created complex regulatory challenges in several industries.

MEASURING THE APP ECONOMY

If the app economy is of such significance then it is appropriate that we seek ways to measure it qualitatively. The problem is that the very characteristic that makes the app economy disruptive and significant is the same thing that makes it difficult to measure using traditional methods – it tends to undercut the relevance and usefulness of traditional definitions of industries.

The traditional approach to measuring the significance of an industry is to define the industry based on its distinctive characteristics and then to assess its size in terms of its contribution to economic activity and employment. Around the world national statistics organisations have developed processes and procedures to collect information about economic value added and employment and the resulting data collections are quite strongly grounded in traditional definitions and the historical continuity of industry structures.

The app economy creates challenges to these traditional structures by cutting across traditional industry boundaries and creating entirely new products that operate under new business models. In this report we propose methodologies by which relatively accessible data could be used to develop estimates of the size and value of the app economy.

REGULATORY IMPLICATIONS OF THE APP ECONOMY

For the digital economy to thrive, an inclusive dialogue is needed to discuss and define appropriate legal and regulatory provisions, and at the same time there is the recognition that the applicable body of law must not hamper the spread of innovation and progress within the digital economy. Regulators and policy makers must ensure consumer security, product quality and other protections in transactions, while at the same time avoiding over-regulating new collaborative business models.

While initially it may seem that the sharing economy promotes competition against legacy providers, there is a danger, as these businesses grow, that they may be tempted to exercise their own expanding market power. Competition regulators will need to be watchful that the digital economies of scale and scope are not exploited contrary to law.

The emergence of the Internet into mass markets at the end of last century and the more recent rise of the app economy are driving ICT ever deeper into the heart of all industries and sectors. Today more than ever before, a greater proportion of value is created in all businesses by the way in which they use information and communications. Increasingly business strategies are built around communications and technology strategies.

The big app and platform companies are driving a massive increase in value in the global economy. As discussed in this report, there are powerful economic and social forces at work that drive the increasing scale of these companies, particularly the niche specialists and the platform owners (primarily, Apple and Alphabet), which predispose them to increasing market power.

THE CHALLENGE TO TELECOMMUNICATIONS CARRIERS

Notwithstanding all of its newness and innovation, the primary channel from the app providers to the end consumer is the traditional telecommunications sector, with the emphasis increasingly on the mobile carriers. In emerging markets, the mobile telecommunications companies are often the only alternative, with fixed telecommunications operators being less present in these markets.

Telecommunications regulators have historically worked to limit the use of market power by fixed line and mobile carriers. They have attempted to find a balance between the level of competition and price for existing services on one hand, and the ability of carriers to earn sufficient profits to enable them to invest in quality and extent of future networks and services on the other. Regulators' efforts to optimise the short-term and long-term benefits to consumers are guided by the familiar objective of 'long term interests of end users'.

Until recently, the main economic driver of regulatory intervention has been the natural monopoly characteristics of carrier businesses, which result primarily from the physical and technical characteristics of telecommunications equipment and infrastructure. As new players emerge, the drivers of market power in the future, however, may have quite different origins.

Now the new app economy players, with their dazzling array of over the top ('OTT') services, is competing directly with the telecommunications operators, undermining consumer demand for their most profitable services, tending to commodify their outputs, threaten their margins and constrain their capacity for investment. This is happening just at the time that the app economy and OTT services are driving the demand for bandwidth ever higher.

The emergence of OTT services has sparked calls for these new players to be regulated in a similar way to telecommunications companies. The OTT players often have global scale and reach dwarfing that of the telecommunications companies, but they occupy a part of the app economy value chain that is different to the carriers and they use different input

and have different business models. The market power of app economy players arises from deep economies of scale on the 'production' side and interlocking network effects on the demand side, not, as for the traditional telecommunications companies, from the traditional natural monopoly characteristics of physical infrastructure.

The approach taken by different regulators globally to OTTs has varied thus far. However, the establishment of a 'two-track' regulatory regime for legacy telecommunication players and OTT providers in the ICT sector is also neither sustainable nor optimal.

REGULATORY CHALLENGES BEYOND THE TELECOMMUNICATIONS INDUSTRY

It is important to emphasise that the need to reconsider regulation is not restricted to the telecommunications industry. For instance, ride-sharing app company Uber is 'disrupting' the taxi business and Airbnb is doing the same to the accommodation sector. But the regulatory challenges reach beyond these specific industry boundaries. Two of the biggest areas that will require regulatory rethinking are competition policy and labour market policies.

Competition policy is designed fundamentally to protect consumer interests against the abuse of market power in a wide variety of forms. As an example, it is clear that the entry of Uber into the marketplace is increasing the level of competition in the taxi industry. Should the various local taxi companies be allowed to collaborate to develop their own app system that will compete with Uber on its own terms? Such behaviour would previously have been regarded as illegal collusion, but now perhaps it is a reasonable response to the changing competitive dynamics in the industry.

It is arguable that app systems are driving an increase in contract employment potentially at the expense of traditional employee-employer relationships. Much is made of the fact that this provides new options and flexibility for contractors¹ but these benefits need to be balanced against the potential loss in the protections for employees, especially coupled with the fact that workers may find themselves in situations where they have little choice but to seek contract work despite a preference for employment. Should governments legislate for protections to contractors; who should pay for these, tax payers or the companies that pay contractors? Clearly, the emergence of the app economy has implications for regulatory practice across multiple dimensions of the economy. Regulators that previously would have operated in relative isolation from each other will increasingly need to collaborate across industries and other domains to develop new regulatory approaches.

There are strong arguments against the establishment of a 'two-track' regulatory regime for old and new business models. Returning to consideration of the telecommunications industry, regulating fixed and mobile network operators differently from newcomers is likely to confer an unfair advantage to the model which has the least costly regulatory burden. Established business models should not be punished, relative to newcomers, for complying with regulations, nor should new businesses be punished for innovating.

¹ The Grattan Institute, Peer-to-peer pressure, Policy for the sharing economy 2016.

Harmonizing regulations between new and old businesses is desirable and arguably necessary as all industry sectors are transformed.

As part of this process of regulatory revision it will be necessary to consider explicitly and carefully the original motivations for traditional regulatory intervention and the ways in which new technologies can potentially or actually provide new mechanisms to address these original motivations. For example, the licencing of taxis and taxi drivers was motivated by the desire to protect taxi users. But new technology-enabled reputational rating mechanisms in the 'collaborative economy' provide a crowd-sourced solution to the problem of consumer protection. Examples of the operative questions that need to be addressed in shaping regulatory responses are: how effective are such mechanisms in protecting users; do these mechanisms reduce the need for oversight by regulators (at least conceptually); to what extent does reliance on these technologies predispose markets to some degree of monopolisation?

In closing, it is unlikely that any policy maker or regulator will get sharing economy regulation right on the first try. The relevant markets are still evolving rapidly and all the regulatory targets are moving. Alternative approaches that may have merit depending on the market and services concerned include temporary licensing or putting in place transition arrangements where legacy industry players are compensated for changes. The challenge is to adopt more collaborative regulatory measures where the applicable regulation on all market players is converged, coherent, promotes competition and provides incentives to invest and be innovative. A conservative approach adopting only as much regulation as is obviously necessary and giving markets the opportunity to both innovate an attempt to find solutions to meet consumer needs, would seem to have considerable merit.

2 BACKGROUND AND DEFINITION

2.1 What is the app economy?

An important first step in developing a qualitative and quantitative economic methodology to analyze the contribution of ICT digital services and apps to the economies of developed and developing countries is to clearly define “ICT digital services and apps”. Creating definitions is more complex than most people suppose. This project is not about the impact of the entire information and communications technology sector on economic and social development; it is about a subset of that sector: the app economy. For the purposes of this paper, the app economy is defined as *the sum of all economic activity, products and services, required to deliver app functionality to end users via mobile broadband services*.

The information and communication technologies (ICT) sector is an important part of modern economies and numerous studies point to the positive impact that these technologies have on economic growth both in developed and developing countries.² A new era began, however, in 2007 when Apple launched the first smartphone, the iPhone. Its new combination of features - flexible touch interface, relatively powerful processing capabilities, mobility and connectivity through mobile broadband and Wi-Fi - led rapidly to the development of new kinds of applications that have had, and continue to have, profound impacts across a range of industries and markets. Analysts found that worldwide smartphone sales in the first quarter of 2008 totalled 32.2 million units, a 29.3 percent increase from the first quarter of 2007. Vendors included Nokia, which in 2008 still commanded over 45 percent of the global smartphone market; Research in Motion, which in Q1 2010 improved its share to 13.4 percent; and Apple moved in third space in the global smartphone market with 5.3 percent share.³

A number of characteristics of the new smartphone are important. They are truly personal, unlike PCs; the fact that users generally don't share these devices means that new use patterns have emerged. The smartphone is always with you and always on – this meant that it has become ideal for a range of communications formats and notifications, including a range of reminder functions for task management. Critically, these devices are geo-aware and have an increasing number of sensors which enable the development of ever more functional apps. In addition to touch screens, increased usability and application integration, they also have powerful hardware. Apple's A9X chip, for example, today is “faster than 80 percent of the portable PCs that shipped in the last 12 months” and the iPhone 6 CPU having 625 times more transistors than a 1995 Pentium.

Smartphones are also becoming more and more ubiquitous, gradually displacing the simpler traditional voice-only mobile phones which are rapidly becoming obsolete. With

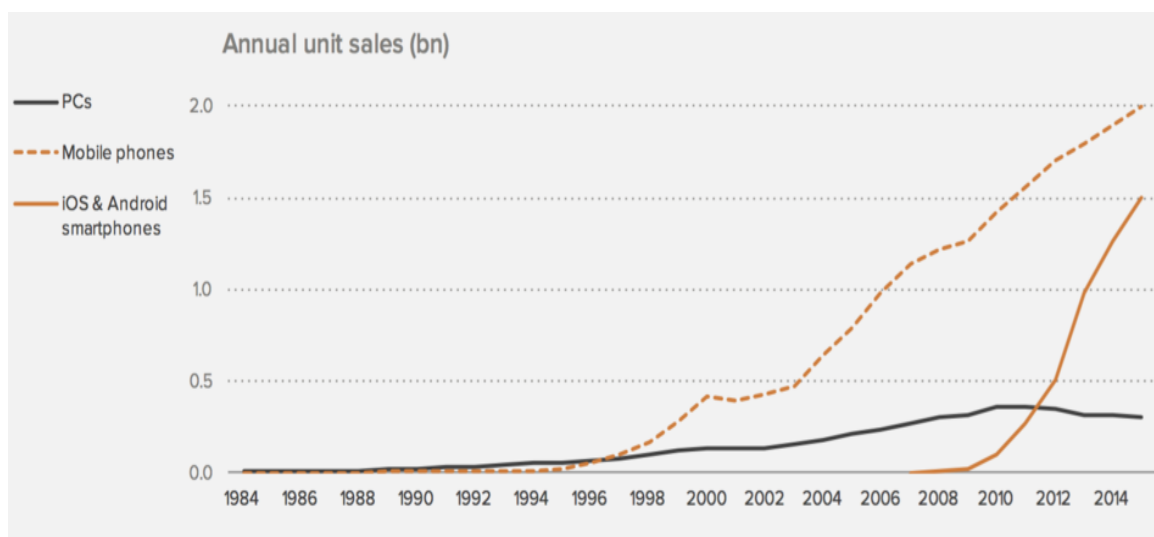
² ITU has published a number of reports focusing on Broadband issues available at <http://www.itu.int/en/ITU-D/Regulatory-Market/Pages/default.aspx>; including the last one from the Broadband Commission at <http://www.broadbandcommission.org/Documents/publications/davos-discussion-paper-jan2016.pdf>

³ <http://www.gartner.com/newsroom/id/688116>

the introduction of affordable smartphones, developing and emerging markets have been greatly increasing worldwide sales of smartphones. Studies show that in the third quarter of 2015, for example, global sales of smartphones to end users totaled 353 million units, a 15.5 percent growth over the same period in 2014.⁴ Taking into account their greater utility for consumers and their increased affordability, smartphones are set to become the world’s most important and widespread consumer information and communications hardware on a global basis (See Figure 1).

Like the personal computer before it, the smartphone is also a *platform* for third party software developers. The Apple and Android app ecosystems have produced an enormous array of apps for the two main mobile platforms, with each currently containing around 1.5 million apps (see Figure 2). This has led to the development of a significant app development industry. In fact, the app economy is no more an ‘economy’ than, say, the television industry is an economy. It is more like a new industry, or industry subsector of the ICT industry. Like all new industries, it is, in part, displacing economic activity from previously existing industries and creating new types of products and services, just as the automobile industry did when it superseded horse-drawn transport.

Figure 1: Growing ubiquity of smartphones



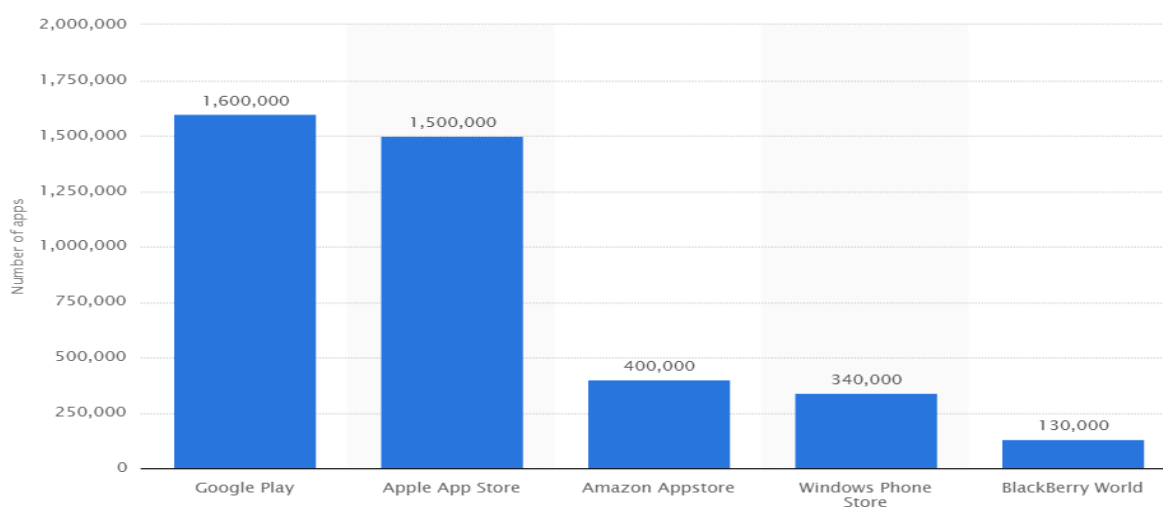
Source: Andressen Horowitz from industry sources, November 2015

In 2014, app sales revenues were USD14.3 billion and USD10 billion for the Apple and Android apps stores respectively⁵ (see Table 1). These revenues have grown rapidly with the respective figures for 2012 being USD1.3 billion and USD0.4 billion. In terms of benefits to end consumers, these revenue figures can be considered to understate economic benefits because many apps are offered free or ‘lite’ versions (which generate revenue from advertising or are a lead for consumers to purchase the full version).

⁴ <http://www.gartner.com/newsroom/id/3169417>

⁵ Source: www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/ (accessed 26/12/15)

Figure 2: Number of apps available in leading app stores as of July 2015



Source: www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/ (accessed 26/12/15)

Table 1: Apple and Google app store revenues 2008-15

Year	Paid to Apple (USD billion)	Paid to developers (USD billion)	Total Sales Revenue (USD billion)
July 2008 to June 2011⁶	1.07	2.5	3.57
2012⁷	1.29	3	4.29
2013⁸	3.43	8	11.43
2014⁹	4.29	10	14.29
2015¹⁰	6.3	14.7	21
Year	Paid to Google*	Paid to developers	Total Sales Revenue
2012¹¹	0.39	0.9	1.29
2013¹²	2.14	5	7.14
2014¹³	3	7	10
2015¹⁴	3.6	8.4	12

Notes: * Calculated from figures paid to developers, based on distribution of 70% of revenue to developers, 30% to Google Play (see footnotes for detail on sources).

⁶ www.engadget.com/2014/01/07/the-app-store-monster-apple-in-2013-paid-developers-more-than-d/

⁷ *ibid.*

⁸ *ibid.*

⁹ www.apple.com/pr/library/2015/01/08App-Store-Rings-in-2015-with-New-Records.html

¹⁰ <http://www.apple.com/pr/library/2016/01/06Record-Breaking-Holiday-Season-for-the-App-Store.html>; <http://www.computerworld.com/article/3019716/apple-ios/apples-cut-of-2015-app-store-revenue-tops-6b.html>

¹¹ <http://android-developers.blogspot.com.au/2015/02/a-new-way-to-promote-your-app-on-google.html>

¹² <http://bgr.com/2013/11/19/google-play-annual-revenue/>

¹³ *ibid.*

¹⁴ <http://9to5mac.com/2016/01/20/app-store-ios-downloads-vs-android-revenue/>

2.2 Defining the app economy and its ecosystem

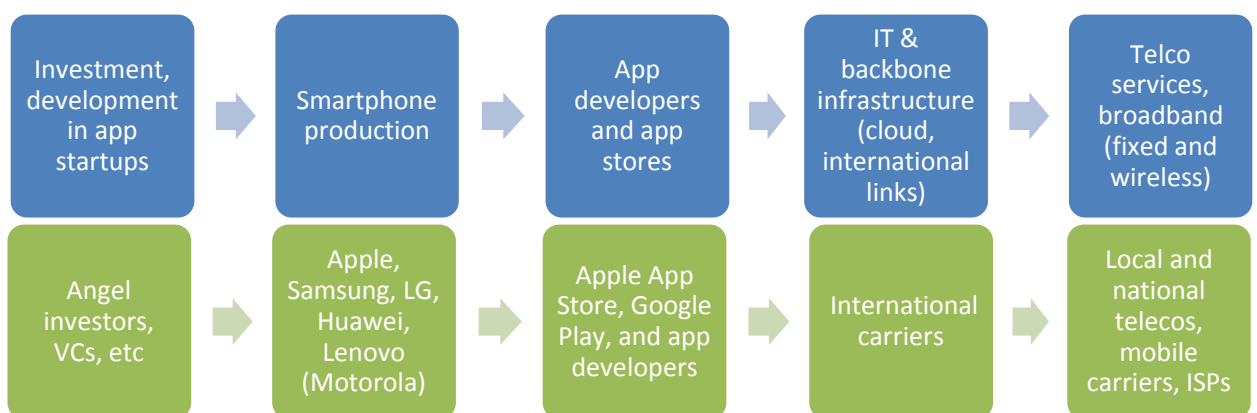
Many terms have been created over the last two decades that attempt to capture and describe the set of phenomena related to the increasing use of computers, the Internet, the web and, increasingly, the new generation of mobile devices characterised by smartphones and tablets. These include: the digital economy, the network economy, the mobile economy and more recently the terms ‘the sharing economy’, the ‘peer-to-peer’ economy and the ‘the collaborative economy’ have been coined to capture the essence of the business models employed by disruptive companies such as Uber, Airbnb, and many others.

The current wave of business disruption, which has been largely sparked by the ubiquity of smart mobile devices in advanced economies, is best understood as a continuation of the ongoing process that began with the rise of the personal computer in the 1980s and continued with the first dot com boom beginning around 1994. As such, all the various ‘economies’ identified above tend to blur into each other and creating distinct meaningful definitions is difficult.

Nonetheless, the emergence and widespread uptake of the smartphone does represent a new era in the convergence between communications and information technology, and the unique set of characteristics embodied in such devices is leading to a new wave of business disruption and creation which has no end in sight.

One starting point for developing a definition of the app economy is to understand the app value chain. In order for a consumer to have a functioning app, a number of things need to happen and various types of infrastructure and services need to be in place: the development and production of apps themselves need to be funded; smartphones need to be produced and made available at affordable prices for mass markets; well functioning app stores need to be available so that consumers can find apps and have them updated efficiently; a range of IT infrastructure and services such as cloud services need to function reliably; and, finally, broadband services, both fixed and wireless, need to be provided by telcos at prices affordable for consumers (see Figure 3).

Figure 3: App economy value chain



Source: Systems Knowledge Concepts (www.skcn.net.au)

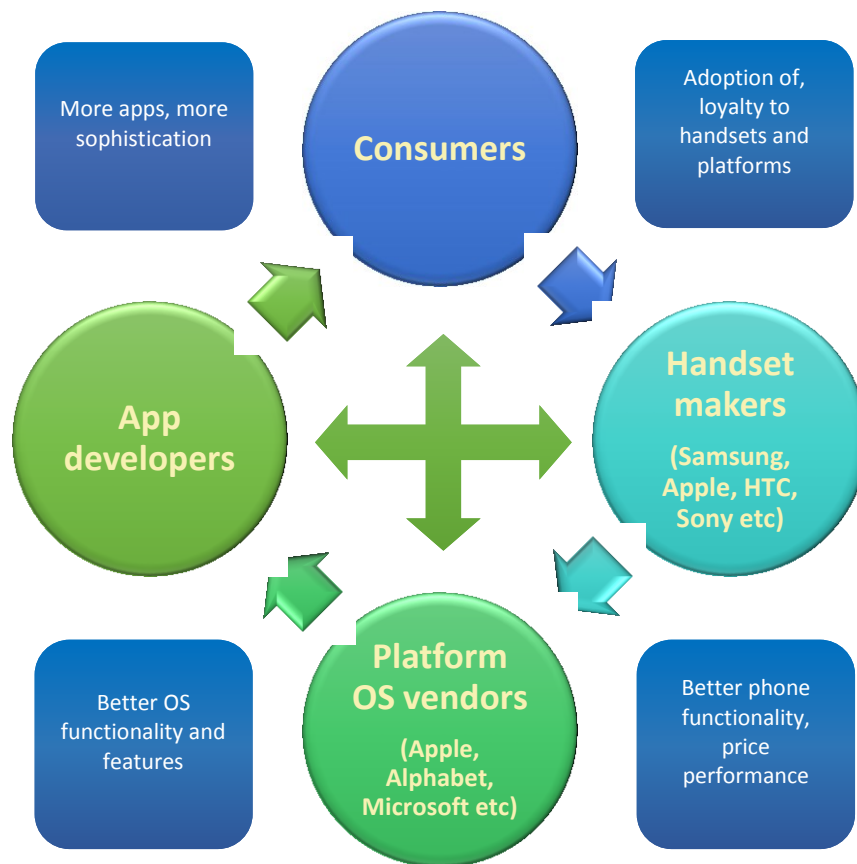
Illustrating the app economy value chain in this linear fashion, however, does not fully represent the various links and interactions between its components. Figure 4 illustrates the app economy ecosystem in terms of these interactions. Each of the major platforms needs to be sufficiently appealing to both consumers and developers. Consumers want high-quality handsets at the lowest price, a large selection of apps and operating systems with extensive feature sets. Developers want as large a market as possible of profitable consumers, high-quality development tools and to minimise problems associated with device incompatibility across the platform, which has been an issue with the various handsets running the Android OS.

The app economy ecosystem is characterised by interacting sets of network effects: the more consumers there are on a given platform, the more profitable will be app development for that platform, the more apps will be produced and the more consumers will be attracted. The manufacturers of handsets that achieved a greater scale will be able to lower unit costs, fine tune that production value chains and extract the greatest discounts from their suppliers, enabling them to be more competitive in the handset market.

Describing the app economy in this way enables us to begin to define what parts of the broader information and communications sectors could be included in the definition of the app economy. For example, telco-provided voice and SMS services would naturally be excluded from the app economy, IT back-end and cloud services not focused on supporting app functionality would be excluded and that part of the value of smartphone production that pertains simply to voice and SMS functionality should also be excluded.¹⁵ It should be immediately obvious that, while conceptually these distinctions are clear, in practice, exact data are unlikely to be available and significant estimation processes will need to be undertaken. This methodological approach will be developed further in Section 5.5 under the heading *The value chain and consumer surplus method*.

¹⁵ As should legacy feature phone production which is rapidly falling globally with Microsoft (Nokia) and Samsung the largest remaining manufacturers.

Figure 4: The 'virtuous cycle' of the app economy ecosystem



Source: Systems Knowledge Concepts Pty Ltd (www.skcn.net.au)

This discussion leads to a definition of the app economy from the value chain perspective. As mentioned above, *the app economy is the sum of all economic activity, products and services, required to deliver app functionality to end users via mobile broadband services.* This definition, as described above, includes all the economic activity in the app value chain, that is required to deliver apps and their associated network functionality to end users. Another perspective on this definition would be that it includes all the economic activity associated with producing the app platforms (primarily, IOS and Android), the apps that run on them and the Internet infrastructure, such as cloud services, that supports them. This definition should also include some services that are delivered to PCs and smart TV or set top box, for example Netflix. Netflix, a video streaming service, simply delivers a video stream that can be watched on a TV, PC, smartphone or tablet. PCs, especially laptops, are converging with tablets to some extent, and other smart devices such as TVs and even high-end digital cameras are becoming app platforms.

This definition of the app economy also highlights one of its critical characteristics from the perspective of the telecommunications industry. This is captured in another expression that is sometimes used to describe some of these new app-based services: they are said to be 'over the top' services. Services are over the top because they are made available via the generic data or broadband services provided by

telecommunications carriers. In this sense, every app is an over the top service (although this is true only in a fairly trivial sense for apps that are simply downloaded and require no further communications links once they are installed on the user device). Apps that have some type of communications or entertainment download functionality, however, represent a strategic challenge to telecommunications carriers. This is because all that users require from telecommunication companies is raw bandwidth with the value-added components being provided by the app creators. This is true whether mobile devices are using wireless bandwidth provided by mobile carriers or landline bandwidth via Wi-Fi in the domestic or work environment. Thus, the rise of apps tends to commodify telco services into simple undifferentiated bandwidth. This tends to weaken telco brand strength and potentially reduces their profitability.

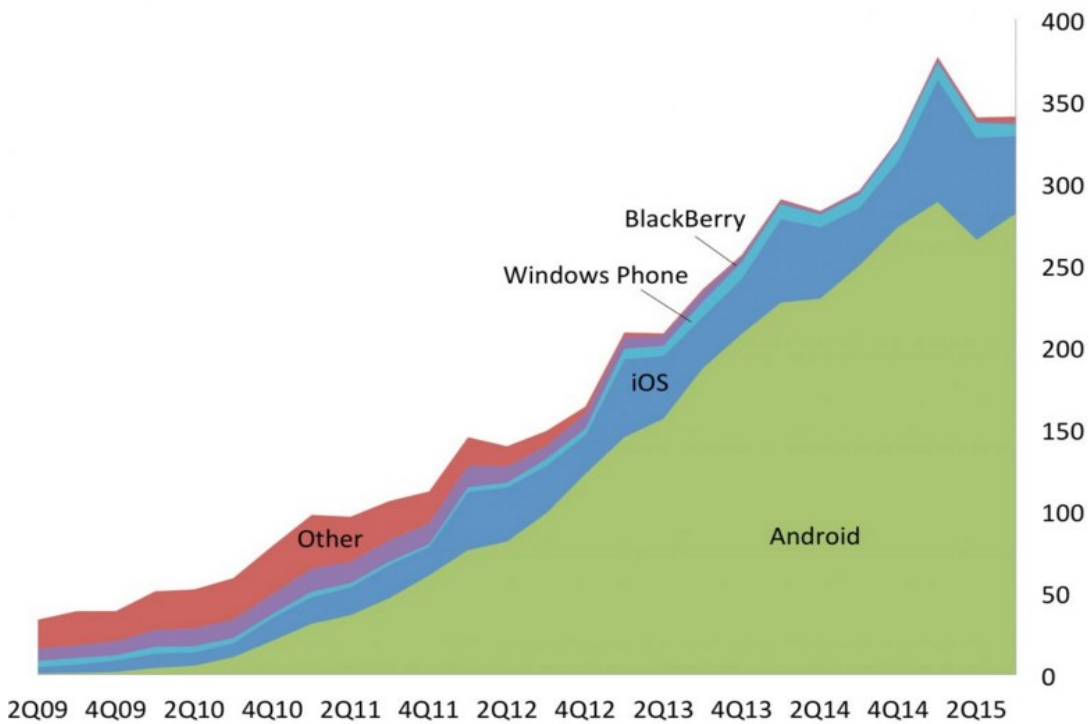
Defining the app economy to include all products and services required to deliver app functionality, including to some fixed devices such as TVs and PCs, does create some definitional and data challenges. A range of browser-based activities that use bandwidth undertaken by users on PCs and/or laptops are not part of the economy and were well-established before apps appeared and such bandwidth should, strictly speaking, be excluded from definition of the app economy. In practice, determining what proportion of the bandwidth used by a household or a business would be related to app use or not would be very difficult.

3 THE APP ECONOMY VALUE CHAIN AND THE GLOBALISATION OF APP DEVELOPMENT

3.1 The structure of the app economy

As described in the previous section, the term ‘app economy’ is a summary description of what really is a new industry or industry subsector. At the centre of this new industry there are several large and influential companies. Primary among these are Apple and Google. Figure 5 shows that Google’s Android and Apple’s iOS are by far the dominant operating systems on smartphones with Windows and Blackberry distant third and fourth.

Figure 5: Global smartphone shipments by platform



Source: BI Intelligence <http://www.businessinsider.com.au/the-mid-year-smartphone-update-report-power-struggles-between-the-biggest-platforms-and-the-underdogs-that-are-gaining-ground-2015-9?r=US&IR=T>

Apple and Google/Alphabet follow very different strategies: Apple is essentially a hardware company that provides an operating system that is tightly bound to its hardware, whereas Google is a software company that makes an open source operating system to all hardware manufactures in order to support its search and advertising business.

For Apple, market leadership depends on the excellence of its hardware. For Google, the functionality, openness and low cost of its operating system for end users is key.

A central driver of the dominance of Apple and Google is the dominance of their app stores and app ecosystems. An app store is essentially a marketplace for app developers and app consumers within a given platform with the two main platforms being Android and iOS. While iOS is dominant in the USA and Europe, Android dominates almost everywhere else, particularly in China and emerging and developing markets.

The app ecosystem is a broader concept that includes the app stores as well as, critically, the mobile operating systems (Apples iOS and Google's Android) for each platform. It also includes the app development industry for each platform (many app developers develop for both platforms), manufacturers of handset and tablet accessories and, of course, the manufacturers of smartphones, tablets, game consoles, smart televisions and other app-capable devices.

Ultimately, the contest between platforms is driven by consumer choice. In the app economy, consumers are driven by:

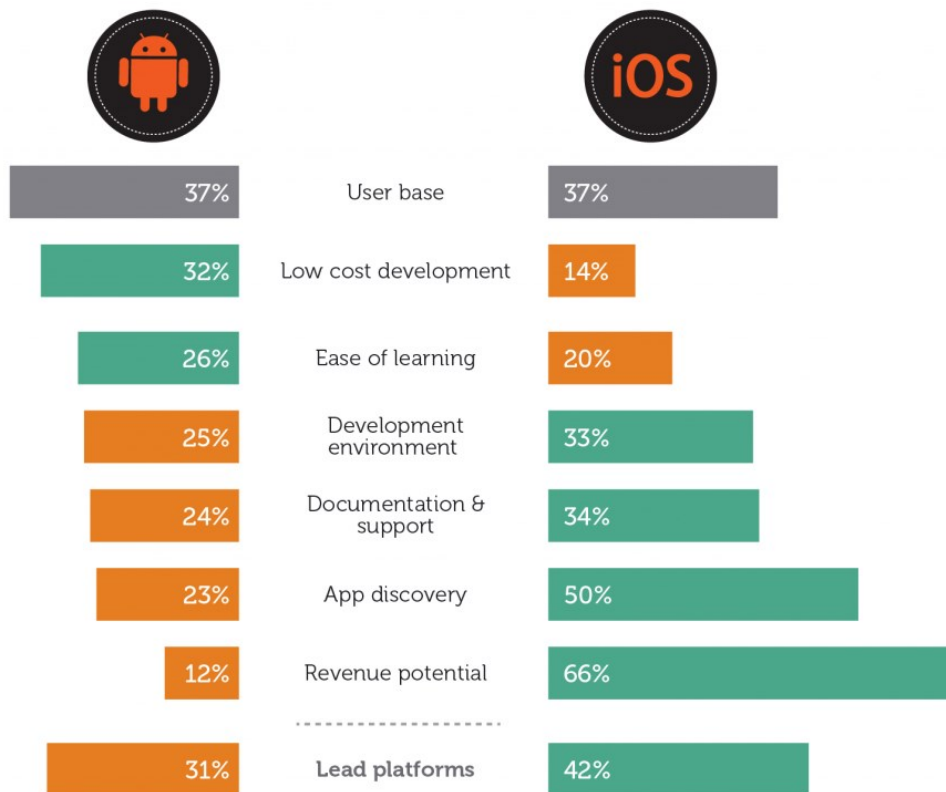
- the quality and price of hardware
- the functionality of operating systems (OS)
- the breadth of choice of apps and their quality.

Because the number and quality of apps is a critical factor driving consumer demand on each platform, the platform owners have an incentive to encourage app developers to develop for those platforms. App developers, attempting to maximise profits, will prefer the platform that enables them to sell the greatest number of apps at the highest price, sell in app purchases or monetise through advertising. Also critical will be the quality of development tools associated with each platform.

In 2013, Developer Economics conducted a survey¹⁶ of 1,200 app developers that were developing for both the Android and iOS operating systems (see Figure 6). The survey results indicated that, from a developer perspective, the two platforms have equivalent user bases but that the iOS platform created greater opportunities for revenue generation and app discovery. Apple's tightly controlled hardware and app store leads to apps being more profitable than for Android.

¹⁶ www.developereconomics.com/developer-economics-2013-survey-ios-vs-android-shoot-out/ (accessed 25/02/2016)

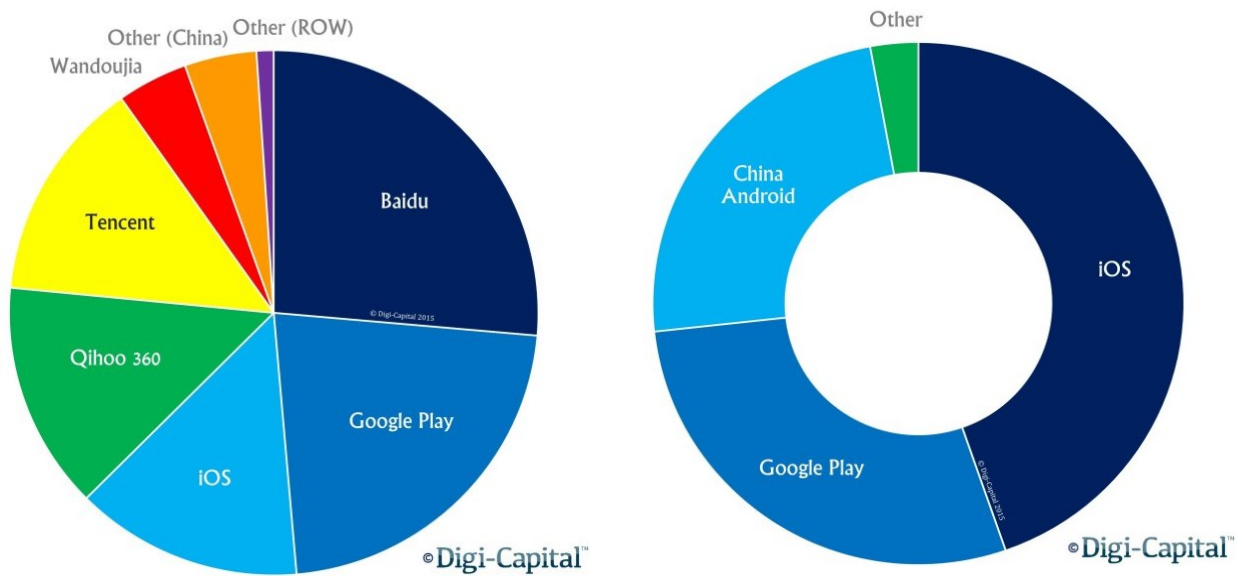
Figure 6: Android vs iOS shootout: % of developers ranking each platform top, among developers using both android and iOS



Source: Developer Economics 2013. <http://www.developereconomics.com/developer-economics-2013-survey-ios-vs-android-shoot-out/>
 Licensed under Creative Commons attribution 3.0 license

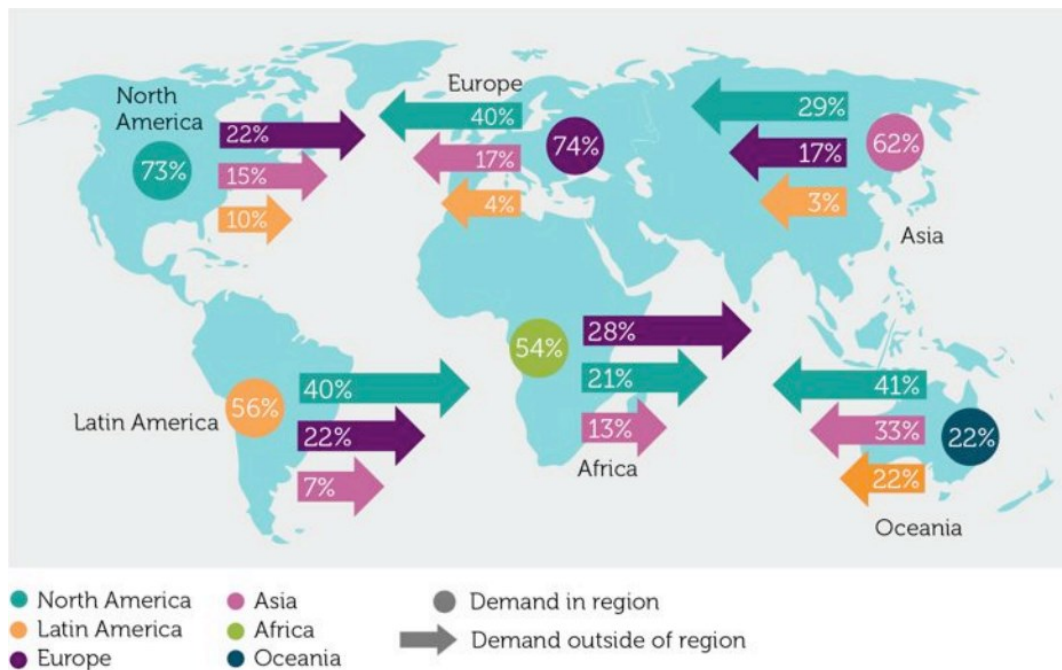
This analysis, however, largely reflects the app economy in developed countries, particularly in North America and Europe. Since 2013, the app economy phenomenon has accelerated rapidly in the developing world, for instance in India. Since Android dominates in China, Southeast Asia and India, growth in the developing world represents a growing market share for Android globally. This, however, has not meant growth for Google’s App Store, Google Play because a number of Chinese companies have begun developing their own versions of Google’s Android, a process that is called ‘forking’. This has led to development of several large Chinese app stores such as Baidu, Qihoo 360, Tencent and Wandoujia. Figure 7 and Figure 8 show the download and revenue rankings of platforms in the increasingly internationalised app market.

Figure 7: Global app stores volume share, and by revenue value share 2014



Source: Tech Crunch <http://techcrunch.com/2015/04/27/android-surpasses-ios-in-revenue-if-chinas-android-app-stores-are-combined/>

Figure 8: Global map of app trade routes: percent of developers seeing most downloads in local versus global market

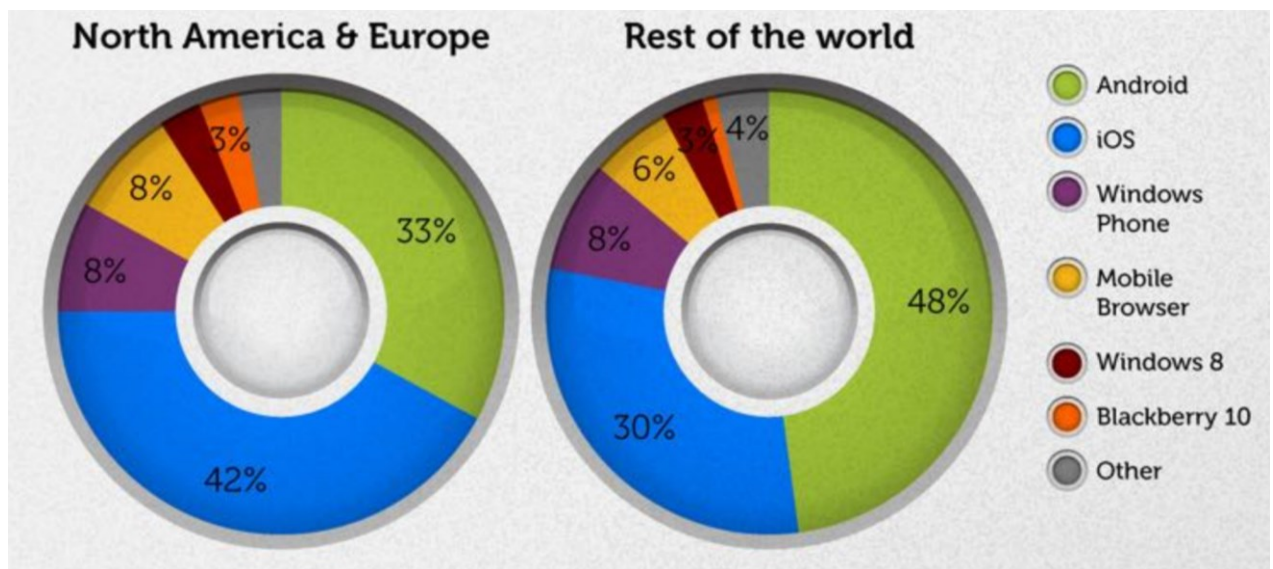


Source: Developer Economics 2012 Licensed under Creative Commons attribution 3.0 license at <https://gigaom.com/wp-content/uploads/sites/1/2012/07/screen-shot-2012-07-03-at-10-29-49-am.png>

In terms of app development, emerging trends show opportunities for developing countries in app export. A 2012 survey¹⁷ by Developer Economics shows that, while North American and European app developments were relatively highly focused on their domestic markets, developers in China, Australia, Latin America and Africa were relatively more focused on app exports.

More recently, a 2016¹⁸ study show that app developers are focusing on Android, rather than iOS, apps in most of the world outside the USA. “Even without much of the high-end, Android represents such an enormous global market that it retains 70% developer mindshare and the priority of 40% of full-time professional developers. Outside North America and Western Europe, almost half (48%) of full-time professionals are prioritising the platform and almost three quarters (74%) target it.”¹⁹

Figure 9: Percentage of full-time developer by platform by market area



Source: Developer Economics Q1 2015: State of the Developer Nation, Mobile Vision

Closely related to the app economy is the ‘start-up economy’. Like ‘the app economy’, the term ‘the start-up economy’ is also ambiguous and more of a conceptual descriptor that is attempting to emphasise the rise in the economic significance of new technology-driven companies characterised by rapid growth and disruptive business models. The economics of starting an online business have changed profoundly in the last decade - that is, since the last dot com boom. The fixed costs of starting a technology business have fallen significantly. Cloud services are now so well established and mature that new companies can buy incremental levels of service as their businesses expand, significantly

¹⁷ www.visionmobile.com/blog/2012/06/report-developer-economics-2012-the-new-app-economy/ (accessed 25/02/2016)

¹⁸ www.visionmobile.com/product/developer-economics-q1-2015-state-developer-nation/ (accessed 25/02/2016)

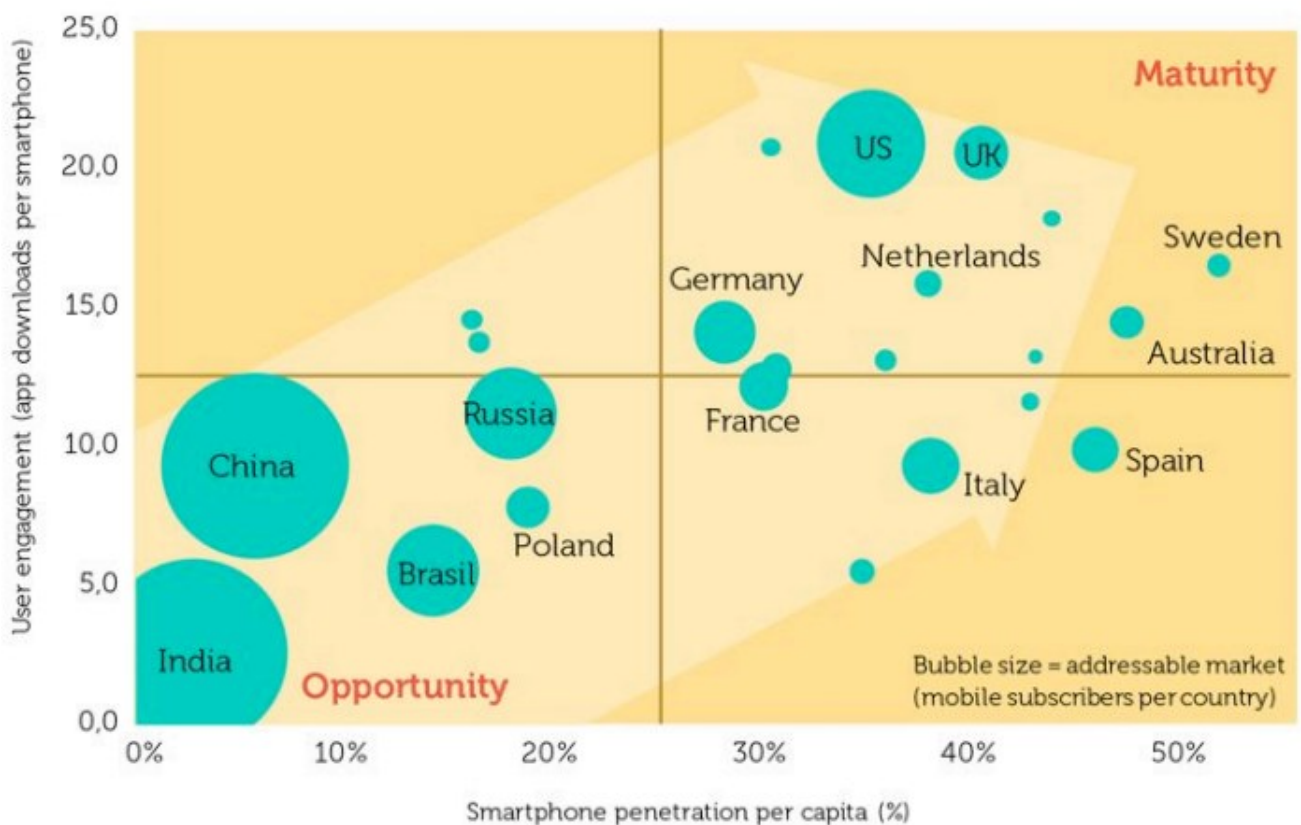
¹⁹ Ibid p 8

lowering the capital costs for start-ups. In this sense, cloud services are a critical input for the app and start-up sectors.

Companies such as Facebook, Uber and Airbnb have led more recent start-up growth in the USA. Now China has produced domestic multibillion dollar start-ups, with India close behind. In addition, budget smartphones are becoming cheaper, and consumers in developing countries will regard the smartphone as the primary means of accessing the Internet, usually through apps. As economic growth continues rapidly in China and India and smartphone penetration rapidly rises, these two countries represent an enormous opportunity for app developers.

Figure 10 shows the countries (bottom left of chart) that have potential for growth and the extent of market maturity as at 2012. As smartphone penetration per capita rises, countries with large populations and immature markets (India, China, Russia and Brazil) have the potential to greatly increase global app revenues.

Figure 10: Evolution of app demand across regions: smartphone installed base versus user engagement by country



Source: Developer Economics 2012 The new mobile app economy. www.visionmobile.com/product/developer-economics-2012/

This potential for growth is supported by a recent study (2015)²⁰ that observes that the “nationalised structure of the app stores offers an advantage to local producers in smaller markets”. The author believes, however, that this is insufficient to outweigh the winner-takes-all dynamics and platform strategies that are increasingly favoring the larger and better-resourced developers.

The dominance of the existing big app companies and of Silicon Valley as the home to the two dominant app platforms may prove to be a barrier to the growth of the app economy in developing countries. The USA, and Silicon Valley in particular, remains far and away the global centre of the app economy. Its networks, its huge community of shared knowledge in close proximity and deep risk-loving capital markets will ensure that it is not challenged in this role for the foreseeable future. The positive information externalities that characterise such economic clusters are not easily replicated.

Figure 11: Location by city of top developers (n = 2,688)



Source: <http://cariboudigital.net/wp-content/uploads/2015/04/Pon-AAG-Platforms-and-app-economy.pdf>

This means that US app companies have an advantage over the international competitors and often they will start earlier and grow faster in particular niches and, given the benefits of scale, they will be hard to catch.

At the same time, China has shown that a vibrant national app economy can develop based on the specific preferences of the domestic market. The willingness of some

²⁰ For AAG 2015 workshop on Geographies of Production in Digital Economies of Low Income Countries “Locating digital production: How platforms shape participation in the global app economy” Bryan Pon (bryan@cariboudigital.net) Caribou Digital

governments to restrict access to parts of the Internet based on internal policies has also played a part in creating opportunities for domestic app developers. Even without this particular advantage, however, app developers all over the world can build solutions that meet more local needs.

Many markets tend to be inherently local in character, example, real estate and job markets and local entrepreneurs can act on these local opportunities. Finally, it is worth observing that the history of technology companies strongly suggests that even the big app companies are vulnerable to successive waves of disruption by new and niche players.

4 THE ECONOMICS OF DISRUPTION

If the app economy had relatively little general impact on existing businesses and industries and formed self-contained niche, it would be of little interest. Clearly, this isn't the case – the app revolution is disrupting business models across many industries. One of the earliest and most spectacular examples of digital disruption was the rise of Apple to the status of the largest music retailer in the world. The Apple iPod, the iTunes Music Store and, eventually, the iPhone enabled Apple to create an entirely new process by which consumers purchase, manage and listen to music, largely displacing the CD and physical music stores.

More recently, the ridesharing application Uber has created a disruptive challenge to taxi companies all over the world, while Airbnb is providing an alternative to the traditional accommodation industry by linking individual providers of accommodation space with end users.

Not only do these developments challenge existing businesses and existing business models, they also challenge conventional classifications of the industrial structure of national economies. Whereas a traditional taxi company would have been classified as part of the transport industry, how should Uber be classified? Is it a transport company, a technology company, or some of both, or neither? Where does the power of app companies to disrupt traditional businesses come from? Are there any unifying themes or analytical frameworks that help us make sense of digital disruption?

4.1 Transactions costs

The famous 20th century economist, Ronald Coase, described the ubiquity and significance of *transactions costs* in all economic systems and how changes in these costs could lead to significant, and often counterintuitive, changes in industrial, commercial and economic structures. Transactions costs are, essentially, the costs associated with using the market to organise economic activity. A buyer must find the preferred seller; research price; research quality characteristics of the good or service that is being sought; and, if a long-term service is being sought, there is a need to design, evaluate and manage a service contract. All of these activities absorb resources.

Digital disruption: from zero to world's biggest music retailer in seven years

On April 28, 2003, Apple threw open the virtual doors to its iTunes Store, and music -- all digital media, really -- hasn't been the same since.

Suddenly, an industry terrified of online piracy had a legitimate place to earn money from the sale of digital music. Listeners no longer had to drive to their neighborhood record store (remember those?) to buy that new album by Norah Jones or 50 Cent. A song cost only 99 cents, a bargain next to an \$18 CD. And iTunes-powered iPods, with their signature white earbuds, became a must-have mobile accessory.

Not everyone was thrilled. Record labels grumbled at being strong-armed over song prices by Apple CEO Steve Jobs. Some musicians complained that they didn't earn enough royalties from digital-music sales.

But by 2010, iTunes was the largest music retailer on the planet. Today, it has 435 million registered users in 119 countries and recently served up its 25 billionth song.

Source: CNN

<http://edition.cnn.com/2013/04/26/tech/web/itunes-10th-anniversary/>

Transactions costs are often highly significant, and in some cases they may be greater than the value the buyer and seller get from the transaction itself, in which case the transaction will not proceed – in effect, the transactions costs form a barrier to the transaction occurring. Thus, high transactions costs may prevent the formation of new markets that would otherwise create benefits for both consumers and producers. In this sense, the non-formation of such markets represents a lost opportunity to create increases in what economists call ‘social welfare’. But Coase pointed out that there are alternatives to using the market to organise economic activity. Rather than using a market system, a ‘command system’ can be used. A business or a firm is, in effect, a region of economic activity within which market forces are suspended and the organisation of resources is undertaken via a hierarchical command structure. But organising activity within a business is also far from costless – the entire cost of the internal management, for example, could be characterised as such a cost. Coase described the costs of organising economic activity within a business as *organisation costs*.

The apps sector can be considered in the context of transactions and organisation costs. Improvements in technology, particularly improvements in information and communications technology, will lead to a decrease in both transactions costs and organisation costs. *Thus, the changing costs of organising activity through the market relative to the costs of doing so within the firm will drive changes to the viability of existing business models and, indeed, of new business models.* For example, within a particular industry, if transactions costs fall by more than organisation costs, then we would expect firms to shrink in size and also expect to see more activity being mediated by market processes and transactions; that is, we would expect to observe the spin-off of business divisions from parent firms and/or higher levels of outsourcing and subcontracting. The changing relative levels of transactions and organisation costs is therefore a significant driver of economic or industrial disruption.

Complicating this picture, changes in information and communications technology also lead to large changes in economies of scale meaning that businesses can operate in a particular field or market at lower per unit costs as they reach a greater scale of operation.

Once these relationships between transaction costs in the marketplace, organisation costs within the firm and economies of scale are understood, the role of technological change in the process of business and industrial disruption can be more easily understood in a more systematic manner.

4.2 Modes of digital disruption

Within the conceptual framework of transactions costs, organisation costs and economies of scale, digital disruption may take a number of forms. These are discussed below.

4.2.1 Falling transactions costs creating new markets

Prior to the development of the Web and the app economy, it would have been *technically* possible to create a business that kept centralised records of spare accommodation in domestic residences around the world that manually collected and maintained ratings for these properties and matched these with requests for such accommodation. Similarly, it would have been possible for any individual to call at random domestic residences at a particular holiday destination and attempt to negotiate an agreement for temporary accommodation. In the former case the organisation costs, and in the latter case the transactions costs, were prohibitively high and such a market simply did not develop (at least not to the extent that it more recently has).

As an example, Airbnb's business innovation was to develop a scalable information technology system that enabled the registration of available space, a rating system for providers and users and pro forma processes for reducing the costs of negotiation and payment. In effect, Airbnb used information technology to create a marketplace with massively lower transactions costs and the significant investment for this system development is now amortised on a global basis leading to relatively low unit organisation costs.

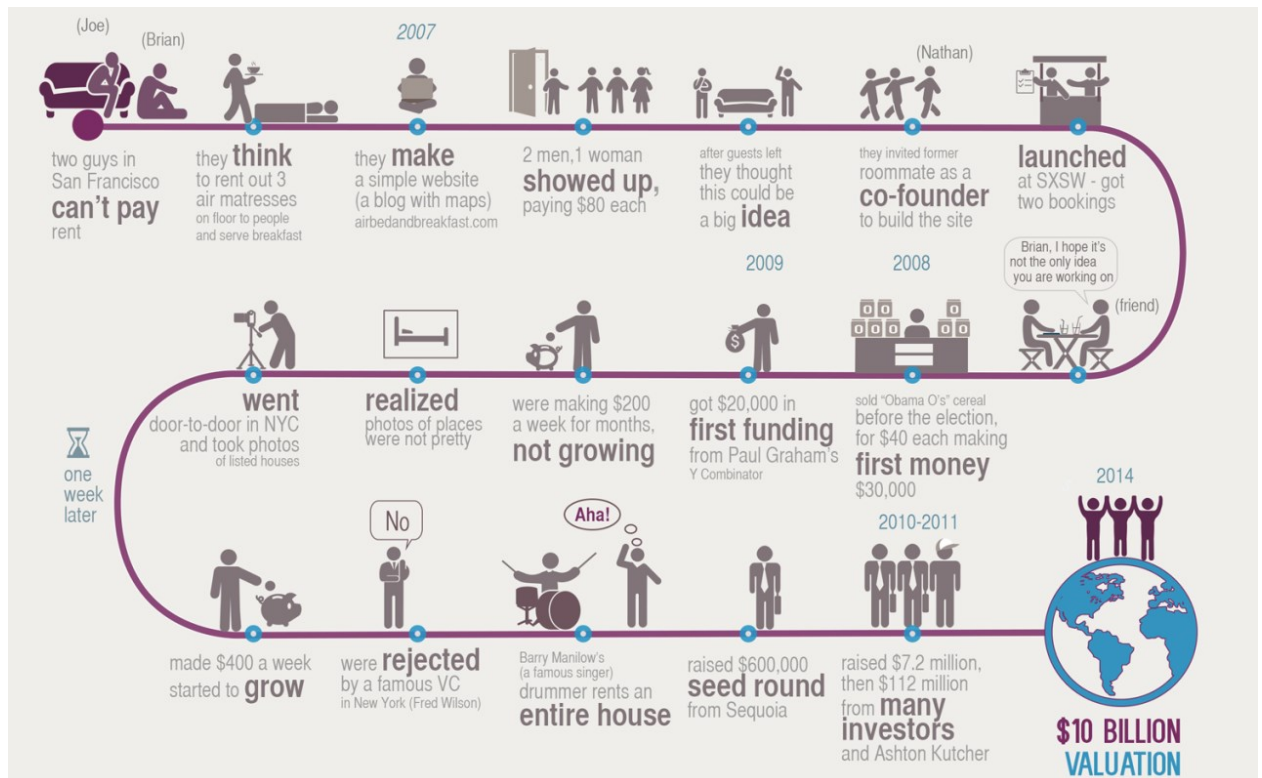
Much of the technology deployed by the disruptive app companies is designed precisely to reduce transactions costs in this manner. Through a combination of websites, mobile apps and back-end software, a new marketplace is formed where sellers can place offers and buyers can access them. Such processes massively decrease the information search components of transactions costs – something that was previously only technically possible thus becomes commercially feasible as well.

The various rules and procedures associated with these systems (for example, registration of credit card details to establish identity and various 'reputation ratings systems' such as those pioneered by eBay) provide an environment where buyers and sellers feel confident enough to trade. The terms governing use of these applications significantly reduce the 'policing and enforcement' aspects of transactions costs.

Figure 12 shows the process by which Airbnb developed from 'an idea' to a company valued at \$10 billion. It should be emphasised, however, that in addition to the total of \$2.4 billion investment in the company over multiple rounds²¹, such businesses are only possible because of the 'accumulated infrastructure' of the app economy that includes the major platform operating systems, the installed base of smartphones in use, the infrastructure of the Internet and telecommunications system, and the ongoing provision of sufficient reliable network access and bandwidth by telcos and ISPs. Together, these investments, ideas and services make possible the development of new markets based on vastly reduced transactions costs, deep specialisations and technological innovations.

²¹ https://en.wikipedia.org/wiki/Timeline_of_Airbnb (accessed 25/02/2016)

Figure 12: How Airbnb started: or how 3 guys went from renting air mattresses to a USD10 billion-dollar company



Source: Funders and Founders (based on reports in Telegraph, WSJ and The Atlantic)

4.2.2 Retailing 'information rich' products and the benefit of scale

Using scalable information technology systems, Apple was able to grow rapidly to become the world's biggest music distributor and Amazon did the same thing for books. Music and books are both complex 'information rich' products – it is difficult to evaluate the benefit they deliver until they are consumed. Consumers wish to discover new works that interest them and, because these goods are complex and there are many of them, they face relatively high transactions costs in finding what they want.

Apple and Amazon have developed large and complex retail information systems that are globally scalable and significantly reduce these transactions and operational costs. These systems enable such companies to specialise, on a global basis, on a particular type of retailing, displacing traditional bricks and mortar stores (Tower Records, which opened in 1968, and was the biggest music retailer in the USA, closed in 2006²² and the Borders Group which operated 511 superstores in the US in 2010, closed its last stores in September 2011²³).

²² www.theguardian.com/business/2006/oct/09/retail.usnews (accessed 27/12/2015)

²³ <http://www.annarbor.com/business-review/borders-liquidation-chapter-11-ann-arbor-bookstore-chain-borders-group-e-books/> (accessed 06/03/2016)

Once these systems are set up and as they are improved over time, there is no limit to their scale – they become global shopping spaces. Because economies of scale are so significant, smaller firms will tend to fail and larger firms grow, leading to the potential for globe-spanning monopolies to develop. Within this context there will be smaller niche and local players.

4.2.3 ‘Excising’ the information component of traditional businesses

The rise of Uber, for instance, graphically illustrates how app economy entrepreneurs seek out the information components of traditional businesses and launch disruptive applications.

To consider the example of Uber further, it is useful to think of traditional taxi companies as being made up of two components – the physical and the information components:

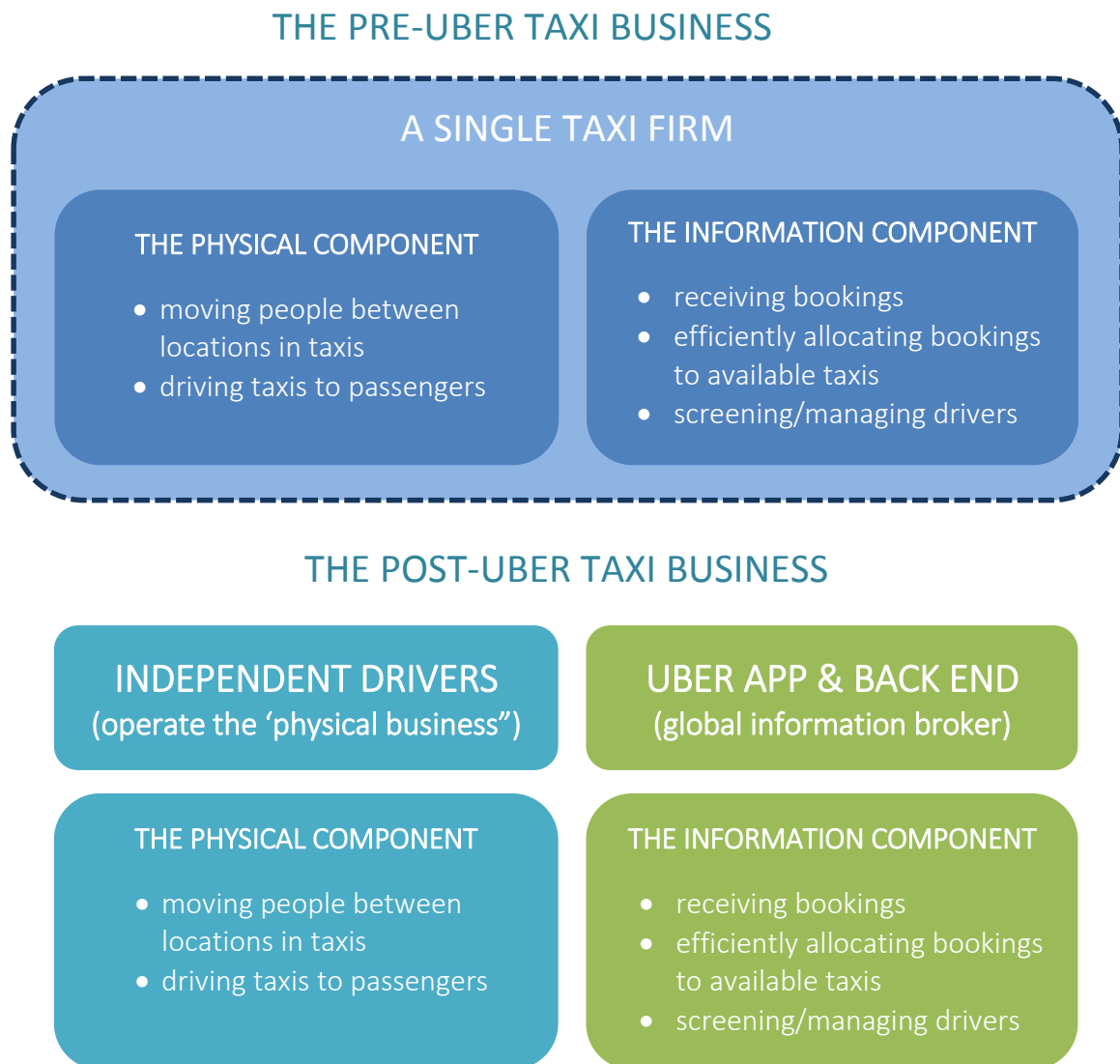
- the physical component is moving taxis to where passengers are and moving passengers in taxis to their destinations – both of these things involve the movement of physical objects through geographic space
- the information component is receiving incoming requests for taxis, coordinating these requests with available taxis, advising taxi users of taxi availability, dispatching taxis and managing a roster of drivers – these require the movement of information between the users of this information.

Traditionally, these two parts of the taxi business have resided within local taxi businesses that operate in all major cities of the world. Uber has worked out how to carve out or ‘excise’ the information component of the taxi business.

Uber and other ridesharing applications provide an alternative means for organising and operating the information component of the taxi business. Figure 13 illustrates how Uber offers a disruptive new processes by which customers and drivers, who both carry GPS capable smart devices, interact with Uber’s distributed broking software to generate automated efficient solutions that replace human dispatchers in the traditional taxi business.

Because the basic problem of taxi-passenger geo-coordination and taxi dispatching is similar all over the globe, Uber can use its application and back-end server infrastructure anywhere in the world where GPS signals are available to use with handheld consumer devices.

Figure 13: Disrupting the taxi business



Source: Systems Knowledge Concepts Pty Ltd (www.skcn.net.au)

Uber’s innovations have enabled processes that previously operated inside firms, to be taken outside into a newly created app-based marketplace. Uber’s systems, by harnessing the capabilities of modern mobile operating systems, can provide enhanced services to users, such as accurate wait times and live map readouts of approaching taxis. Uber has also introduced demand-responsive pricing for ride services, which arguably results in more efficient operation than traditional business models can provide by better matching global demand and supply.

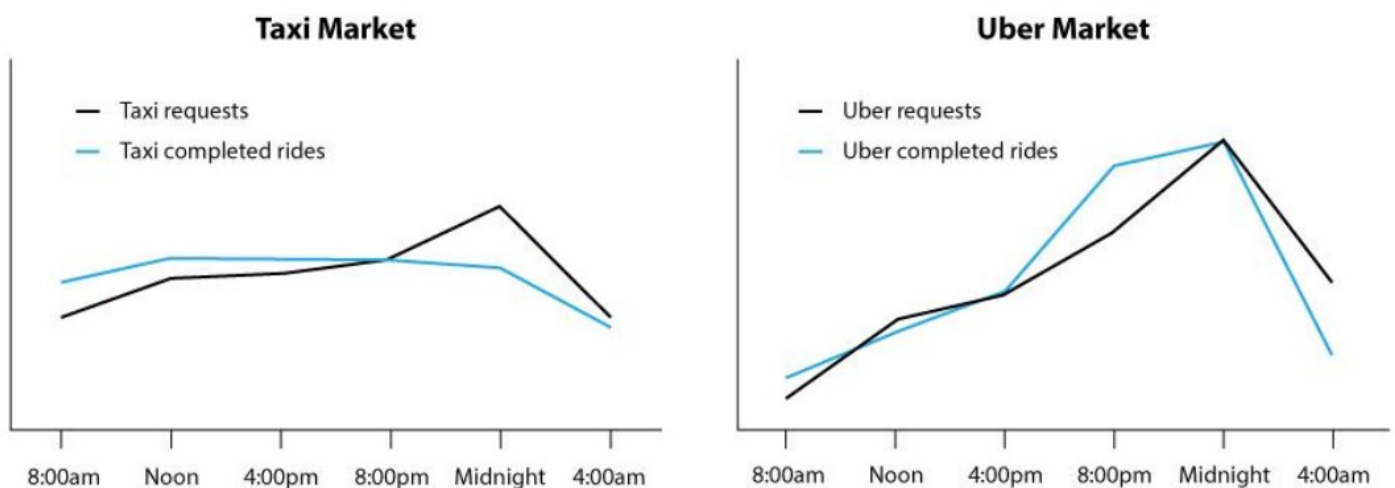
4.3 Potential benefits of app disruption

Economists use the term ‘social welfare’ to describe the overall benefit to society from all economic activity and government policy settings. Thus, the desirability of a particular economic change or policy change can be assessed in terms of its impact on social welfare.

By reducing transactions costs and creating markets, new technologies and applications enable buyers and sellers to come together more cheaply than previously possible. In general, assuming markets are working well, well-informed trade motivated by mutual advantage is thought by economists to unambiguously increase social welfare. But these new applications can do more than just bring buyers and sellers together. They can, for example, more easily accommodate dynamic pricing. Simply put, dynamic pricing is designed to achieve better matching of supply and demand. In the case of taxis, clearly there are periods of very high demand and very low demand. Traditional taxi drivers do have an incentive to increase supply during periods of high demand because on average they will spend more of that time with passengers at these times.

In the case of Uber, periods of peak demand are associated with higher prices so that drivers have a double incentive to increase aggregate supply at the busiest times. Figure 14 shows in black the level of taxi requests per unit time across the day and in blue shows the number of completed rides for both traditional taxis and Uber. Under Uber’s system of dynamic pricing, completed rides much more closely matched demand.

Figure 14: Uber versus Taxi Supply and Demand in Austin, USA, 2014



Source: Ryan, 'Providing rides when they are most needed,' Uber Blog, September 13 2014, <http://blog.uber.com/atxsaferides>, in How over-regulation could destroy an economic revolution: The sharing economy, The Institute of Public Affairs December, 2014

Decreasing transactions costs also enable higher utilisation of existing resources such as Airbnb’s use of spare rooms and houses. Other apps enable users to share power tools, boats or cars.

It should be recognised, however, that advocates of the app economy or the sharing economy emphasise the positive dimensions. But not all of these benefits are achieved without associated costs. For example, increasing utilisation means increased wear and tear and shorter operational life for capital assets. Further, the various reputational mechanisms employed do not eliminate all risks to participants. One of the characteristic objections of existing players that are experiencing disruption is that they bear the costs of traditional regulatory imposts that are designed to protect consumers.

As well as business disruption, therefore, such innovations also create regulatory disruption and regulatory responses by authorities, and play a large role in determining the success or otherwise of these new app-based corporations. The taxi industry is heavily regulated for good reasons, primarily user safety. Regulatory systems, however, as economists have observed, do not always operate as legislators intend. They are sometimes subject to ‘regulatory capture’ over time resulting in the regulation serving, to some extent, the interests of the industry being regulated rather than the interests of consumers.

Technology-driven business disruption offers new opportunities to reassess regulatory settings across all industries and sectors so that they better serve consumer interests. It should not be assumed out of hand, however, that existing regulation and institutions throughout the economy are necessarily outmoded and obsolete. They have evolved over a long period of time with the intention of limiting risks and protecting both consumers and producers in a way that provides assurances, safety and ongoing trade – that is, enabling markets to function. Generally speaking, it is still too early to tell what should be the regulatory responses to technology driven change, and case-by-case responses will be necessary. But it is clear that governments and regulators need to move quickly and on the basis of sound well-considered principles in order to respond effectively.

A feature of this need to re-consider regulation that is distinctive and relatively new is the need for regulators from disparate parts of the economy, who have hitherto interacted little, to now come together and work more collaboratively on more holistic approaches to regulation. The issues that require regulatory responses are now clearly cutting across different parts of the economy in novel ways: the transport and telecommunications sectors, for example, or finance and communications to cite another. Again, this can, at least in part, be seen as a consequence of the spread of new ICT-based technologies into almost all industries. It is not just that ICT is increasingly present in all industries, it is increasingly becoming of ever greater strategic importance. This is partly due to the ongoing maturation and improving performance of software and computing hardware systems, but is also due to the large advances in reach and ubiquity resulting for the adoption of personal mobile computing devices and the ever more sophisticated apps that run on them.

4.4 The race for scale and the future of market power

One of the early hopes that many associated with the rise of the Internet was for a ‘democratisation’ of marketplaces in which many small-scale sellers could reach many buyers with unique niche preferences. Whilst this has happened, with companies like eBay providing small-scale marketplaces and Google enabling advertisers to operate at any scale, as the Internet matures we are witnessing the rise of globe-spanning technology companies operating international business models that show no signs of reaching a maximum efficient scale. Many of these companies wield significant market power (SMP) and profile themselves as natural monopolies.

This type of development could be viewed as paradoxical: very large companies are enabling markets which enable individuals to trade at a very small scale. But, of course, this is just the development that we should expect from highly saleable, very large information and communications systems with very high storage capacities and very high processing capabilities and with all of these characteristics available at ever falling costs. These new (and not so new) technology companies are using the increasing power and the ubiquity of ICT systems to massively reduce the transactions costs which would otherwise inhibit, or even prohibit, transactions occurring between many individuals.

In one sense, the large ICT companies own the marketplaces they have developed and this ownership will likely confer some degree of market power. It is important, however, not to over generalise or make unsubstantiated assumptions about the nature and extent of this market power, particularly in relation to the formation of new regulatory responses.

These new technology-enabled marketplaces are a substitute (at least in some domains) for traditional marketplaces that have been created through the interaction of business, government and consumers. In many cases - for example, retailing - traditional markets continued to exist and compete with new online markets. Market power will be determined by factors on both the supply and demand side (see below). Further, market power is very much a moving target. The acquisition of market power is a central strategic concern for large firms, and from time to time, their strategies meet with success and failure.

The market power of these technology companies is circumscribed, to some extent, by the potential for further successive waves of disruption, but in the meantime their emergence means the balance of economic and market powers is shifting against traditional players such as telcos, banks, and accommodation and transportation providers. This process immediately raises the question about whether regulation which is being designed to limit the market power that these entities have traditionally enjoyed is now excessive, counter-productive, excessively partial and/or simply unfair.

The rise of the app economy and ubiquity of smart mobile devices seems to create even greater opportunities for companies to offer global scale solutions and systems than does the Internet alone. The outcomes of the interactions between falling transactions costs, falling organisations costs and increasing economies of scale are difficult to predict but some analysts and academics are of the view that these changes will ultimately make technology-driven global corporations more powerful:

No Coasian analysis of the electronic economy is complete until we assess the impact of distributed information technologies on organizing costs and economies of scale. And in both cases the picture is clear. Simply put, distributed information technologies make it vastly easier to capture economies of scale and coordinate a large firm.²⁴

²⁴ Phil Agre, The market logic of information, *Knowledge, Technology, and Policy* 13(3), 2000, pages 67-77.

The history of competition regulation in the information technology industry suggests that recurring waves of technological change weaken the market power of dominant firms in the long run. Just as Microsoft unseated IBM in the 1980s, so Microsoft was unseated by the Internet itself and by Google as the 21st Century began. Currently, Google is in ongoing negotiations with EU competition authorities regarding alleged use of its market power in the presentation of search results that favour its own products. The app economy itself provides a challenge to dominant firms in Internet search by providing consumers with alternative pathways to the products and services that they seek²⁵ and social media companies are increasingly competitors in the advertising market. Perhaps again the march of technological change will erode the market power of entrenched dominant firms. On the other hand, the Internet, in combination with the app-economy, offers companies new ways to dominate particular narrow niches:

As diseconomies of scale are destroyed, it becomes more and more practical to run a globally integrated firm -- indeed, a global monopoly -- provided, again, that the firm maintains a strong focus, picking one activity and doing all of it for the whole world. The picture that results is a large collection of focused monopolies, each of them taking a precision "slice" through the world economy by means of global computer networks and by the grace of the standardized world that it both depends upon and helps to create²⁶

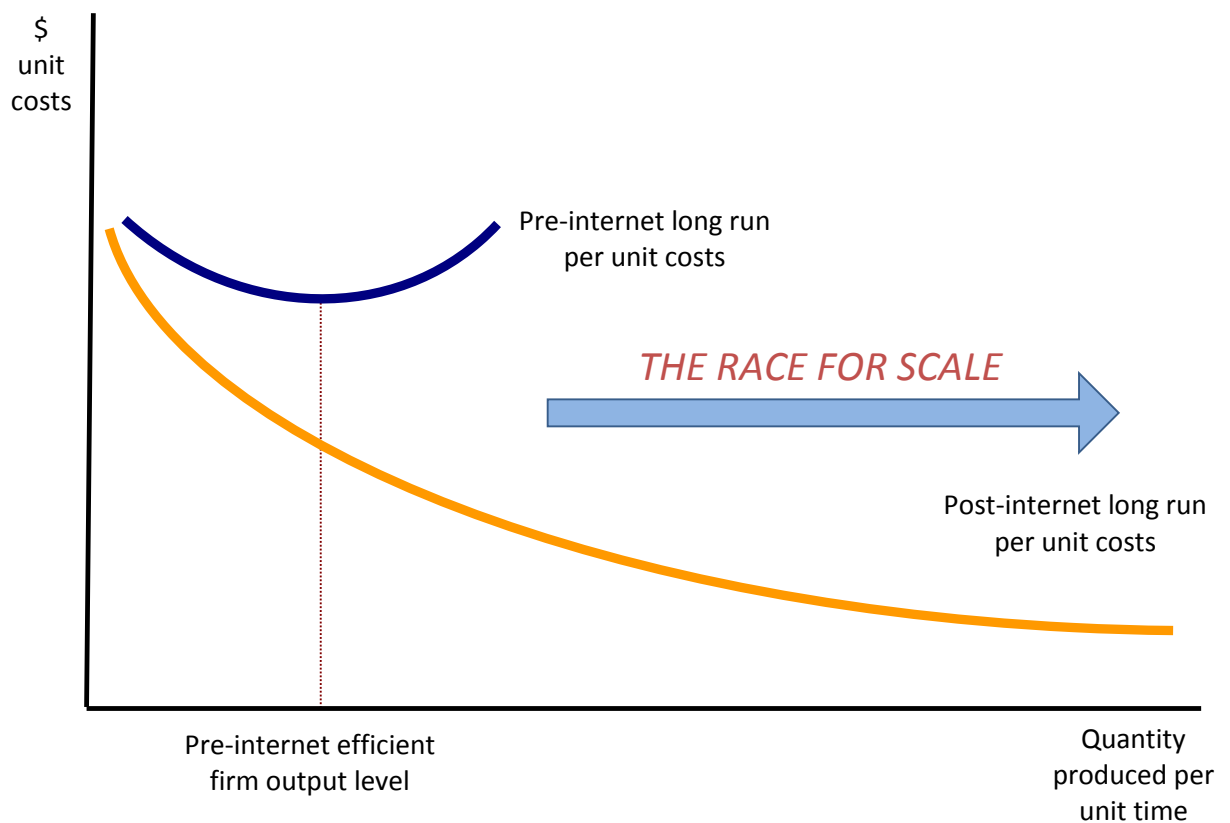
Thus, to continue with the example of Uber, a globe-spanning company has now established a world-wide integrated information system that is challenging all taxi companies in the world by operating a technology solution to the problems of taxi logistics and commerce, while circumventing established businesses. As its scale and level of use increases, its per unit costs fall and it pulls further ahead of competitors because of its lower unit costs.

In this view of the unfolding digital age, the old industrial world diseconomies of scale (represented by the upward sloping section of U-shaped 'Pre-internet long run per unit costs' cost curve in Figure 15) are increasingly artifacts of the traditional world of physical production processes. In the world of physical products, physical stores and physical factories, at some point it becomes an economic grow any larger – stores and factories will become too large to manage effectively and unit costs will rise. As economists put it, eventually there will be 'diseconomies of scale' or 'increasing costs' (meaning increasing per unit costs). This means that at the point unit costs start to rise, the 'maximum efficient scale' of the firm will have been reached. As long as this maximum efficient scale is relatively small compared to the entire market size, there will be room for several or more large firms to compete in the market.

²⁵ www.nytimes.com/2015/08/28/technology/google-eu-competition.html?_r=0 (accessed 27/12/15)

²⁶ Phil Agre, The market logic of information, *Knowledge, Technology, and Policy* 13(3), 2000, pages 67-77.

Figure 15: Decreasing costs and the race for scale



Source: Systems Knowledge Concepts Pty Ltd (www.skcn.net.au)

In the digital world, these traditional long run cost curves are superseded by long run cost curves that continue to slope downwards over any level of production – there are no physical limits to scale; that is, diseconomies of scale never set in. Under such conditions, firms that identify new niches and new business models are in a race at the global scale with the existing or potential competitors. As particular companies such as Uber or Airbnb pull ahead of the competition their unit costs fall and competitors can no longer keep up.

Not only do these economies of scale exist over any level of production, there are positive effects associated with scale on the consumer side as well. Network effects reinforce economies of scale in production. Network effects increase the benefits to consumers from increasing scale of operation and can be encapsulated by the question, why would I join a new social network with hardly any members when almost everyone I know is already a Facebook user? This is the problem that Google faced trying to launch its Google+ social network. Network effects occur because the more users there are, the greater the benefit each user derives. This is amplified by the absence, for the time being, of data portability on social networks, for instance.

In addition to network effects, there are branding benefits that flow from dominance in a particular niche. Facebook is ‘the social network’; Uber is ridesharing; Airbnb is online accommodation; and so on. In the many-niched digital world, many consumers tend to associate the single most prominent provider with a particular niche.

Thus, while the emergence of the app economy will likely eventually attract the attention of competition regulators, there are also implications more particularly for sector specific regulators. For example, in relation to telecommunications regulation, the increasing use of apps increases the demand for bandwidth, particularly mobile bandwidth, while at the same time the app economy also tends to weaken the market power of telecommunications companies by commodifying the demand for their services to generic bandwidth at the best possible price. This reduces the capacity of telecommunications companies to market their services and differentiate themselves which will likely lead to lower margins and profitability. The regulatory implications of these changes are discussed in more detail in Section 7.

In terms of international telecommunications/ICT service provision, ITU is working on the identification of relevant markets and significant market power (SMP) addressed to international services and notably multinational companies, in light of the outcomes of the World Telecommunication Standardization Assembly (WTSA-12) and World Conference on International Telecommunications (WCIT-12). An ITU-T Recommendation is under study to propose principles and guidelines to be considered by Member States in defining, identifying and assessing the degree of abuse of market power and dominance by international telecommunication service providers in the various markets for international telecommunication services and obligations on such service providers with SMP²⁷.

Governments and regulators need to find a balance between maximising the benefits of the disruptive app economy while countering the market power of its leading players and balancing sectorial regulation. Increasingly, effective regulation will need to consider its effects across sectors, leading to the need for collaborative regulation between the regulators of various sectors who have traditionally not needed to work together.

²⁷ <http://www.itu.int/en/ITU-T/studygroups/2013-2016/03/Pages/default.aspx>

5 MEASURING THE BROAD ECONOMIC IMPACTS OF THE APP ECONOMY

5.1 What is the significance of the app economy?

As discussed in the previous section, the plummeting costs and increasing performance of converged communications and computing, has led to enormous decreases in transactions costs, as well as a range of other production costs, across all industries. The emergence of the app economy as a new and distinct phase in the development of ICT, more generally, has accelerated this process because of the rapidly expanding reach and availability of mobile smart devices.

Because the app economy appears to be such a powerful phenomenon, it is desirable to establish quantitative measures of its size in order to understand its economic significance. The definition identified in Section 2.2 focuses on the economic activity associated with production of app platforms and apps themselves. It is emphasised again, that, in practical measurement terms, this definition includes unavoidable ambiguities because the app economy is really a subsector of the broader ICT industry.

What do we mean when we are trying to assess the 'size' of the app economy? Typically, what is meant is the dollar value of economic activity. This approach is based on the traditional national accounting methodology which attempts to measure 'value added' for each industry. It is important to emphasise that such estimates on an industry basis have been developed and have evolved over long periods and national statistical organisations have developed sophisticated methodologies based on an array of data sources, including regular surveys.

There are other potential measures of the economic significance of the app economy. These might include: level of employment that it generates, the extent to which it improves productivity in other industries, and the ways that it might contribute to economic growth and development, especially in emerging economies. In this section, potential methods for measuring the app economy are proposed. This is preceded by a discussion of how ICT affects other industries and the issue of ICT and productivity.

5.2 ICT disruption is wide-spread and ongoing: apps accelerate the process

This technology-driven industrial change is unevenly distributed. In some industries, disruption has occurred earlier and has been dramatic than in others. For example, the music industry and newspaper publishing were disrupted early in the cycle and this disruption has been dramatic with only a remnant bricks-and-mortar music retailing surviving and with newspaper publishing seeing ongoing large staff layoffs for well over a decade along with significant changes in ownership. Other industries came later, and can be considered to be in the middle of such a disruption: for example, the taxi industry and the accommodation sector (as already discussed). Today, there is broad recognition that

ICT is impacting all industries and the improving functionality and increasing ubiquity of smart mobile devices is accelerating this effect.

Consider for example the impacts of ICT on:

- **Education** – growth of Massive Open Online Courses (MOOC), and in online-only enrolments (a trend following the previous developments in distance learning models)
- **Retail** – all major retailers now offer online shopping as an alternative to bricks-and-mortar stores and many online only retailers have appeared. Additionally, there is a class of online services that provide price comparison services and offer a range of specials and bargains (for example, Catch of the Day, 1-Day)
- **Banking** – with significant reductions in the use of physical bank branches, cheques, and increasing use of online systems for payment of bills, digital financial services, and all general transactions. An important factor in banking competition is now the quality of their banking apps. Importantly, app-based banking and app-enabled substitutes to money transfers, in the form of trading in mobile minutes has introduced the capability of saving, and micro-transactions are gaining momentum in developing regions. New services have emerged that enable international guest workers to more cheaply repatriate income home.
- **Governments services and systems** – with most aspects of government support and engagement moving to on-line, such as welfare payments, mailing and transport offices (delivering online shopping), and taxation arrangements

While much of this shift was triggered by the internet more generally, the use of mobile devices has seen app-based options evolve and become a part of the landscape: for example, *Blackboard*, the international online education platform used by a large number of universities globally, has now released a mobile version that interacts with the PC-based version. Mobile smart devices make many previously computer-based applications more accessible to more users. For example, users can participate in eBay auctions while undertaking the normal day-to-day activities, instead of needing to be present at a computer when the auction is nearing its endpoint.

The fact that the new generation of smart devices is mobile and personal, coupled with the fact that mobile apps greatly improved access to huge array of commercial services, means not only that very few industries are unaffected by the app revolution, but that very few industries and businesses cannot afford to bring apps and smart devices into their strategic thinking. Because ICT systems generally, and apps specifically, now permeate so many industries and businesses so thoroughly, it becomes increasingly difficult to separate the ICT sector itself from other industries. In a very real sense, ICT and the app economy are interconnecting more deeply industries and businesses across the whole economy. This phenomenon has many implications but, for our purposes, it is important to recognise that this makes the app economy difficult to tightly define and increasingly difficult to quantify meaningfully. In this section we will describe three possible approaches to quantification that consider the app economy from alternative perspectives. This is both a pragmatic approach and recognises that, for the purposes of

policy development, different perspectives will be relevant depending on the types of policies that are under consideration.

5.3 The productivity paradox

It might be expected that these technology-driven disruptions would substantially improve productivity in all of these sectors – but somewhat paradoxically, this period, particularly the last 7 to 10 years, has been one of relatively stagnant productivity growth in developed countries in particular. The economic literature on the drivers of productivity change is large and complex but, generally speaking, productivity becomes increasingly difficult to measure when:

- the rate of emergence of new products is high
- when production techniques are changing quickly
- business models are evolving rapidly
- industrial structures are changing rapidly.

Figure 16: The collaborative economy: participation in the collaborative economy: recent and projected



Source: Sharing is the new buying, www.slideshare.net/jeremiah_owyang/sharingnewbuying

In addition to these factors which impact on traditional measurement methods, some of the apps that are changing industry structures can be considered to benefit final consumers by reducing the final price that is paid for many goods and services, while at the same time having a negative impact on productivity measured by traditional methods. For example, online retailing allows people to find the lowest price for a product, reducing the total value of sales revenue and negatively impacting on traditional productivity measures which are based on market prices. Even further, in the case of retailing, the way in which the internet and apps have facilitated a substantial change in the second-hand goods market (for example, eBay and Gumtree) has further impacted traditional retailing. Again, mobile platforms have made online sales and bidding processes more efficient and widespread – participants no longer need to sit in front of a computer to bid in online auctions.

Thus, the development of the app economy *may be leading to a systematic understatement of national productivity growth as measured by traditional methods and, at the same time, be leading to improvements in consumer welfare that are not being measured.* Such factors mean that measuring and quantifying this recent period of volatile change is challenging for conventional economic methodology. Nonetheless, we want to address questions like ‘what is the size of the app economy’ and ‘what is its economic significance’. Despite the definitional and measurement difficulties, there is a range of approaches that could be employed.

One approach to estimating productivity impacts would be to estimate the impact of technology-driven change on an industry by industry basis. Impacts in some industries have been early and large, while other industries have been left relatively less affected. An important part of such an approach would be to note important differences between different countries and also important differences between advanced, developing and less developed groups of countries. Indeed, some writers have noted how new technologies will enable more rapid economic development in developing countries.²⁸

Such an approach would, in effect, attempt to estimate improvements to productivity on an industry by industry basis while, at the same time, attempting to make allowance for the blurring of industry boundaries that has begun and the emergence of new industries. We note that there are conceptual challenges (as already discussed above) associated with measuring productivity in such a highly dynamic environment and that the data requirements of this approach are quite high, requiring inputs about productivity changes across all industries, or at least those most affected by ICT, in all countries.

An alternative methodological approach would be to examine the emergence of various companies along the value chain, including Apple, Google, Facebook and the more specifically niche disrupters such as Uber, Airbnb, Spotify, Dropbox, SurveyMonkey, etc. In total, the market capitalisation of these and related companies, including those in other countries, such as China’s Alibaba, represents trillions of dollars of value and there is a link between this value and the value created for consumers. This method would

²⁸ *How Developing Nations Can Leapfrog Developed Countries with the Sharing Economy*, Jeremy Rifkin, www.huffingtonpost.com/jeremy-rifkin/developing-nations-sharing-economy_b_8419960.html (accessed 28/02/2016)

enable order-of-magnitude modelling of the economic benefits of the services provided by these businesses. It should be noted that there is not necessarily a tight correspondence between a company's share market value and the utility it creates for users. Some apps are very popular among users and yet they struggle to find a business model that generates sufficient revenue to realise high share market valuations.

The emergence of these services delivered over the Internet and through the mobile telecommunications network, has led to strong growth in consumer demand for fixed and mobile bandwidth. Government policy concerning infrastructure investment, communications regulation and a range of related issues has played critical roles in the development of these services. The price and quality of these services remains a key political issue for many, if not most, governments around the world. The rise of the app economy will likely make the quality and price of these services even more critical, because consumer benefits and economic development will be increasingly linked to these services.

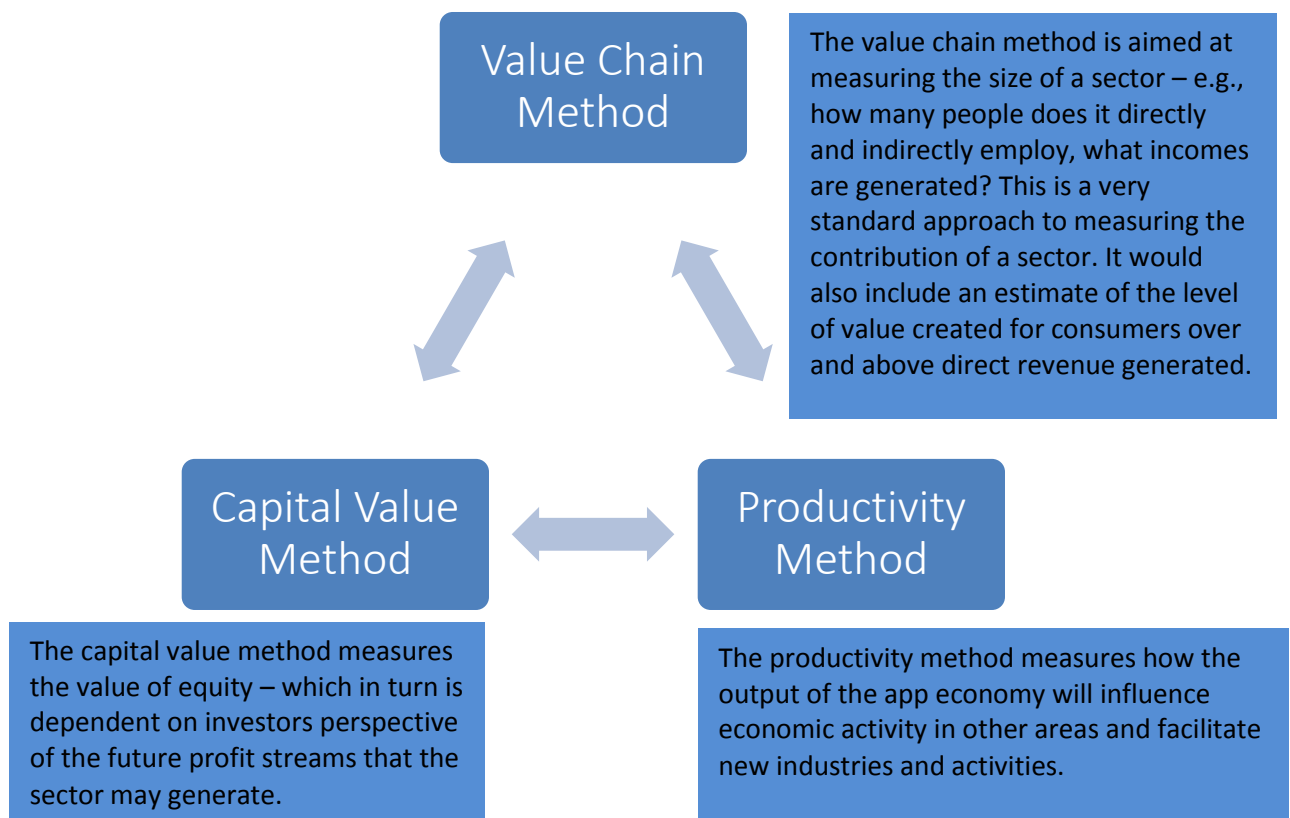
Before governments can introduce policy and regulatory changes, however, it will be necessary to generate more evidence and analysis in support of any changes. It is abundantly clear that the pace of change is challenging the capacity of most governments to respond, and the discussion in this Section identifies some of the challenges for traditional economic measurement and analytical approaches. It should be emphasised that solving these data collection and measurement problems will require significant co-ordinated effort. Traditional data collections will tend to be unhelpful and new sources will need to be investigated and developed. This will take time and, in any case, a better understanding of the economic dynamics will need to be based on longitudinal data, which will need to be collected over a suitable span of time. Below, methods are described which could form a basis for a more comprehensive approach to measuring the app economy and its broader economic impact.

5.4 Challenging traditional industry structures and definitions

One of the characteristics of the app economy is that it disrupts not only traditional businesses and business models, but also traditional definitions of industries. The statistical collections of national statistics agencies are based on conventional industry definitions and are therefore of limited use in describing and measuring the app economy.

Since the statistical data collections that directly measure the value of the app economy are not available, a number of approximation methods will need to be developed and, over time, further refined. Given the multiple ways in which the sector contributes to the economy it is suggested that there are three ways in which the contribution of the sector can be measured. Each measure has different aspects and attempts to value different things, but, taken together, they can be considered as a way to triangulate the contribution the sector makes to the broader economy. These potential measurement methods are illustrated in Figure 17 and each is discussed in more detail below. In addition, a further more speculative method, the value of time method, is also discussed at the end of this section.

Figure 17: App economy measurement methods



Source: Systems Knowledge Concepts Pty Ltd (www.skcn.net.au)

5.5 The Value Chain and Consumer Surplus Method

This method is linked to the app economy definition developed above in Section 4.

The level of economic activity in a particular economy is measured by Gross Domestic Product (or GDP) within the National Accounting Framework. The measures are defined as:

- GDP equals Consumption plus Investment plus Government Expenditure plus Exports minus Imports
- GDP is also defined to be equal to Wage and Salary Income plus Gross Operating Surplus

In a global context, exports will equal imports, and so the world GDP is Consumption plus Investment.

Therefore, as a starting point we can measure the economic activity of the apps economy as the value in consumption plus the relevant investment expenditure. Investment expenditure is also a 'predictor' of future consumption, particularly in a start-up technology or industry and can outweigh the consumption value itself. It is important to consider how much development expenditure (i.e. investment) has grown over the last few years as an indicator for where consumption will be in the years to come. The app industry has many aspects of start-ups or entrepreneurial businesses (such as biotechnology) with a long tail of a few large successes offsetting the investment spent on the many that don't succeed. This app development activity is generally funded by a narrow part of the financial market: a combination of personal equity (sometimes funded by mortgages etc. on personal assets), business angels and venture capitalists, governments (funding entrepreneurial activity for economic development purposes), universities, and larger corporations as part of their research and development portfolio. Data concerning all these sources of investment would need to be collected from many sources and it would need to be recognised that even with such a data collection effort, the resulting figures would need to be considered as estimates.

In attempting to estimate the size of consumer value creation, a first step would be to estimate the value of all expenditures by consumers that are required for their participation in the app economy. It is important in this value representation not to double-count, as some products (e.g. handsets) perform multiple functions – for example, a smartphone would be used for simple voice calls on that component of its value to consumers should not be considered part of the app economy benefits. In summary, the relevant costs to the consumer are:

- cost of apps and associated ICT services (this would include direct costs, that is, the price of apps, and indirect costs, such as the implied cost to consumers of having to view advertising in free advertising-supported apps for example).
- The net cost of the 'smart component' of a smartphone for access to these services (conceptually this would be the full cost of a smartphone that allows app access etc. minus the cost of a feature phone with basic telephony access).
- The share of the monthly subscription price that relates to mobile broadband (data) service (versus voice call and SMS access).
- The share of fixed broadband that is available for Wi-Fi access as a basis for mobile app use.

Table 2 summarises the various components of the value chain approach, along with a preliminary perspective of possible sources of data.

Table 2: Components of the value chain

Component of value chain	Sources of data
Global investment and development in app and related start-ups Friends family, business angels Venture Capitalists (VCs) Governments Large corporates Accelerators and incubators Financial institutions	Many sources: investment history of major app companies, industry commentary, summary reports by government or industry representative bodies etc.
App store sales (include Apple share etc.) at national level	Data published by the main app platforms, annual reports, industry commentary and consultants reports.
Handsets - Total value of smartphones sold minus value of feature phone	Annual reports of smartphone manufacturers, industry commentary etc.
Backend – cloud etc. – IT infrastructure	Revenue reports from large-scale cloud providers ²⁹ as well as Industry commentary and consultant reports.
Telecom Operators services –mobile revenue – minus voice and SMS revenues	Annual reports of telcos and industry reports on changes in the composition of revenues to telcos particularly in relation to voice and SMS versus data.
Advertising (not double-counting revenue through Apple and Google)	Commentary and some reports from the mobile advertising industry plus app industry commentary on revenue sources.

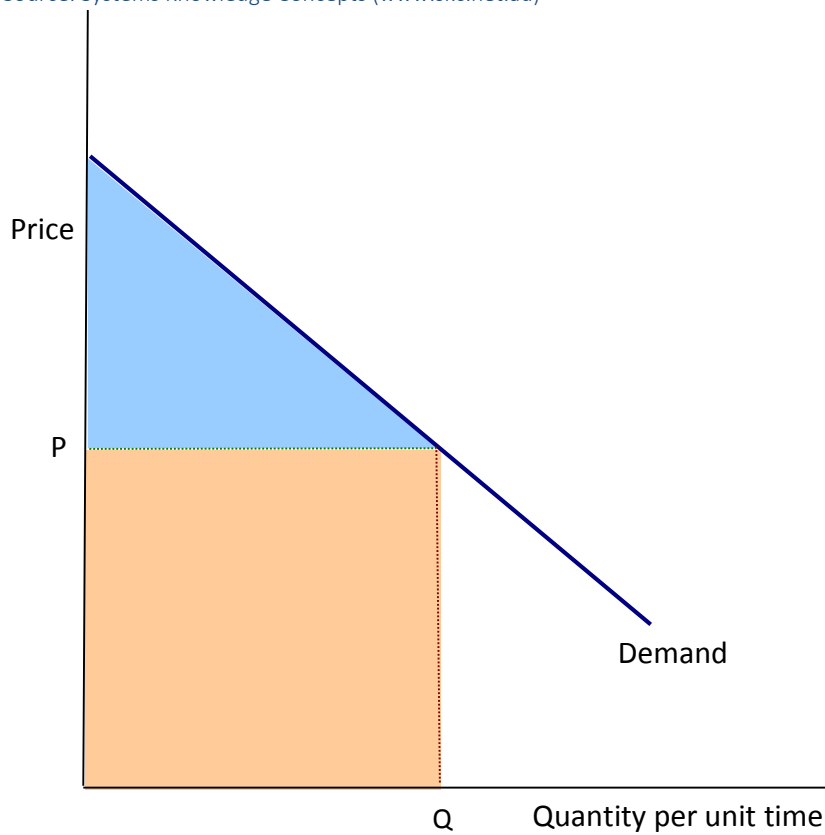
Source: Systems Knowledge Concepts (www.skc.net.au)

Once a summary of total consumer expenditure on apps and related services is estimated, consideration needs to be given to the economic concepts of ‘consumer surplus’. Consumer surplus is a central concept in microeconomics and refers to the fact that, in most transactions, consumers receive a benefit from the transaction that is greater than the price they need to pay to secure the good or service. This is depicted in the typical demand curve framework applied in economics (see Figure 18 – total market revenue is showed by the orange rectangle area and consumer surplus by the blue triangle).

²⁹ <http://openviewpartners.com/news/global-cloud-computing-services-market-to-reach-us127-billion-by-2017-according-to-new-report-by-global-industry-analysts-inc/>

Figure 18: The demand curve and consumer surplus

Source: Systems Knowledge Concepts (www.skc.net.au)



This aspect of value creation in the app economy is an important consideration in many areas of new technology. There is a need for primary research in this area, to provide evidence-based quantification of this aspect of consumer benefit. Such research would likely need to include survey work to generate data about consumers' subjective evaluation of apps and app services. There is secondary research available³⁰ regarding consumer surplus values in related markets such as broadband, which could be applied to achieve indicative estimates of consumer surplus values in app markets.

Thus, in order to calculate consumer valuations of benefits related to app services, it is necessary to identify the total amount of consumer expenditure on these services and estimate the average level of consumer surplus. The consumer surplus value is then used to adjust upwards the total expenditure on apps services to arrive at a total benefit figure. It may be worth categorising apps into various types (games, accessing services (transport, banking), online shopping) or into groups of apps with high consumer surplus ratios and ones with lower.

³⁰ Creating new markets : broadband adoption and economic benefits on the Yorke Peninsula / Simon Molloy, Barry Burgan and Sally Rao, Australian Communications and Media Authority, 2008, <http://trove.nla.gov.au/work/34112571?selectedversion=NBD43360631> (accessed 29/02/2016)

For example, assume that, in the app market, for every \$1 million that consumers spend in accessing and using apps, that there is an additional consumer surplus of 50% of the level of consumer expenditure (based on the literature³¹). This inclusion of consumer surplus would increase the value to consumers to \$1.5 million (the original \$1 million of consumer expenditure plus \$0.5 million of consumer surplus). Note that the value of consumer surplus is likely to be different in different countries and for various segments of the app economy. These differences would need to be taken into account in an empirical estimate of the value of consumer benefits.

This type of valuation could be undertaken for a single year and/or calculated for some period of, say, 10 or 20 years using Present Value techniques. The calculation of longer term benefits would require making assumptions about the expected growth rates in the app economy and the use of an appropriate discount rate.

5.6 Capital Value Method

A second measure of value would be to identify the market value of the app providers as an indication of the valuation placed on the businesses that provide these products. The fundamental idea behind this method is that the capital value of companies in a particular sector is related to the value added to the economy by these companies. Having made this point, it is important to emphasise that there are several factors which may cause these valuations to not reflect value-added. These would include: unrealistic expectations about the future value of these companies leading to inflated share prices; monopolistic market structures leading share values to overstate value-added; and sources of value created for society not reflected in share values.

The components of this valuation method would include:

- A proportion of the value of the publicly listed companies that form the core of the app economy (i.e. Apple, Google, Samsung, Sony etc.) and publicly listed companies in other countries. The objective would be to estimate that proportion of each company's valuation that was related to the app economy. This value, for example, would be high in the case of Apple but low in the case of Sony.
- An additional amount for larger corporate private businesses that facilitate the app economy, including the telcos, backbone carriers etc. The proportion of these businesses' activities that were part of the app value chain would be included – for example, data services would be included but not traditional voice services.
- A pro-rata value in smaller and start-up businesses – this would include the entire value of pure app start-up companies and some proportion for those that are only partially app-based.
- Consideration of the fact that some apps benefit users without generating significant capital values for the companies that provide them (often because an appropriate revenue generating model cannot be found).

³¹ ibid

An estimate of the total capital value created in the app economy could then be broken down into an annualised value on various assumptions to create an estimate of the annual value generated for consumers (again with assumptions about expected growth rates and an appropriate discount rate).

The table below shows the total market capitalisation of the major contributors in the developed economies, but as noted, the apps-related proportion needs to be extracted by a detailed review of the revenue streams of these entities. This would need to be done across global markets.

Figure 19: Total Market capitalisation of selected key players (in USD billions)

Year	Apple	Google	Microsoft	Amazon	Yahoo	Nokia	Oracle
2005	62.56	61.25	281.66	20.13	56.64	82.29	63.54
2006	70.05	70.42	295.11 ³²	16.60	35.03	83.93	88.62
2007	174.96	108.06	337.92	37.89	31.34	151.89	117.99
2008	76.83	48.37	171.51	21.77	16.61	59.94	89.97
2009	189.50	98.41	273.65	60.36	23.71 ³³	47.71	125.33
2010	299.77	95.33	239.64	81.28	21.42	38.12	159.50
2011	378.59	104.50	219.05	80.16 ³⁴	19.96	17.73	128.79 ³⁵
2012	582.57	116.60	226.07	112.62	23.15	15.03	159.12
2013	501.31 ³⁶	188.00	312.55	185.10	41.24	29.55	169.13
2014	668.53	361.44	394.67	143.11	48.14	30.05	202.44
2015	598.34 ³⁷	515.76 ³⁸	437.82	311.96	31.13	26.08	155.47

NB. Nokia is now been acquired by Microsoft.

Source: Various – see footnotes

5.7 Productivity Method

This method would probably be the most difficult to execute because of a lack of data, despite a significant base in the economic literature on the importance of productivity growth as the core source of per capita increases in income over time³⁹. The fundamental

³² Dip between 2005-6 down to 225 billion

³³ Peak between 2008-9 up to 39 billion

³⁴ Peak between 2010-2011 up to 110 billion

³⁵ Peak between 2010-11 up to 182 billion

³⁶ Peak between 2012-2013 up to 657 billion

³⁷ Peak between 2014-2015 up to 750 billion

³⁸ 23/12/15 – *Ycharts*

³⁹ Jalava, J, Pohjola, M, Economic growth in the New Economy: evidence from advanced economies, Information Economics and Policy, Volume 14, Issue 2, June 2002, Pages 189–210

Edwards, S., 1998. Openness, productivity and growth: what do we really know?. *The Economic Journal*, 108(447), pp.383-398.

Fischer, S., 1993. The role of macroeconomic factors in growth. *Journal of Monetary Economics*, 32(3), pp.485-512.

concept is to investigate the extent of digital disruption on a sector by sector basis and estimate the increases in productivity caused.

Given that the level of economic activity in each sector is well known given national accounting data collections, it would therefore be possible to attribute a boost to national economic activity arising from the disruptive effects of the app economy.

This method would also involve some novel thinking about the nature of productivity change and would require some speculative 'what if' type economic modelling which would entail making various assumptions about the relevant productivity changes and factoring these into various modelling scenarios. This would enable testing the sensitivity of the conclusions to these various assumptions. This type of approach would be required because, as we have noted above, traditional productivity measures are of limited use when evaluating such a dynamic influence on economic activity as the app economy.

The steps required to model the value using this approach would be:

- To categorise the world economy into country (or country group – such as developed economies, developing economies etc.) and industry groups (IT sector, manufacturing, services etc.). The objective of this categorisation would be to identify industries according to the extent of impact of the app economy. The classification of economic activity that resulted from this step in the process would likely be different from traditional industrial classifications.
- For each of the industry groups, using information from industry studies with respect to how digital disruption and use of apps is impacting on the industry, and from various case studies develop a scenario of the extent to which productivity has improved due to the app economy within each country or country group. In essence, this would be a pragmatic exercise that entailed examining those industries which appear to be most impacted by the app economy and developing estimates of the productivity impacts. These estimates would then be used in the 'what if' analysis described above.
- Model the whole of economy impacts of these scenarios of productivity change based on assumptions of elasticity of demand and supply for these industries. Elasticities of supply and demand have significant effects on how changes in cost structures and productivity translate into profits for business and benefits for consumers. In effect, these elasticities determine how the gains from productivity are shared between these two groups.

The core outputs of this modelling would be the increase in real incomes (per capita) as a consequence of the growth of the app economy.

5.8 Value of time method

This method is somewhat more speculative, but at the same time potentially more expedient than the other methods discussed. Many goods and services can only be consumed if the consumer is willing to spend time consuming them. Movies, books and many other entertainment products are good examples. Similarly, apps and

communication products are typically associated with specific dedicated allocations of time in their consumption.

The economic basis of this proposed valuation method is that consumers value their own time and that if they are willing to dedicate time to consuming 'time intensive' goods and services then the value of time that they are willing to sacrifice consuming these goods represents a lower bound to the value that they place on them.

This measure is potentially interesting in the context of the app economy because telcos and app companies generally have good data regarding the amount of time users spend using telecommunications services and apps. Actually putting a value on time is somewhat complex: allowances would need to be made regarding variations in the opportunity cost of time in different jurisdictions, considerations regarding whether consumers regarded themselves as in 'recreation or work mode' and various other technical considerations regarding the value of time. Notwithstanding these specific data challenges, if aggregate measures of consumers' allocation of time to apps and telecommunications services could be identified, then these could be used as a basis for estimation of the value of the app economy to consumers.

5.9 Commentary on potential measurement methodologies

The objective of this section of the report was to generate a set of prospective methodologies for measuring the value and economic contribution of the digital platforms and app economy. The methodologies discussed in this section are based on traditional economic methodologies applied to new types of data being generated by the growth of the app economy. As has been emphasised previously, the disruptive nature of the app economy growth means that traditional data sets corresponding to existing industry structures are of little use.⁴⁰

The size of the task associated with constructing meaningful, robust and defensible estimates of the size of the app economy should not be understated. Drawing together data sets from multiple countries from relatively new and potentially incompatible sources over multiple years is a very large task. Moreover, the target is moving rapidly; some countries are already collecting some data through their National Statistical Office. However, discussion is required at the international level on the optimal approaches to measuring the app economy. Early consensus on this issue would allow the collection of consistent data to commence.

⁴⁰ It should be noted that the current system of *System of National Accounts* ('SNA') (available at <http://unstats.un.org/unsd/nationalaccount/sna.asp>) is the internationally agreed standard set of recommendations on how to compile measures of economic activity dates from 2008. While the related documents such as the International Monetary Fund (IMF)'s *Balance of Payments and International Investment Position Manual* was updated in 2012 (BPM6), it is likely that globally further revisions and adjustments will be required to the SNA (and subsequently how it is applied by national statistical bodies) so as to reflect the development of the app economy, economy wide transformation and to better capture national economy activity sooner rather than later.

6 REGULATING THE APP ECONOMY

6.1 Introduction

The app economy is going mainstream,⁴¹ it is challenging businesses across multiple industries and this has inevitably led to significant debate about what forms of regulation, if any, are optimal. This debate is observed most publicly in legal disputes in a range of markets concerning *inter alia* both ICT sector ‘disruptive’ entities such as Netflix, Google, Apple, Facebook/WhatsApp, Tencent/Wechat, LINE and Viber, and Uber and Airbnb.

There are a number of factors that drive the uptake of ICTs. One factor that has been identified as key in this process is the regulatory environment. The right regulatory environment can ensure that consumers can use the full palette of new opportunities and services made available by the greater choice of devices, online services and applications. The regulatory environment needs to find the best possible trade-offs between consumer protection, investment and innovation for the whole of society. Regulators around the world have endorsed a set of best practice guidelines to protect consumer interests while ensuring a level-playing field for traditional and new market players by fostering a light-touch regulatory approach (see Figure 20 below).

OECD also recognized the importance of the app economy in a 2012 report (DSTI/ICCP/IE(2012)1/FINAL) and provided that:

Apps are one of the main new sources of innovation in the economy and remain an area of spectacular growth during this economic downturn. Mobile apps enable significant efficiency gains by improving the way people communicate, access information and obtain services. Apps extend the rich communication potential of the Internet beyond the traditional desktop computer and enable users to benefit from a myriad of information services practically anywhere or anytime they want. Economies rely on information to function effectively and the app economy represents a leap forward towards the goal of an informed and efficient knowledge-based society.

The app economy is extremely dynamic and evolving, and policy makers are keen to maximise its innovative potential and benefit for all sectors of the economy and society. Policy makers need to understand the mechanisms of the app economy in order to support innovation and ensure the maximum benefits possible for users.

The app economy is inherently global and this, in itself, has an impact on regulation. Ideally, a unified global approach to regulation is desirable but is unlikely to be operative in the short, or even medium, term. Regulation does not occur in a vacuum, and the establishment of a legal and regulatory framework is determined in large part by each country’s specific legal tradition, today regulators and industry players are struggling with this issue.

⁴¹ See Richard Waters, *Sharing economy starts to go mainstream*, Financial Times, 2 July 2015

Figure 20: ITU GSR Best Practice Guidelines

For over fifteen years, the ITU Global Symposium of Regulators (GSR) has brought together heads of national telecommunication/ICT regulatory authorities from around the world and has earned a reputation as the global annual venue for regulators to share their views and experiences. Every year, GSR adopts Best Practice Guidelines on topical regulatory and policy issues.

In 2015, GSR adopted Best Practice Guidelines to facilitate the widespread adoption and use of mobile applications and services through targeted regulation. The 2015 Best practice Guidelines also urged regulators to simulate demand and protect consumers and suppliers, Regulators recognized the importance of facilitating availability, access and use of m-services and digital apps by stating:

“New generation networks are the foundation of innovation in the ICT sector and the engine for the development of m-services and applications. Therefore, we believe that unified rules for facilitating infrastructure deployment and open access to networks at national and regional level can strongly contribute towards stimulating the development of m-services and apps. Cooperation among all public authorities involved at the international, regional, national, and local levels is key to rapid, smooth and efficient implementation. Policy makers and regulators must be mindful of the importance of designing flexible, incentive based and market-oriented policy and regulatory frameworks with regard to spectrum allocation and assignment for mobile broadband services, so as to create trust and provide the necessary conditions for m-services and apps markets to thrive. The development of new markets and the industry for mobile devices need to be sustained through adequate regulatory measures, in particular in developing countries.

Revisiting and reviewing, where necessary, current Government policies to make sure that they are still valid and appropriate for the new environment and ensuring privacy and security of government, business and consumer data may be necessary while open and collaborative regulatory frameworks are needed to promote the development of cross-cutting services such as m-commerce, m-banking and mobile money, as well as m-health. We recognize that creating a converged reference framework for competition, interconnection and interoperability can effectively facilitate the relationships among the various providers of infrastructure and services, as well as among them and apps and content providers.

Recognizing that it may be commercially attractive to share network elements between service providers to avoid duplication costs, and provide opportunities for more m-services to be made available, regulators may consider promoting network sharing practices in all network and value chain layers while maintaining healthy competition between network providers. We believe that innovative, out-of-the-box measures should be put in place to stimulate the take-up of m-services and the creation of locally-relevant apps in remote and rural areas.

Among other measures, universal service strategies can be defined and the appropriate mechanisms used to create ICT incubators or for funding local developers and locally-relevant apps. We call for regulatory measures, private initiatives and partnerships to reduce the cost of m-services and apps in order to ensure equal and universal access. We further recognize that acquiring digital skills is essential for the wide take-up and efficient use of m-services and apps, and inclusive training programmes for different target groups need to be established. We reiterate the relevance and value of the GSR13 Best practice guidelines on the evolving roles of both regulation and the regulators in a digital environment; and of the GSR14 Best practice guidelines on consumer protection in a digital world.”

Source: GSR-2015 Best practice guidelines⁴²

⁴² www.itu.int/en/ITU-D/Conferences/GSR/Documents/GSR2015/Consultation/BPG_2015_E.pdf

In 2015, the European Commission launched its much-trailed Consultation on Online Platforms, Cloud and Data, Liability of Intermediaries, and the Collaborative Economy⁴³. The Consultation is part of the Commission's assessment of the role of online platforms, promised in its Communications on a Digital Single Market Strategy for Europe on 6 May 2015. The enquiry asks whether platforms should be left to market dynamics, self-regulated or subject to regulatory measures

The Commission has summarised the scope of the Consultation as:

the social and economic role of online platforms, transparency (e.g. in search results), terms of use, ratings and reviews, the use of information by platforms, the relation between platforms and their suppliers, the conditions of switching between comparable services offered by platforms, and the role of online intermediaries, including ways to tackle illegal content on the Internet.

The latter has already generated a substantial level of commentary and debate within Europe and no doubt this is but the start of a broader dialogue in that market and globally. Industry stakeholders are concerned that the review will lead to developing unnecessary regulations for the Internet economy. This debate will undoubtedly play out in 2016 and beyond.

Irrespective of the approach, top-down, or industry by industry or by the courts the fact is, for the app economy to thrive, legal provisions are needed, and at the same time the applicable body of law must not hamper the spread of innovation and progress within the app economy. This is indeed a balancing act especially since most regulation is national (or in the case of Europe regional) when the app economy is in many ways 'born global'.

6.2 Preconditions for the development of platforms

Although the business models themselves may differ greatly from one sharing economy market to another, successful peer-to-peer platforms typically have three core attributes, which need to be acknowledged in any approach to regulation of the app economy.

First, the platform must create opportunities for sellers and buyers to do business with one another. This means attracting potential sellers and buyers to become users of the platform.

Secondly, peer-to-peer platforms need to be able to assist buyers and sellers in reaching an agreement. They need to have a way of determining or negotiating a price and other relevant terms of the transaction.⁴⁴

Third, peer-to-peer platforms need to ensure that buyers and sellers can conclude their transaction in a mutually satisfactory manner. In other words, there need to be mechanisms for creating trust between the parties and for addressing problems that may

⁴³ <https://ec.europa.eu/digital-single-market/en/news/public-consultation-regulatory-environment-platforms-online-intermediaries-data-and-cloud>

⁴⁴ Interestingly when Airbnb first started it identified an interest in renting rooms and spaces but individuals had no clear way to price such services. So Airbnb created an algorithm to provide a guide to their hosts.

arise. Almost all platforms have adopted reputational rating mechanisms (first popularised by ebay) in order to provide a crowd sourced view of the reputation of the seller/host/driver/supplier etc. The latter is important as there is a high degree of self-regulation in the app economy which can mean that there can be less oversight by regulators (at least conceptually).

6.3 Addressing Government, regulator and key stakeholders

In formulating the optimal approach for the regulation of the app economy there is a need to address Governments, regulators including both ICT and non-ICT regulators, and key stakeholders. Suggested generic advice to businesses in addressing sector regulators is set out in Figure 21.

Figure 21: Suggested advice to businesses in addressing sector regulators and stakeholders

Be collaborative (rather than defensive) with regulators: The app economy is a new concept and as new business models are involved these may be unfamiliar to existing market players including regulators. Increasing understanding takes time. There is often an assumption that sharing economy firms are trying to make a profit by skirting the regulations 'traditional' industries face. Without explaining the nature of your firm clearly to regulators you will likely be regulated as a traditional market player not as say, an intermediary (providing a platform for consumers rather than providing services directly) resulting in higher taxes and requirements.

Be responsive to regulators' legitimate concerns: Many app economy business models do raise legitimate concerns about user safety, privacy and access. These need to be addressed such that entities proposing new models should make compelling arguments they would believe if they were regulators.

Use state of the art approaches to reaching out to government: The best practices in approaching government include, forming coalitions and industry associations to represent a shared point of view rather than each company approaching regulators independently and only in times of crisis. There is a need to be an active participant, taking part in open consultations, seeking place on the decision-making table, being open and transparent about one's expectations and the challenges ahead. Further, app economy firms should seek outside validation from external third party stakeholders.

Share your data: Data need not be made public in order to share it with Government, and can help your case by reducing regulator concerns.

Make a well-researched case for the value provided by your firm: Rather than relying on maxims about the usefulness of the app economy, it helps to have concrete data.

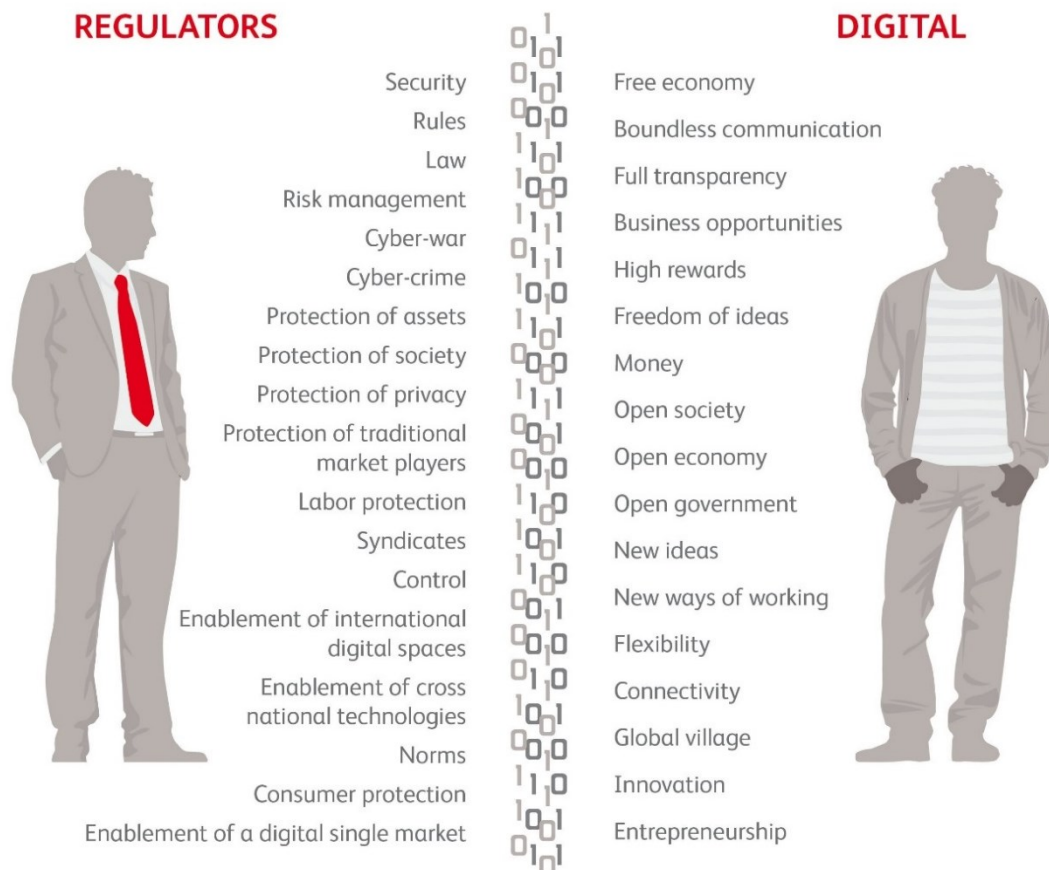
Find the best regulations out there and share them with the Government: Governments are often under-resourced and many existing rules are simply out-dated and are not relevant given the business model of app economy firms. There's no reason firms themselves cannot find the best rules out there and propose such optimal rules. Having said that, industry has specific (and often technical) knowledge and experience of business that they could contribute to the discussion – in order to avoid decisions and regulation not solidly grounded.

Source: ITU modified version of Sarah Cannon and Lawrence H Summers, How Uber and the Sharing Economy can win over regulators, Harvard Business Review, 13 October 2014.

6.4 The debate on optimal regulatory approaches

As part of the debate on optimal regulatory approaches, some have called for the **creation of a digital services category** with the reclassification of traditional communication services, followed by the reorganisation of the associated obligations such as transparency and non-discrimination, security, privacy, data retention, emergency services, interoperability and portability.

Figure 22: Different perspectives on the app economy and its regulation



Source: Bearing Point, 2015. NB, Digital refers to digital sector market players.

In the United States, Chairwoman Edith Ramirez of the US Federal Trade Commission (FTC) in October 2015 discussed the growth of the sharing economy for regulations that preserve competition and customer protection.⁴⁵ She indicated that central to this discussion was the question of how to balance regulations for established businesses and newer, innovative businesses. While the former often has strong consumer protections built up over years, the latter benefits from avoiding these regulations. At the same time, innovation could be hampered by regulations tailored to a specific (arguably legacy)

⁴⁵ Keynote Remarks of FTC Chairwoman Edith Ramirez 42nd Annual Conference on International Antitrust Law and Policy Fordham Law School New York, 2 October 2015. Available at www.ftc.gov/system/files/documents/public_statements/810851/151002fordhamremarks.pdf

business model. Capturing the benefits of innovative business models will require regulations that allow for growth without sacrificing consumer protections developed over many years.

Chairwoman Ramirez indicated that the FTC had “cautioned state and local governments not to impose legacy regulations on new business models simply because they happen to fall outside of existing regulatory schemes. The threshold question for policymakers examining new peer-to-peer businesses should be whether there is a public policy justification for regulating the service at all, either through an expansion of existing regulatory schemes or entirely new ones. If there is no public policy rationale justifying regulation, policymakers should allow competition to proceed unfettered.”⁴⁶ It was the FTC’s view that in their experience consumers generally benefit from the competition that arises between traditional and new business models.

Chairwoman Ramirez strongly advocated against the establishment of a ‘two-track’ regulatory regime for old and new business models. Regulating established businesses differently from newcomers would confer an unfair advantage to whichever model had the least costly regulations. Established business models should not be punished for complying with regulations, nor should new businesses be punished for innovating. Harmonizing regulations between new and old industries would preserve consumer protections without hindering innovation. There is no need to reinvent the wheel for sharing economy regulations when a mere extension of existing consumer protections may be all that is necessary. This is of course, easier to say than for Governments to do.

Other industry stakeholders hold even stronger positions as summarised in Figure 23 below

Figure 23: The case of less rather than more regulation for the sharing economy

Globally a range of organisations are arguing the case for less rather than more regulation for the sharing economy. In Europe, in response, with respect to EU collaborative economy consultations which will run through to early 2016, the Technology Policy Institute advises policy makers to dismantle policies that primarily protect incumbent operators. Policy makers should also resist applying the rules regulating incumbents to new market entrants; instead the appropriate response should generally be to lower the requirements for incumbents.⁴⁷

In Australia, the Institute for Public Affairs similarly recommends that liberal regulatory approaches be instituted to promote the growth of the sharing economy, including:

- The encouragement of bottom-up, self-regulating institutions prior to introducing top-down government controls;
- The reduction of occupational licensing, to allow private certification schemes and reputation mechanisms to evolve;

⁴⁶ *ibid*, page 7

⁴⁷ Refer to https://techpolicyinstitute.org/press_release/ec-proposals-may-impact-entire-internet-economy/

- Industry specific regulatory frameworks need to be avoided;
- Regulations making it harder for start-ups to compete for labour need to be reduced; and
- The status of individual contractors needs to remain separate from highly restrictive employment law.

Source: Darcy Allen and Chris Berg, The sharing economy How over-regulation could destroy an economic revolution, IPA, December 2014

An example of ‘light touch’ regulation is Singapore’s *Third Party Taxi Booking Service Providers Act 2015* summarised in Figure 24.

Figure 24: Singapore’s Third-Party Taxi Booking Service Providers Act 2015

Recent innovation in the shared economy has caused disruptions to the transportation sector. In response, the Singapore Government has chosen to regulate all third-party taxi booking services.

The *Third-Party Taxi Booking Service Providers Act* takes a ‘light-touch’ approach to regulation by only imposing basic requirements that are necessary to protect commuter interests and the ‘fundamental tenets’ of taxi regulatory policies. Under the regime, all third-party taxi booking services with more than 20 participating taxis are required to register with the Land Transport Authority (LTA). The threshold of 20 is to allow very nascent services to be exempted from registration, providing them room to ‘experiment’ before their size reaches the registration threshold. Furthermore, clause 11 of the Act empowers the LTA to impose conditions on registered providers to ensure that commuter interests are safeguarded and taxi regulations are not undermined. These conditions include the requirement that registered service providers must dispatch only licensed taxis and drivers holding valid Taxi Driver’s Vocational Licences, fare-related safeguards for commuters and the existence of customer support services for commuters.⁴⁸

Upon an overview of the Singaporean legislation, it is obvious that the ministry intended not only to minimise disruption and protect consumer interests, but also to allow space for new services to innovate and thrive, and for new technologies and business models in the market to emerge.⁴⁹

In summary, while there are many approaches which may be adopted, there is no compelling case for one to be recommended. It is simply too early to say, as the app economy has not been around for long enough nor are there examples of significant market failure which warrant prescriptive rule making. What is clear, however, is that (i) new models for the app economy are important, collaborative regulation has merit and is being embraced by users and (ii) that light-touch regulation, if any, ought to be preferred.

Over time a single regulatory treatment (as opposed to the two-track approach) of sectors, market substitutes, competitors etc. will become necessary as what was new and innovative becomes the norm. In the telecommunications/ICT sector in order to preserve *inter alia* competition and a level-playing field, this may necessitate reduced regulation, less operator obligations and more transparency with respect to sector cross-subsidisation.

⁴⁸ www.mot.gov.sg/News-Centre/News/2015/Second-Reading-for-Third-Party-Taxi-Booking-Service-Providers-Bill-by-Minister-for-Transport,-Lui-Tuck-Yew,-in-Parliament-on-11-May-2015/

⁴⁹ www.lta.gov.sg/apps/news/page.aspx?c=2&id=193b3496-9acd-4473-833e-b2b5d2bf5eaa

6.5 Exploring key regulatory questions for the ICT sector

6.5.1 Overview

Currently, collaborative economy platforms often exist in regulatory grey areas. That is 'sharing economy' platforms, often operate outside the scope of the specific national regulations that apply to their industry, current competitors and may in fact be incompatible with traditional forms of regulation.⁵⁰

Such is the speed of the broadband and smartphone revolution that collaborative business models were not anticipated by regulators, and therefore there were no rules drafted to govern these entities. It is not all too surprising, that Government policy can struggle to keep up with technological innovation and corresponding move away from traditional approaches. This has happened before in the ICT industry with the explosion of mobile services and is likely to happen again in the future given rapid technology innovation.⁵¹

However, collaborative platforms in the app economy do not exist yet in a legal vacuum. The best example of the application of rules, even though it is outside the ICT/Telecommunications sector is case of Uber (see Figure 22 below).

Figure 25: Uber, a case where the primacy of service is overcoming regulatory uncertainty

Uber's recent expansion demonstrates the ability of a sharing-economy platform to overcome regulatory uncertainty to provide services whilst fostering new competition in existing markets.

The legality of the ride-sharing app Uber has been a topic of great contention since the platform's inception in 2011. Uber Technologies Inc. is involved in numerous lawsuits internationally, amidst protest from taxi industries and governments. However, the growing primacy of the platform in regions with well-established taxi industries has shown that there is great market demand for the app.

Non-ICT Regulators and legislators globally have taken divergent approaches to the Uber platform. Uber has been the subject of claims that their drivers are not licensed to drive taxicabs, and hence that the application operates illegally. In Spain, France, and Thailand, the service has been banned outright.⁵²

⁵⁰ For example, there have developed over time very comprehensive classification systems for audio-visual content many of which are national and tailored for national cultural and religious norms and traditions. However, global web content including streaming of audio-visual content, often does not adjust the delivery based on geographical location and/or such classification systems. While globally games typically use the PEGI classification system – see www.pegi.info/en/index/ this is not the case for other content resulting in actions like Indonesia's largest operator Telkom Indonesia currently blocking Netflix's content in Indonesia.

⁵¹ While perhaps now forgotten there was a considerable debate about how cellular mobile services should be regulated and whether fixed line regulatory models should apply to wireless technologies. Likewise about VOIP. So in a way, the debate about the optimal regulatory regimes for OTT and similar services is nothing new.

⁵² www.businessinsider.com/heres-everywhere-uber-is-banned-around-the-world-2015-4?IR=T

However these countries form a small exception to the now-large range of markets where Uber is in successful and authorised operation.⁵³

Furthermore, the benefits of the platform are increasingly being recognized. Uber gives consumers a choice between regulated taxi companies in their area, and other forms of transport. Users can track their driver on approach, their own journey, and pay over the internet with their smartphone.

More broadly, the app creates jobs for drivers, together with competition for often- inefficient and ineffective taxi industries. Uber is increasingly being recognized as a superior service to traditional taxis. Reviews of the platform cite Uber as favorable in terms of price, reliability, and overall experience.⁵⁴ Therefore, Uber represents how collaborative business models can overcome regulatory uncertainty to provide new services and competition within existing markets.

Source: Author analysis of industry sources

More broadly, a continuing policy issue relating to the app economy is the need to provide users with meaningful information and control over how platforms are using personal data.⁵⁵ The debate about the use of personal data is a significant issue in and of itself and has been the focus of separate regulatory reviews in a range of markets in Europe, the Americas, Asia and elsewhere.⁵⁶ Data protection and privacy is also a topic which will be explored at the ITU GSR16.⁵⁷

Most significantly, a key risk to sharing platforms is government policy, in many cases driven by current industry incumbents. Regulators must find the balance between consumer concerns, and claims by existing incumbents that seek to protect their own market position or the primacy of their businesses.

It remains necessary for regulators to adapt and clarify existing regulatory schema to account for collaborative and app economy platforms. Doing so would provide all operators, businesses and consumers with greater legal certainty. Regulators – both in the ICT sector and beyond must therefore negotiate the difficult line and find the appropriate balance between ensuring consumer security, product quality and other protections in transactions; while at the same time creating the enabling environment for investment and innovation and avoiding over-regulating new business models.

Rather than simple two-sided marketplaces that match people looking for a service with others willing to supply it, over time it is expected that the business case will create the framework where there will be a greater responsibility for the delivery of services, meaning that business cases will consider engaging more at local level and consider greater local human and financial resources including hiring workers locally, and

⁵³ www.uber.com/cities

⁵⁴ www.choice.com.au/transport/cars/general/articles/uberx-vs-taxi-which-one-is-best

⁵⁵ [www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IE\(2012\)1/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/IE(2012)1/FINAL&docLanguage=En)

⁵⁶ Data privacy legislation or revised data privacy legislation has now been enacted in a majority of global markets. By January 2015 the total number of countries with data privacy laws totalled 109 and such legislation is expected to become ubiquitous. See detailed discussion in Graham Greenleaf, *Global data privacy laws 2015: 109 countries, with European laws now a minority*, (2015) 133 *Privacy Laws & Business International Report*, February 2015 UNSW Law Research Paper No. 2015-21. Available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2603529

⁵⁷ www.itu.int/en/ITU-D/Conferences/GSR/Pages/GSR2016/default.aspx

channelling back financing assets to the local economies in the process. Developments such as these may leave sharing economy companies, for better or worse, looking far more like other types of business. This is the process of integration of online services into the general economy and broader economic activity. Online services instead of being ancillary, an adjunct business channel or similar becomes fully integrated within business models, delivery platforms and central to business activity.

6.5.2 Taxation issues

While beyond the scope of this report, taxation and related regulations will also need significant updating in order that there is not a significant erosion of the tax base. It is important to note that this has already been the subject of considerable debate in a number of countries and in international institutions such as the Organisation for Economic Co-operation and Development ('OECD')⁵⁸ and others.

In a recent ITU study, *The Impact of taxation on the Digital Economy*⁵⁹, policy issues related to the taxation of firms operating within the digital sector are discussed, as well as levies imposed on consumers purchasing digital goods and services. As indicated in the title, its scope is wider than just telecommunication services, although it also addresses taxation of telecommunication/ICT operators.

This study explains that at the highest level, two opposing trends can be defined in terms of digital taxation policy: one aims to maximize collections based on exponentially growing digital flows; the second one recognizes that lowering taxation benefits consumers and businesses, and consequently, economic growth. According to the first trend, governments recognize that digitization is critical in their generation of revenues and are putting in place more mechanisms to maximize collection in these domains of economic activity. On the other hand, some countries consider that lowering taxes on the digital sector of the economy triggers spillovers that are larger than the foregone taxes. This effect in the case of broadband taxes is depicted in the Figure 26 which shows the Virtuous Circle of Tax Reduction on Broadband Devices, Equipment and Services.

⁵⁸ See recent report, *Addressing the Tax Challenges of the Digital Economy*. Available at www.oecd-ilibrary.org/taxation/addressing-the-tax-challenges-of-the-digital-economy_9789264218789-en

⁵⁹ www.itu.int/pub/D-PREF-EF/en

Tax Office (ATO) AUD1.5 million to establish, and is forecast to raise AUD150 million from Australian consumers in its first year of operation and AUD200 million in its second year.⁶¹

Similar taxation laws aimed at targeting the digital economy have been introduced in the European Union (EU). At the start of 2015, the EU begun to overhaul its consumption tax (value added tax or VAT) to extend it to providers of broadcasting and electronic services based on the location of their customers, instead of where the companies set up their head offices. Digital downloads and services sold to European retail consumers are taxed VAT rates of up to 27 percent, making the digital retail economy a significant source of tax revenue.⁶² The complexity and variation of VAT regimes in different EU member countries, however, has created huge challenges for the EU and the digital companies.

The United States has also attempted to pass an Internet sales tax that would force online retailers such as Netflix to collect sales taxes for state and local governments, even if the companies do not have a physical presence in the state. However, US Congress has yet to pass such a Bill.⁶³

6.5.3 Specific approaches to new ICT market players

It is also critical to explore key ICT regulatory questions as the regulation applying to such services (including OTT services) has a material impact not only on the telecommunications and IT sectors but on the uptake of such services in all other sectors of the economy. The ability and flexibility to embrace technology diffusion has a profound effect on a country's ability to take advantage of the transition to the app economy and increased consumer surplus arising from innovation and disruption.

As noted by an industry commentator on developments in the technology sector at the 2016 World Economic Forum in Davos: *"Why is innovation so important? In the technology driven world that we live in today, we see the digital influx in every sphere of our lives – whether it is in our workplace, our homes, our cars, our lifestyle and even our health. Going forward, the impact which technology and innovation will have upon our lives is likely to increase, and not decrease. It is therefore not surprising that many more governments around the world are talking about their innovation economy and making this a focal point of their economic and strategic planning."*⁶⁴

The Body of European Regulators for Electronic Communications (BEREC) published a report in October 2015 (BoR (15) 142) which recognizes that *"technological developments, especially the transition to the IP technology, which enables a growing range of services to be consumed online, has implied the emergence of new services and business models operating over the Internet. The provision of Internet-based services commonly known as "over-the-top" (hereafter: OTT) is of increasing importance in the rapidly evolving information- and communication technology industry, and of great value for consumers and businesses. BEREC acknowledges that availability of OTT services is*

⁶¹ www.news.com.au/finance/economy/federal-budget/australians-to-pay-millions-more-for-digital-music-movies-games-and-apps-under-federal-budget-plan/news-story/7ac55733c877a0ca0a657ef226cb08c7

⁶² [www.ey.com/Publication/vwLUAssets/EY-Digital_products_and_services_in_2015/\\$FILE/Digital_VAT_Campaign_Brochure.pdf](http://www.ey.com/Publication/vwLUAssets/EY-Digital_products_and_services_in_2015/$FILE/Digital_VAT_Campaign_Brochure.pdf)

⁶³ www.irishtimes.com/business/economy/who-will-pay-europe-s-new-digital-tax-consumers-or-publishers-1.2052859

⁶⁴ Irene Ng, *The Innovation economy is here to stay ...*, 4 February 2016. Available at www.linkedin.com/pulse/innovation-economy-here-stay-irene-ng

also driving a change as for the competitive dynamics and technology scenarios in communication markets and, therefore, the BEREC 2015 Work programme has identified OTT development as a strategic area of investigation.”⁶⁵

Aside from the data protection and privacy issues, and the regulation of social media, the greatest challenge for ICT regulators is the optimal approach to OTT supervision and regulation (if any). There is no question that there are significant regulatory imbalances that currently exist between the approach both in law and by regulators in relation to traditional telcos compared with OTT providers. Such regulatory imbalances are summarised in Table 3: Regulatory imbalances between traditional and OTT operators below.

Table 3: Regulatory imbalances between traditional and OTT operators

Areas of Regulation	Network Operators	OTT Players
1. Applicable laws	Domestic law or in Europe EU regulations	Home jurisdiction maybe; many gaps in applicable laws
2. Taxes	Local and domestic taxes	Located in low cost locations and tax havens
3. Licensing	Must be granted or acquire licence from national Governments	Mostly exempt
4. Operating Area	Only serve customers within the jurisdiction	Serve any user globally
5. Infrastructure/ Network	Investing in new technology networks to deliver services to end users	No investments in networks that reach end users while telcos must deliver competitors services
6. Competition	Strict rules applying including ex ante & per se rules, M&A restrictions	Mostly exempt except M&A if OTT subject to domestic competition law
7. Fees	Customers’ charges contribute to the costs of network provisioning	<ul style="list-style-type: none"> Services offered without any relationship to the underlying costs; two sided markets
8. Quality of Service	License requirements include SLAs and/or mandatory QoS standards	<ul style="list-style-type: none"> No QoS guarantee QoS issues blamed on network provider
9. Inter-connection	<ul style="list-style-type: none"> Required as part of regulatory regime Additional costs 	OTTs have no interconnection requirements for calling or messaging
10. Net neutrality	<ul style="list-style-type: none"> If applicable, best effort data transport without discrimination, independent of source or nature of data. Only typically traffic management permitted 	<p>No obligations (control over content and freedom of choice concerning customers)</p> <p>OTTs could be affected if Network operators apply traffic management restrictions</p>
11. Emergency services	Mandatory provisioning as part of licence conditions	Typically no such obligations
12. Interception	Strict regimes with costs borne by operator	Typically no such obligation

⁶⁵ http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/5431-draft-berec-report-on-ott-services_0.pdf.

Areas of Regulation	Network Operators	OTT Players
13. Retail Prices	Regulators' approval is typically needed in advance	No need for approval and maybe free for users
14. Universal Service	<ul style="list-style-type: none"> • Mandated • USO contributions as a percentage or network revenues 	No contribution
15. Spectrum fees	Required to acquire in an auction or pay market based fees for usage	No additional costs for OTT
16. Privacy	Strict data protection and privacy requirements for users	Practiced on a limited and generally voluntary basis
17. Number Portability	Obligation to offer number portability between providers	OTT service independent from mobile number

Source: Moktar Mnakri, *Regulating "Over-The-Top", Services - Need and Efficiency*, Arab Regional Forum on "Future Networks: Regulatory and Policy Aspects in Converged Networks". 19-20 May 2015 as augmented and modified by Windsor Place Consulting.

A number of other countries are looking at such issues and there have been international forums arranged by the ITU.⁶⁶ To highlight one market, in South Africa, the parliamentary Portfolio Committee is presently conducting an inquiry into data services and the possible impact of OTT providers on the market. In response, South Africa's network operators have requested the regulation and implementation of policies to govern OTTs, claiming the loss of a substantial portion of their revenues to new technologies. In order to produce a regime that is representative of the realities of the marketplace and technological landscape, the South African Government is attempting to balance multi-stakeholder objectives.

The approach taken by different regulators globally to OTTs has thus far varied. One regulatory trend has been to block the provision of OTT VoIP services. Alternatively, the regulatory approach in countries such as the UK and Australia has been to classify the different types of VoIP and treat them accordingly. Where VoIP services that are not designed to substitute directly for, or to interconnect with the PTSN, they are left unregulated. However, those that are designed to substitute traditional telephone services have been regulated with a 'light-handed' approach or when there was no specific regulatory framework for VoIP services they were classified and treated as any other telecom services.

Similar to earlier comments in this paper, the establishment of a "two-track" regulatory regime for legacy telcos and OTT providers in the ICT sector is neither sustainable nor optimal. Regulating fixed and mobile network operators differently from newcomers is likely to confer an unfair advantage to the model which has the least costly regulatory burden. Established network operators should not be punished for complying with the law and regulations, nor should new businesses be punished for offering innovative ICT services. Harmonizing regulations across the sector over time is optimal and arguably necessary as all industry sectors including the ICT sector are transformed.

⁶⁶ See ITU - ASEAN Forum on Over The Top (OTT) services, 8-9 December 2015. Phnom Penh, www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/Dec-OTT/en.aspx

Such harmonisation must however take account of the changed nature of competitive advantage, dominance and market power. Consequently, regulating OTT services as incumbent operators is not viable; nor is the continuation of current regulation on operators possible without change. The challenge is to adopt more collaborative regulatory measures where the applicable regulation on all market players is converged, coherent, promotes competition and provides incentives to invest and be innovative. Adopting only regulation which is necessary would seem to have considerable merit.

6.5.4 Competition concerns

In technology, today's small entrants are tomorrow's dominant firms. Witness the growth of players such as Google, Facebook and alike. While initially it may seem that the app economy promotes competition against legacy providers, there is a danger however, as these businesses grow, they may be tempted to utilise their market power⁶⁷ rather than compete. The economies of scale and scope are even more pronounced in the digital world.

As a consequence, the rise of the app economy does not alter the fact that competition policy should be at the heart of economic regulation in each and every market economy providing a set of tools to promote sustainable competition.

This means that competition regulators will need to be very watchful. In particular, the terms and conditions contained in contracts between sharing platforms and both suppliers and buyers need careful scrutiny especially if they involve exclusivity arrangements. This issue has been discussed earlier in this report.⁶⁸

Competition policy may be implemented through general competition laws, or through competition enhancing rules in specific sectors. In this context there is a need for a strong interworking arrangement between ICT regulators and general competition regulators, if they are separate. When there are separate entities enforcing telecommunications/ICT and competition rules, balancing the interplay and jurisdiction between these two entities is a key element in allowing the app economy to expand. On the other hand, where a single entity exists (either a Telecommunication/ICT regulator or a general competition authority), policies applicable to the sharing economy should encourage growth and competition.

⁶⁷ Market power occurs when an industry participant can unilaterally set and maintain prices and other commercial terms.

⁶⁸ It is also the subject of review by global competition regulators. The International Competition Network (ICN) conference held in Singapore from 26 to 29 April 2016 has as one its themes a special project entitled "*Dealing with Disruptive Technologies & Engaging Stakeholders: Challenges and Opportunities for Competition Agencies*". See <http://www.icn2016.sg/>. The ICN is the peak body devoted to national and multinational competition authorities. While the study/survey is not yet completed please refer to this presentation on its scope. www.oecd.org/competition/globalforum/Singapore_TOH%20Han%20Li_Disruptive%20Innovations.pdf

In addition to minimising an overlap between ICT and general competition regulators, if separate, it is also necessary to consider whether *ex ante* competition rules may be needed for some elements of the app economy in the future rather than rules which regulate *ex post* conduct (see Figure 28).

Figure 28: Is *ex ante* regulation needed in the future or is *ex post* regulation sufficient for the regulating the app economy?

Ex post: After the event regulation relating to specific allegations of market abuse	Ex ante: Anticipatory intervention mainly concerned with market structure
Advantages: <ul style="list-style-type: none"> • Attempts to stop conduct only shown to be harmful • Lower information and monitoring requirements • Least disruptive regulatory approach for emerging markets 	Advantages: <ul style="list-style-type: none"> • Sets forward looking expectations for firm behaviour • Provides industry certainty by setting clear rules • Promotes a greater degree of transparency
Disadvantages: <ul style="list-style-type: none"> • Triggered only after anti competitive conduct has occurred • Securing information from accused firm is difficult • General competition provisions may be unsuitable for industry specific issues 	Disadvantages: <ul style="list-style-type: none"> • Can lead to excessive or unnecessary regulation • Can create market distortions through regulatory arbitrage • Regulatory processes are costly and prone to capture by regulated entities

Source: Windsor Place Consulting (www.windsor-place.com)

6.5.5 Net neutrality issues

In this context of the importance of the app economy, the issue of net neutrality⁶⁹ is also likely to be reassessed by global Telecommunication/ICT regulators. Net neutrality, file defined differently in various markets has at its core that that Internet providers should treat all network traffic the same, that providers should not block certain sites, apps or services, should not control access to certain sites, apps or services nor should they give preferential treatment to certain sites, apps or services.

The key issues under discussion globally, as to whether they are permitted and if so, to what degree, include:

⁶⁹ The BEREC’s definition is that “literal interpretation of network neutrality, for working purposes, is the principle that all electronic communication passing through a network is treated equally. That all communication is treated equally means that it is treated independent of (i) content, (ii) application, (iii) service, (iv) device, (v) sender address, and (vi) receiver address. Sender and receiver address implies that the treatment is independent of end user and content/application/service provider.”

- Traffic management. These include technical measures that allow network operators to allocate available resources and maintain QoS for all users across a network.
- Zero rating. Zero rating is the practice by Internet providers of offering customers access to particular apps, sites or services for free or without tapping into customers' limited monthly allocations of bandwidth. To make such an offer there is a business arrangement between OTTs and Telecommunications operators/Internet service providers.
- Differential pricing for data usage. Under this scenario, the Internet provider charges users different rates for the various apps and websites they use. Examples include the ability to price data differently, like how much data you have consumed (e.g. first 100MB free or at a higher/ lower rate) or the time of the day (e.g. free Internet during night hours).
- Bandwidth Throttling. Examples of this include the intentional slowing of Internet service by an ISP after data quotas have been exceeded (e.g. the first 8GB at 10mbps, and 512 kbps thereafter) or depending on type of application (e.g. VoIP). Often throttling on mobile networks occurs depending on whether users have complied with “acceptable use policies”.

Internationally, three basic approaches to net neutrality issues in countries have been observed (see Table 4).

Table 4: Overview of approaches to Net neutrality

	Cautious observers	Tentative refiners	Active reformers
Measures taken	No specific measures	Light-handed NN measures: e.g. Guidelines or recommendations on transparency, lowering switching barriers, minimum QoS	Specific NN measures: e.g. laws in place, no blocking, no discrimination in treatment of traffic
Example countries	Australia Korea New Zealand (most of the countries)	Japan United Kingdom (voluntary code)	Argentina Benin Brazil (bill) Chile European Commission Ethiopia France India Mexico Netherlands Singapore Sudan Ukraine USA (FCC Order)

Source: ITU, 2015

It should be expected that a more active stance on the issue will be taken by ICT sector regulators. These approaches are:

- **Cautious observation:** These countries have taken note of net neutrality issues and have currently chosen not to take any specific measures to address these issues;
- **Tentative refinement:** These countries have adopted a light handed approach, with some refinements to the existing regulatory regime governing communications services, but not going so far as to prohibit certain behaviours; and
- **Active reform:** A growing number, these countries have gone further and sought to prohibit specific behaviours by ISPs, often subject to reasonable network management practices.

The GSR12 Best Practice Guidelines adopted by the global community of regulators recommend that regulators and policy makers seek to implement measures to oversee the use of traffic management techniques to ensure that those do not unfairly discriminate between market players. In addition, regulators also need to review existing competition laws to determine whether the regulatory tools, such anti-discriminatory law or regulations that are already in place, adequately address the competition issues that tend to impact net neutrality⁷⁰.

6.5.6 Possible approaches to licensing

App economy services are unprecedented in recent policymaking terms and in their pace of development, and how they will develop in the long term is difficult to predict. But if the benefits are real and the risks are manageable, then there's a good argument for legalising these services sooner rather than later so that they have a real chance to grow. This is easier said than done. Licensing structures in the telecommunications sector have been relatively static for some time, even though various attempts including by the ITU⁷¹ have been made to reform them. While perhaps licensing structures have underpinned by national WTO telecommunications sector commitments, in general licensing in the sector is focused on infrastructure and services typically with a number of sub-categories.

Alternative approaches, including those used in regulating the app economy in the transportation sector, may have broader merit in telecommunication/ICT sectors depending on the market and services concerned. They include:

- **Temporary licensing:** Apply temporary rules/grant licences for a limited period in order to permit greater study. This has been done in for example, Pennsylvania and Detroit, US, where Uber and similar services have classified these companies as 'experimental' service providers, in recognition of the fact that both their long-term impact and viability is unknown. These jurisdictions have given the

⁷⁰ GSR Best practices guidelines 2012 (https://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR12/consultation/GSR12_BestPractices_v3_E.pdf)

⁷¹ For example, see ITU, *Trends in Telecommunication Reform, 2004/05. Licensing in the Era of Convergence*.

companies temporary, two-year approval to operate while they decide on a more permanent regulatory response;

- **Transition arrangements:** Put in place transition schemes to compensate existing stakeholders. In the Australian State of New South Wales, UberX and similar services have been legalized, pending legislation in early 2016. They will be subject to an AUD1 levy per trip to fund a AUD250 million compensation package for the taxi industry. Some 50 taxi and hire car regulations were also repealed concurrently in that State.⁷² Such a levy provides funds for managing industry transition and compensating taxi plate holders; or
- **Deemed class licensing.** Another alternative approach which has been used in Singapore and has been debated in Malaysia and Indonesia is to use deemed class licensing for say web content such that services while not being located in the jurisdiction may be subject to a country's classification regime (eg with respect to nudity, violence etc.).

While such measures have not generally been adopted by telecommunication/ICT regulators except by the issuance of "no objection certificates" say, to a telecommunications operator's asset transfer ahead of later formal licensing⁷³ there would be merit for example, in having the ability to temporarily licence innovative services pending more detailed analysis or bring certain services within the penumbra of domestic regulation. New telecommunications legislation in selected jurisdictions would certainly permit this.⁷⁴ Putting in place transition from existing licensing and other sector regulatory regimes may also be required going forward.

Another approach which has considerable merit is industry or self-regulation. Industry regulation includes the formulation of industry codes of conduct. Often codes of conduct are industry-specific and will be decided by all operators or retailers within a given market amongst themselves. Examples of markets with a self-imposed code of conduct include the United Kingdom's ISP Code of Practice which is uniform and obligatory on all members.⁷⁵

The chief appeal of such regulation to providers is that, where sufficient self-regulation is accepted by market participants, regulators will not seek to impose more stringent rules. Regulators may also favour such mechanisms as they are flexible, can be implemented perhaps quicker than formal regulation and move the cost of regulatory compliance is with market players.

⁷² See www.smh.com.au/nsw/uberx-legalised-in-nsw-compensation-for-taxi-plate-owners-20151217-glpt6r.html

⁷³ For example, the no objection certificate issued by the Bangladesh Telecommunications Regulatory Commission (BTRC) in relation to the tower company spinoff (ie passive infrastructure transfer) to edotco Bangladesh from Robia Axiata Limited dated 15 January 2013.

⁷⁴ For example, the Cambodian *Law on Telecommunications 2015* promulgated 17 December 2015 provides in Article 17, for the licensing of operations (other than infrastructure and services) to be determined by Prakas of Telecommunications Regulator of Cambodia.

⁷⁵ See www.ispa.org.uk/about-us/ispa-code-of-practice/

6.6 Recommended approaches to regulation of the app economy

6.6.1 Overview

This report highlights the importance of the app economy, its speed and its transformation effects on broader economic activity.

It is important to appreciate that sharing economy sometimes involving two-sided markets is complex and very different from the traditional telecommunications markets. The traditional linear relationship between operator and subscriber may no longer exist and where it does, this relationship may not just be local but indeed global. Frameworks therefore must evolve as markets evolve, it is not possible to regulate the future into the past. In addition to technology neutrality, regulatory frameworks must also be as future-proofed as possible. Flexibility is arguably the key but there is little doubt that new arrangements, approaches and tools are likely to be necessary. As highlighted elsewhere in this report, some of those frameworks may need to be temporary and transitional.

Supporting innovation is not however the only goal. There are some elements of regulation which ought to be immutable. These pillars include the need for competition policy – both between competing substitutable services and in the supply of connectivity, consumer protection, data protection and privacy, and that the services supplied especially to consumers of are merchantable quality.⁷⁶ Taxation and the application of domestic laws on the international supply of services and content further highlight the complexity of this new environment and the upcoming challenges. The optimal approach to app or app economy does not mean more regulation but rather better regulation.

6.6.2 Building Blocks for App Economy Regulatory Guidelines

Given the above, the suggested advice to Government and ICT regulators in relation to future regulation in the Telecommunications/ICT sector is set out in Figure 29.

Figure 29: Suggested advice to Government and Telecommunications/ICT regulators

Undertake a review of the regulations applicable to network operators and OTT players: Assess whether such regulations are appropriate, whether forbearance should be applied to network operators, whether additional rules should apply to OTT providers and map how regulation of market participants – especially for substitute/competing services - should converge over time. Likewise review content regulation to ensure in a global market with greater levels of realism (e.g., virtual reality and similar) are appropriate and consistent with domestic conditions and cultural policy objectives. A key element of such a review is to

⁷⁶ In others words, “when the buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required, so as to show that the buyer relies on the seller's skill or judgment, and the goods are of a description which it is in the course of the seller's business to supply (whether the seller is the manufacturer or not), there is an implied condition that the goods shall be reasonably fit for such purpose.” See *Sale of Goods Act, Queensland, 1896*, section 17. Available at http://www.austlii.edu.au/au/legis/qld/consol_act/soga1896128/s17.html

consider market definitions and whether such definitions currently permit a differentiated regulatory treatment for OTT services.

Update the licence conditions and as required provide deeming provisions for non-resident OTT providers etc.: Update analogue/legacy licence conditions so as to reflect the move to digital/IP services and as required enact legislative amendments to provide for deeming provisions (eg to be say, a special class licence) for non-resident OTT providers etc.

Assess and continually monitor the state of competition in the market. It is critical to assess and critically monitor the state of competition in ICT markets. Ensure there are no gaps in regulation between telecommunications regulators and general competition regulators including where services are offered from outside the jurisdiction. Promote competition whilst recognising that ICT services markets are no longer national and that there is a range of competing services which are domiciled domestically. Ensure that operators with significant market power do not foreclose or significantly dampen the innovative service offerings and OTT services. Further, acknowledge as outlined earlier in this paper that while initially they may have provided strong disruptive competition, as new digital businesses grow and scale almost exponentially, they may be tempted to exercise their market power. Regulators will need to be watchful that the digital economies of scale and scope are not exploited contrary to law.

Collaborate with tax authorities: Ensure that there is, to the extent possible a level playing field for competing services. Such analysis should include the applicable income and value added taxes applicable to competing services.

Promote and facilitate ubiquitous broadband: Recognising the political, economic and societal need for ubiquitous broadband formulate policies to facilitate nationwide broadband using a mix of cable/fibre, wireless, satellite and other technologies. In particular, given the growing importance of wireless broadband to the meeting of global broadband density targets that there is sufficient International Mobile Telecommunications ('IMT') spectrum of at least 760 MHz but preferably 840 MHz IMT spectrum available and allocated to such services by 2020. In addition, to promote investment in backhaul transmission and higher speed broadband services in urban/economically viable regions.

Ensure adequate and up to date data protection, privacy and cyber security legislation based on global exemplars: Ensure that domestic legislation for data protection, privacy and cyber security is based on global exemplars and that agencies charged with ensuring compliance and promoting education are properly resourced and staffed by experts. The scope of such legislation should be wide and include legacy and new systems including the Internet of Things ('IoT'). It is also critical to enact digital identification ('digital ID) legislation.

Establish co-ordination procedures between regulators: Establish co-ordination procedures between communications sector regulators and regulators of broadcasting/content (if separate), competition, financial services and privacy/data protection to ensure consistent regulation and comprehensive inter-working arrangements.

Engage in greater public awareness and advocacy campaigns in relation to digital/ICT services: It is important that the public including all sections and age groups in society are well-informed as to their digital rights and responsibilities.

Regulators must engage more broadly with education and training sector: As many skills needed in the future and indeed the jobs of the future are very different from today, there is a role for sector stakeholders lead by the regulator to engage with Education and training Ministries, universities, tertiary institutions, schools and other places of learning to ensure that curriculum and syllabus reflect the app economy and the move to a digital society.

7 APPENDIX A: DATA FOR THE APP ECONOMY

As noted in Section 6, the onset of the App Economy has prompted widespread industrial change. However, quantifying the scale and scope of these changes is difficult. Established metrics and categories that national governments use for data collection are not applicable to the App Economy. Further, the App Economy has various flow-on effects within constituent ecosystems that present a fundamental problem for traditional modes of measurement. Almost every industry in the traditional economy is rapidly spilling revenue into the App Economy, as apps are integrated into existing modes of consumption.⁷⁷ Applicable data sources are fragmented, and often not particularly comprehensive on comparable points.

This report summarises data on the most obvious available economic indicators of the App Economy. A core component of findings relate to labour market data. In this report, 'App Economy jobs' are defined so as to include:

- Core ICT App Economy jobs: ICT-related jobs that use App Economy skills: the ability to maintain, develop, or support mobile applications. These include app developers, software engineers, and security engineers; and
- Direct non-ICT App Economy jobs: non-ICT jobs (such as HR, marketing or sales) that supports core App Economy jobs in the same enterprise; and
- Indirect or 'spillover' job: roles that exist to support workers in app development, production, marketing, and sales of apps or app-related products.
- Indirect ICT jobs: at telcos, etc. traditional players providing network services for mobile broadband and which have operations (supporting or else) to the app economy.

Further, to complement limited economic data, this report notes qualitative findings, and other indicators of the broader industrial effects of the app economy, where relevant. This report notes that the ITU may wish to consider accessing commercial data sources for further quantitative information as required.

7.1 Comparative global data

In 2016, the global mobile app market is projected to expand 24 percent to reach \$51 billion in gross revenue across all app stores. By 2020, gross revenue across all app stores will exceed \$101 billion globally. China will surpass the U.S. in terms of total revenue from app stores by the first half of 2016, having surpassed it in downloads in early 2015. Mature markets will see continued growth, while emerging markets like India, Indonesia,

⁷⁷ Vision Mobile, 2015, 'European App Economy 2015: Creating jobs and driving economic growth in Europe', www.visionmobile.com/product/european-app-economy-2015/

Brazil, Argentina and Turkey will expand the most dramatically this year and through 2020.⁷⁸

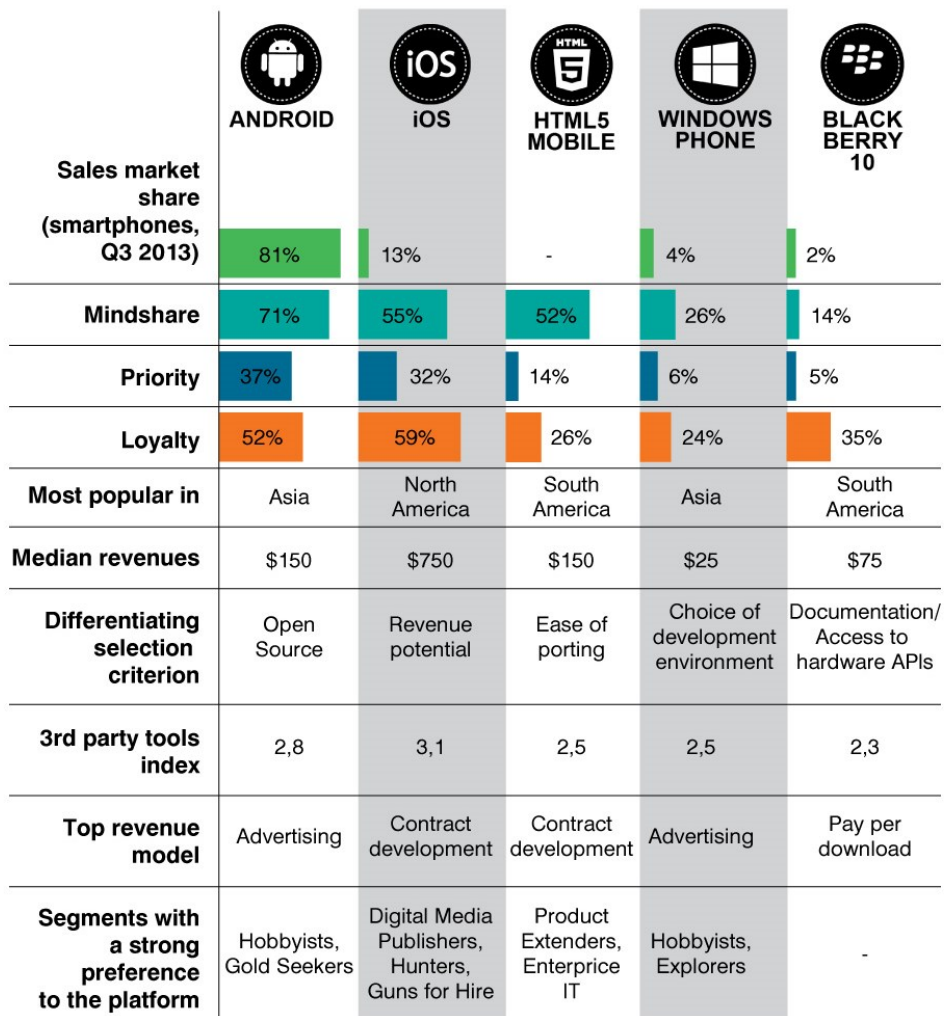
Table 5: Top 25 countries of app use, ranked by Smartphone users, 2013-2018 (millions)

Country	2013	2014	2015	2016	2017	2018
1. China	436.1	519.7	574.2	624.7	672.1	704.1
2. US	143.9	165.3	184.2	198.5	211.5	220.0
3. India	76.0	123.3	167.9	204.1	243.8	279.2
4. Japan	40.5	50.8	57.4	61.2	63.9	65.5
5. Russia	35.8	49.0	58.2	65.1	71.9	76.4
6. Brazil	27.1	38.8	48.6	58.5	66.6	71.9
7. Indonesia	27.4	38.3	52.2	69.4	86.6	103.0
8. Germany	29.6	36.4	44.5	50.8	56.1	59.2
9. UK	33.2	36.4	39.2	42.4	44.9	46.4
10. South Korea	29.3	32.8	33.9	43.5	35.1	35.6
11. Mexico	22.9	28,7	34.2	39.4	44.7	49.9
12. France	21.0	26.7	32.9	37.8	41.5	43.7
13. Italy	19.5	24.1	28.6	32.2	33.7	37.0
14. Turkey	15.3	22.6	27.8	32.4	37.2	40.7
15. Spain	18.9	22.0	25.0	26.9	28.4	29.5
16. Philippines	14.8	20.0	24.8	29.7	34.8	39.4
17. Nigeria	15.9	19.5	23.1	26.9	30.5	34.0
18. Canada	15.2	17.8	20.0	21.7	23.0	23.9
19. Thailand	14.4	17.5	20.4	22.8	25.0	26.8
20. Vietnam	12.4	16.6	20.7	24.6	28.6	32.0
21. Egypt	12.6	15.5	18.2	21.0	23.6	25.8
22. Colombia	11.7	14.4	16.3	18.2	19.7	20.9
23. Australia	11.4	13.2	13.8	14.3	14.7	15.1
24. Poland	9.4	12.7	15.4	17.4	19.4	20.8
25. Argentina	8.8	10.8	12.6	14.1	15.6	17.0

Source: eMarketer 2014

⁷⁸ http://blog.appannie.com/app-annie-releases-inaugural-mobile-app-forecast/?utm_source=AAhomepage_LO&utm_medium=cta_button&utm_campaign=1602_App_Forecast

Figure 30: Global App Economy – platform comparison⁷⁹



Source: Vision Mobile via TheAPPY 2014

Below is a discussion of data on a regional and national basis, indicative of the global economic significance of the App Economy.

7.2 Europe

The European⁸⁰ mobile App Economy market is continuing to grow on a rapid trajectory. User bases are increasing, as smartphone penetrations rates reached 50% of mobile users in 2015.⁸¹ Consumers are fuelling the corresponding increase in app development markets. However, future growth will be met with the limitations of potential market saturation, and offshore competition - particularly from Asia.

⁷⁹ www.theappys.ie/blog-news/global-app-economy-will-be-worth-143-billion-by-2016/

⁸⁰ Note: references to Europe here include EU member states, plus Switzerland and Norway

⁸¹ ITU.

7.2.1 Employment

Currently, it is estimated that there are between 1.6 – 2 million App Economy jobs in Europe.⁸² The app development industry is estimated to have earned developers in Europe over 11 billion USD from around the world.⁸³ Two-thirds of these roles belong to full-time professionals. This is indicative that the European market has maintained its global standing and is relatively stable, even in light of increasing Asian competition.

Of these developers, a study by *Vision Mobile* estimates that for every app developer job in the EU, an additional 1.31 non-technical and indirect jobs are created on average.

Figure 31: Vision mobile: 2 million App Economy jobs in EU28, 2015⁸⁴



Source: Vision Mobile 2015

7.2.1.1 Drivers of employment

iOS and Android generate most of these non-technical jobs. Notably, there are more professional developer jobs tied to iOS (40%) app development than to Android (33%). This speaks to the nature of the mobile user market in the region: Apple products continue to be the preferred platform in the region. In 2016, Apple announced it was opening Europe's first iOS app development centre in Italy. The centre will support teachers, and create a specialized curriculum for developers.⁸⁵

However, the total proportion of app-related employment directly attributable to iOS has fallen. This is presumed to be due to the maturing of the EU app development market, with corporations supporting parallel development in iOS and Android to cover entire

⁸² Note – estimates based on Vision Mobile 2015 report, and Progressive Policy Institute paper (2016). The latter used a considerably more conservative ratio estimate metric, hence the discrepancy in results. See:

www.progressivepolicy.org/blog/app-economy-jobs-in-europe-part-1/
www.visionmobile.com/product/european-app-economy-2015/

⁸³ www.apple.com/pr/library/2016/01/21Apple-Opening-Europes-First-iOS-App-Development-Center-in-Italy.html

⁸⁴ As noted, the 2016 *Progressive Policy Institute* papers use a more conservative ratio estimate. The *Vision Mobile* estimates remains useful as indicators of relational aspects of the industry.

⁸⁵ www.apple.com/pr/library/2016/01/21Apple-Opening-Europes-First-iOS-App-Development-Center-in-Italy.html

mobile user markets. Other platforms, including Windows Phone and its mobile browser, also create jobs, albeit at a much lower multiplying rate.

7.2.1.2 Policy response

European politicians are also starting to take an increased interest in the sector. Policies and programs are being put in place to support future App Economy innovation, and development. For instance, the Startup Europe program aims to offer an integrated pan-European platform to help startups and entrepreneurs. The initiative works by pairing top startups with corporate participants, to help startups emerge more rapidly from local ecosystems and economies of scale.⁸⁶

7.2.1.3 Incomes

The average incomes of App Economy jobs in Europe also surpass their regional and global market equivalents – pointing to the stability and security of the EU app developer market. In the EU, more than half (51.4%) of app developers make over \$500 per month, over the worldwide average of 48.7%. Notably, enterprise app developers in Europe earn significantly more than their consumer-based counterparts. A survey of full-time App Economy professionals reveals that 47% of developers making enterprise apps earn more than \$5,000 per month, while only 32% of consumer app developers exceed this level.

7.2.1.4 Dominant national markets

France, Germany and the UK are among the top app producing markets in Europe. As a percentage of total workforce, App Economy jobs are estimated to represent 0.9% in France, 0.7% in Germany, and 1.0% in the UK. The Nordic countries are also emerging, with lower numbers of jobs that make up a higher percentage of smaller labour markets.

⁸⁶ <http://startupeuropepartnership.eu/>

Table 6: App Economy jobs by European country: by total number and as % of overall labour market⁸⁷

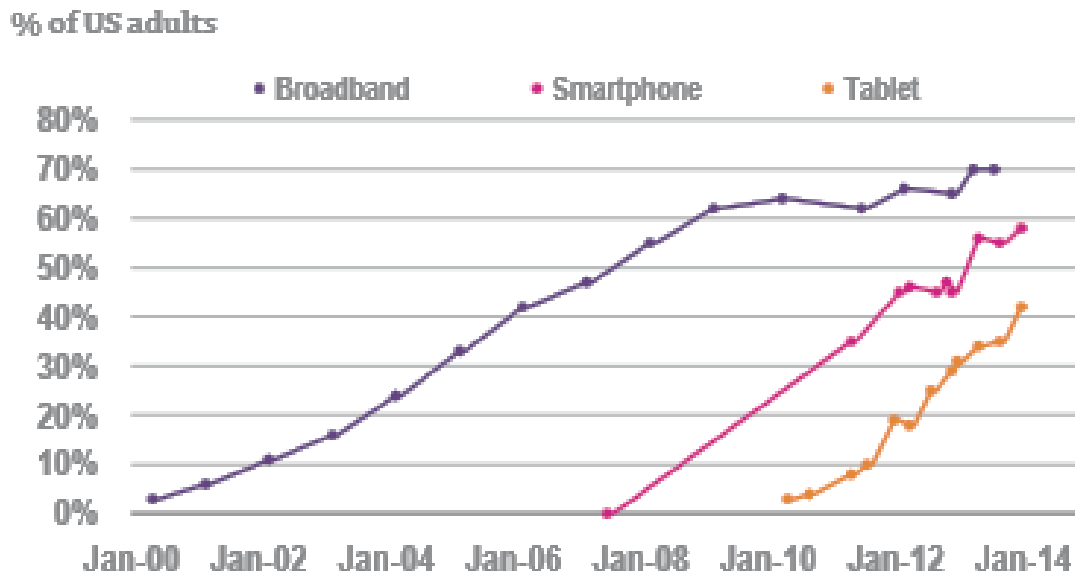
Country	No. of jobs (1000s)	% of overall labour
UK	321.2	1.0%
Germany	267.9	0.7%
France	228.9	0.9%
Netherlands	125.2	1.5%
Italy	97.5	0.4%
Poland	84.3	0.5%
Spain	78.2	0.5%
Sweden	67.2	1.4%
Finland	47.4	1.9%
Norway	41.6	1.6%
Denmark	33.4	1.2%
Switzerland	28.5	0.6%
Portugal	27.4	0.6%
Belgium	23.4	0.5%
Czech Republic	19.2	0.4%
Hungary	15.3	0.4%
Ireland	13.2	0.7%
Austria	11.9	0.3%

7.3 USA

The American app market was valued at USD87 billion in 2014, and is projected to grow to 150 billion by 2017. The rates of smartphone adoption in the US are increasing to the point where smartphone use will outstrip broadband access. The App Economy in the US is only set to grow larger, with 37% the current estimates of approximate annual growth rate.

⁸⁷ www.progressivepolicy.org/blog/app-economy-jobs-in-europe-part-1/

Figure 32: App Economy technology adoption in the US



Source: Plum Consulting, Pew Internet Research

7.3.1 Employment⁸⁸

An estimated 1.66 million app economy jobs exist in the USA in 2016. The App Economy is cited as a significant driver of the growth in the US economy since the development of smartphones and app platforms in the nation in 2007-2008. 22.7% of App Economy jobs are predictably located in California, with the next-largest App Economy states being New York (9.4%) and Texas (7.3%). It is worth noting that the App Economy has spread widely from its birthplace in Silicon Valley, to 25 other states in the country. This evinces the decentralisation of app development, and related employment.

Table 7: Estimates of American App Economy jobs over time

Publication	App Economy jobs (1000s)
Feb 2012	466
October 2012	519
July 2013	752
Dec 2015- Jan 2016	1660

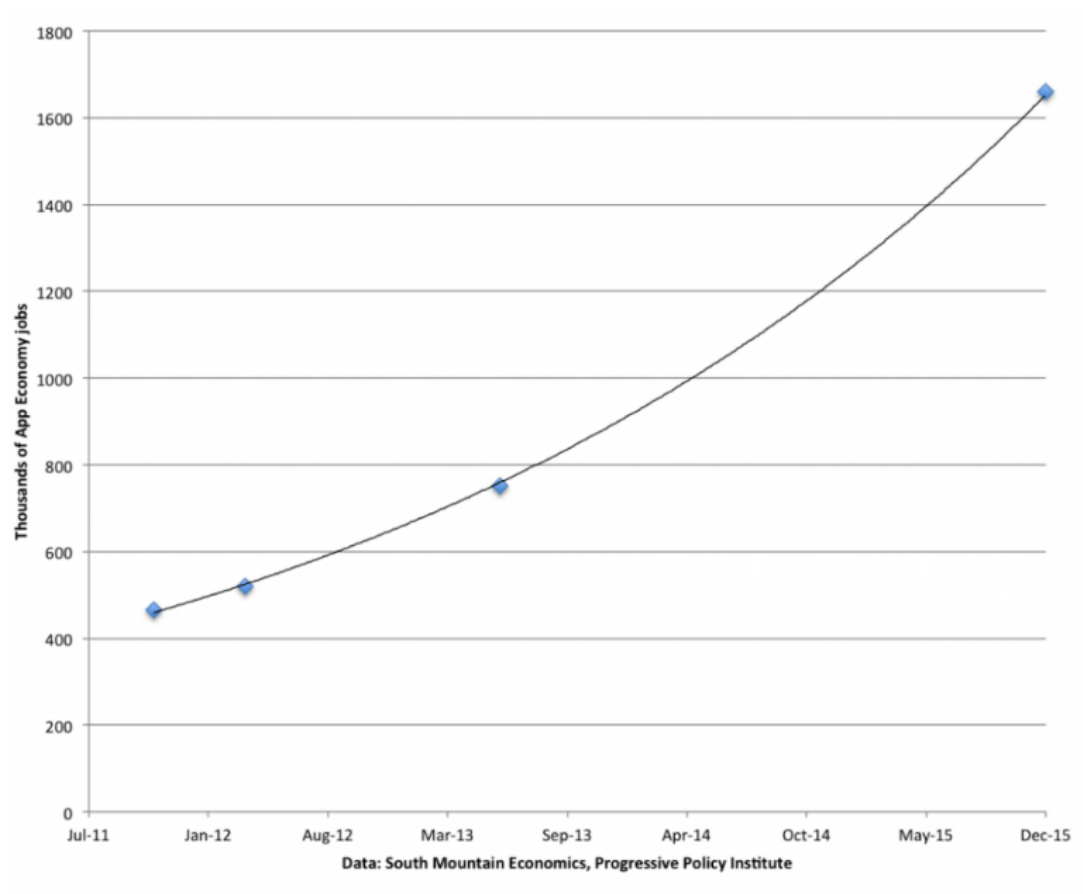
Source: Progressive Policy Institute synthesis of South Mountain Economics, The Conference Board, Indeed, and BLS data.

⁸⁸ www.progressivepolicy.org/blog/app-economy-jobs-part-2/

7.3.1.1 Drivers of employment

Small companies and startups comprise of 77% of the American app industry, dominating larger players in all categories except gaming. As with Europe, iOS and Android systems dominant the App Economy markets. iOS developers have experienced a 54% job growth between 2012-2014, while Android has experienced 110% job growth. This rapid increase in Android developers is likely to be for similar reasons to comparable growth in Europe. That is, with the maturing of the American app development market, entities are now supporting parallel development in iOS and Android to cover entire mobile user markets.

Figure 33: Growth trajectory of American app economy



Source: Progressive Policy Institute

Table 8: Market comparison: Europe vs the US⁸⁹

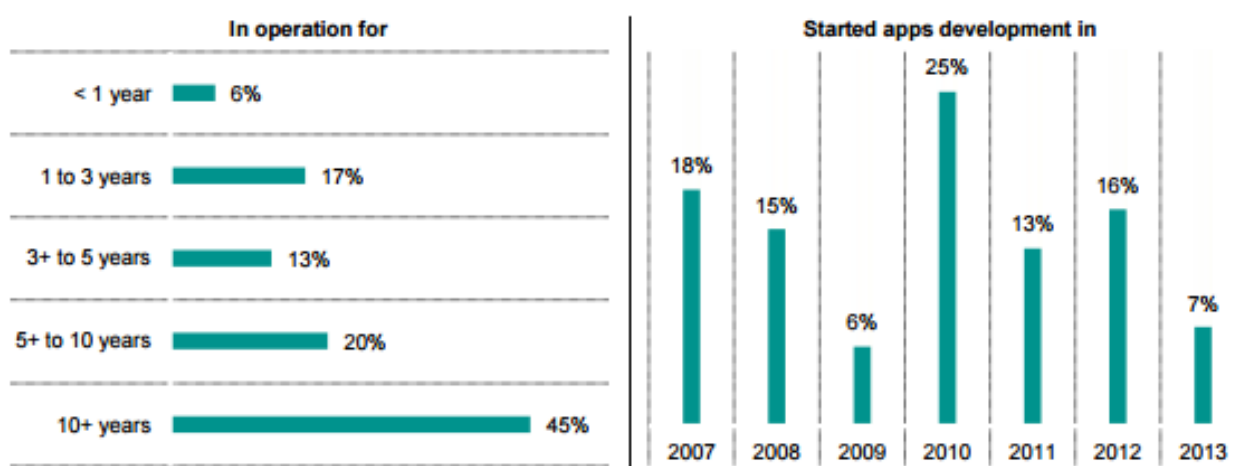
	App Economy jobs (millions)	As % of overall labour market
Europe	1.64	0.7%
United States	1.66	1.2%

Source: Progressive Policy Institute

7.4 Canada

The Canadian app market has been on a growth trajectory in recent years. The total number of apps users in Canada is 18 million, as smartphone penetration rates are set to exceed 21 million.⁹⁰ An estimated half of all Canadian businesses use mobile technologies to input data for faster information flows.⁹¹ Entities developing apps are generating \$1.7 billion in revenue per year, a figure expected to climb to CAD3.3 billion in 2017, and CAD5.2 billion by 2019. However the recent economic downturn in the nation has affected app sales, and initial forecasts are less certain than previously estimated.

Figure 34: History of Canada's App enterprises



Source: Surveys for Canada's apps enterprises, ICTC 2014

7.4.1 Employment

An estimated 64,000 jobs in the App Economy exist in Canada. Of these, 27,100 individuals are in technical positions, 24,100 are in non-technical roles, and 12,800 are in induced employment. This figure is predicted to grow to 110,000 by 2019. Estimated that

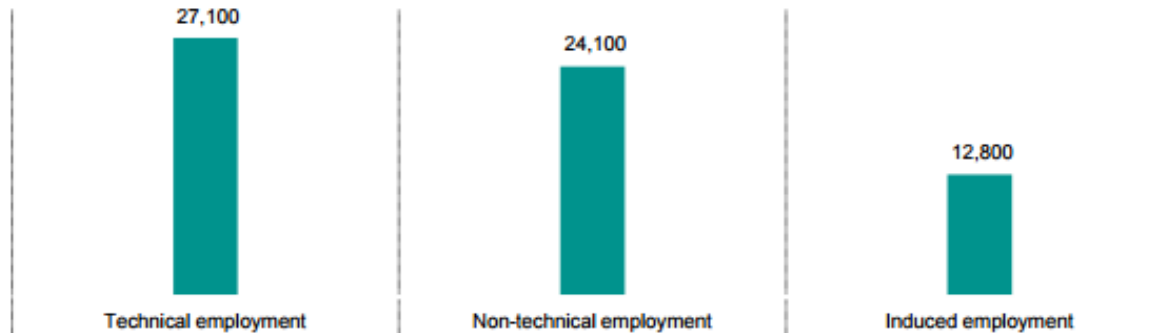
⁸⁹ www.progressivepolicy.org/blog/app-economy-jobs-in-europe-part-1/

⁹⁰ www.ictc-ctic.ca/wp-content/uploads/2014/02/AppificationFeb2014.pdf

⁹¹ *ibid.*

1 in 2 jobs is a technical position, the other a non-technical position assisting with promotion, marketing or sales.⁹²

Figure 35: Apps economy employment in Canada by job type



Source: ICTC 2014

7.4.2 Market

Canada's apps market faces many challenges. Global industry competition, lack of awareness of services offerings, shortages of capital, limited opportunities to collaborate with end-user enterprises and a shortage of skills all represent key impediments to future market growth.⁹³

Notably, the US is a key market for Canadian apps sales, as over a quarter (28%) of revenue is sourced from the US alone (see Figure 36). As the Canadian economy slows and exchange rates decreases the value of the Canadian dollar relative to the USD,⁹⁴ the Canadian app market will need to ensure within-province revenue streams remain stable. Notably, Apple's App store has introduced a new, lower pricing tier for apps in Canada in January 2016. The new tier will let developers price apps as low as CAD\$0.99, allowing developers to sell more copies of their apps, with less money for each sale.⁹⁵

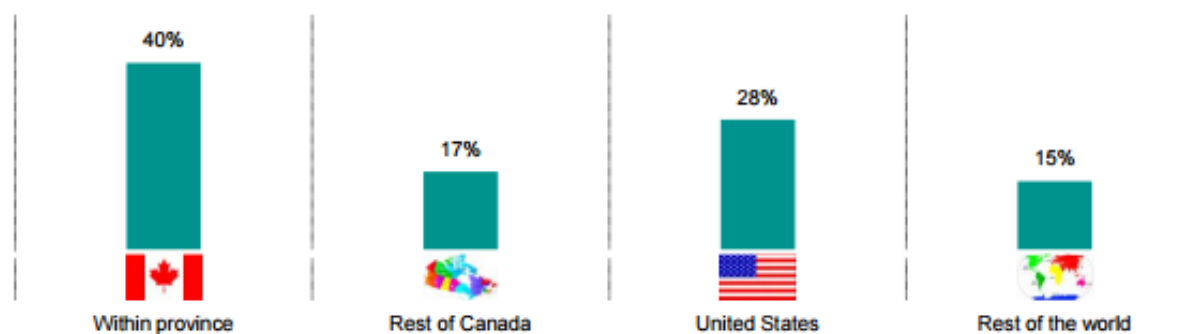
⁹² *ibid.*

⁹³ *ibid.*

⁹⁴ <http://mobilesyrup.com/2016/01/28/apple-introduces-new-0-99-pricing-tier-for-apps-in-canada-and-new-zealand/>

⁹⁵ *ibid.*

Figure 36: Revenue sources for Canada's apps enterprises



Source: Surveys for Canada's apps enterprises, ICTC 2014

7.5 India

The Indian mobile market has rapidly grown, to now include close to a billion mobile subscribers. Despite a relatively low smartphone penetration rate (est. 10% of total mobile users), and low internet penetration (17.4%, lowest among the BRICS) the aggregate number of smartphone users in India (100,000,000 approx.) still forms a large market for app downloads. For instance, India is among the top 5 countries for Google Play downloads internationally.⁹⁶

7.5.1 Developing market

As mobile data plans become more affordable and India's burgeoning middle class grows, the Indian app market is only set to grow further. However, India notably represents an opportunity for alternate OS platforms, particularly those designed to operate on lower-end devices. In this respect, India is distinct from developed markets where the Android/Apple duopoly is firmly established.⁹⁷ India is a highly price-sensitive market, and represents a challenge to OS companies and app developers to monetizing its large download market.

7.5.2 Employment

India currently hosts an estimated 75,000 'core' developers according to a study by the Indian Council for Research on International Economic Relations (see Figure 28 below for infographic of summary of study data). India is therefore the largest developer industry outside the USA. The aggregate number of jobs that the app market will create in India during the period 2014-16 is predicted to lie between 91,486 and 604,867. Notably the upper limit is close to eight times the current levels of employment. It is estimated that 10% of apps globally are developed by Indian nationals.⁹⁸

7.5.3 Social outcomes

The rapid growth of the app market in India is having a transformative impact on livelihoods and businesses. However, the potential for India to leverage the app

⁹⁶ <http://icrier.org/pdf/appreport.pdf>

⁹⁷ *ibid.*

⁹⁸ *ibid.*

ecosystem to achieve certain developmental goals is still underutilised. Current app usage in the nation is geared towards social networking and entertainment. Apps that focus on development initiatives like agriculture, health and education have not scaled adequately because of the limited nature of the Indian app ecosystem itself.

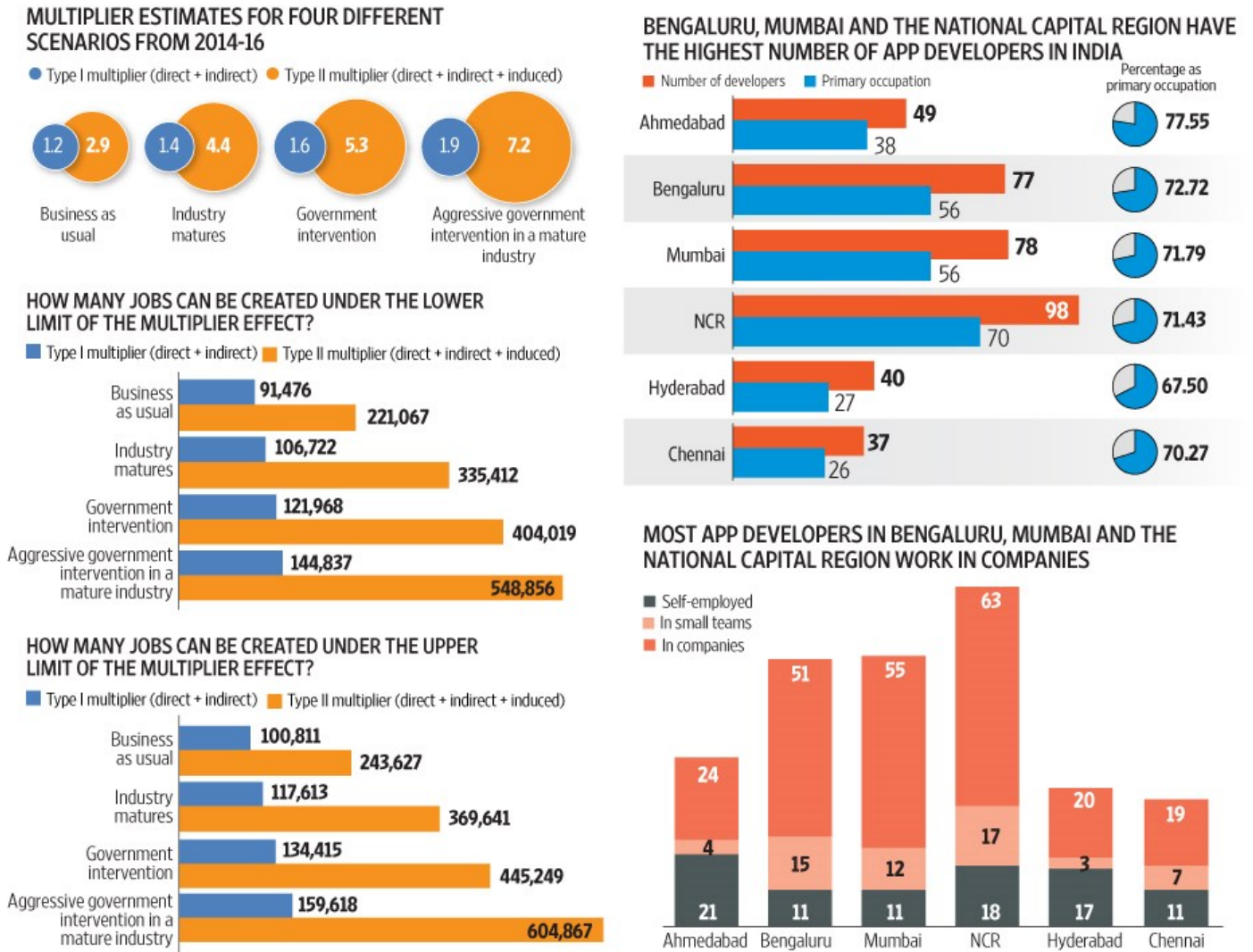
7.5.4 Policy responses

Notably, the Indian government has commenced its 'Mobile Seva' project to respond to the emergence of the nation's mobile market, and develop a framework of 'm-governance'. The Department of Electronics and Information Technology has developed a centralized mobile App store, currently hosting over 700 apps. The eGov AppStore facilitates public service provision via a common platform.

The eGov AppStore is hosted on the National Cloud, with apps customized so they can be used by government agencies and departments at Centre and State levels.⁹⁹ The eGov AppStore represents an interesting marriage of policy and developing market technology. If successful, the eGov Appstore will hallmark the capability of developing national governments to harness mobile markets to improve social outcomes.

⁹⁹ *ibid.*

Figure 37: Jobs and India's App Economy, 2015



Source: Livemint 2015 – based on research from Indian council for Research on International Economic Relations

7.6 Australia

The Australian App Economy represents is one of the most matured digital ecosystems internationally. Australia currently has a higher proportion of 'core' App Economy jobs as a share of all ICT roles than the United States and the United Kingdom.¹⁰⁰ Smartphone penetration rates in Australia are also higher per capita than in many international counterparts, including the US and the UK.¹⁰¹ It is estimated that Australia's computer systems design industry has grown at 38% since 2008, vastly outstripping overall employment growth.¹⁰² As the sector continues to grow, pundits highlight the potential

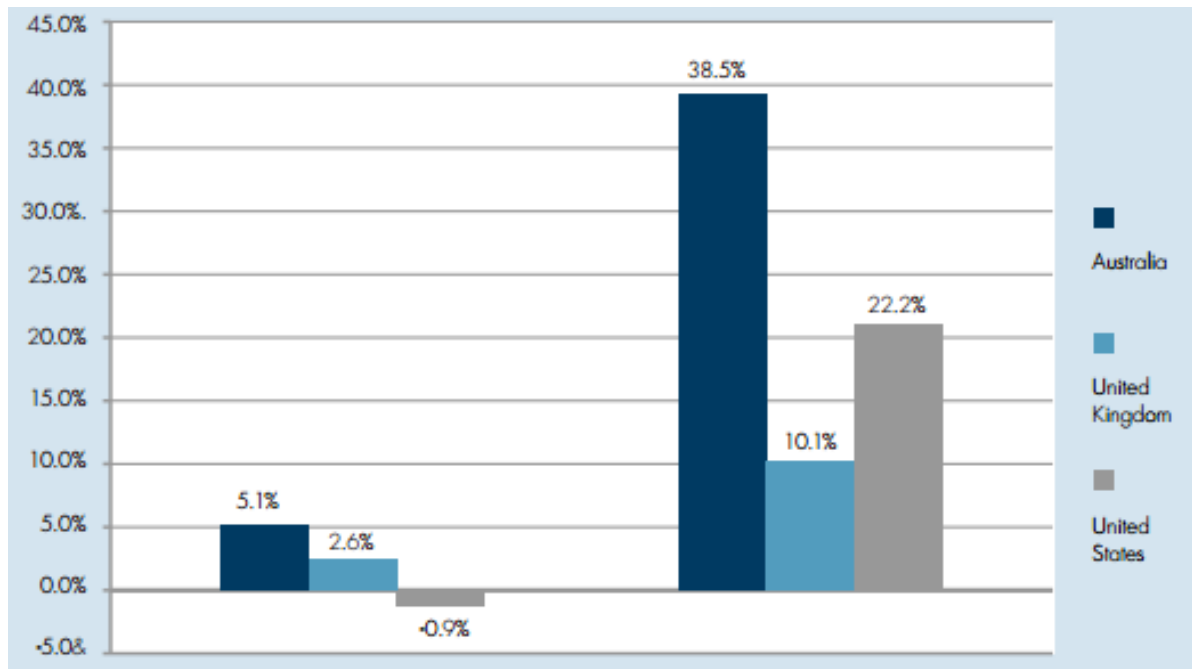
¹⁰⁰ www.acs.org.au/news-and-media/news/2014/jobs-in-the-australian-app-economy-white-paper-by-michael-mandel

¹⁰¹ http://landing.deloitte.com.au/rs/deloitteaus/images/Deloitte_Mobile_Consumer_Survey_2014.pdf

¹⁰² www.progressivepolicy.org/wp-content/uploads/2014/07/2014.07-Mandel_Jobs-in-the-Australian-App-Economy.pdf

for Australia to become an exporter of apps and app-related services, given the current international importance of English-language markets.

Figure 38: Australia’s tech employment outperforms United States and United Kingdom (L: tech/info, R: computer systems design) ¹⁰³



Source: Progressive Policy Institute 2014

7.6.1 Features of a mature market

The Apple-Samsung duopoly is well-established in the Australian market. Australia has been a relatively early adopter of mobile payment and banking services and applications, and in-app usage rates are high.¹⁰⁴

Indeed, Australians spend an estimated 1 hour per day on in-app smartphone usage. However, app re-engagement rates are low. One attribution provider in the Australian market, Tune, has noted that only 13% of users remain active beyond a week of installing an app. Market leaders like Facebook and Google have responded rapidly to improve re-engagement, by releasing new ad products in 2015, and facilitating deep linking and post install measurement.¹⁰⁵

7.6.2 Employment

Approximately 140 000 workers are employed in the Australian app economy. On a per-capita basis, Australia compares favourably with other developed nations for App Economy employment and growth. As highlighted above, the computer systems design

¹⁰³ *ibid.*

¹⁰⁴ http://landing.deloitte.com.au/rs/deloitteaus/images/Deloitte_Mobile_Consumer_Survey_2014.pdf

¹⁰⁵ www.bandt.com.au/featured/future-app-economy-australia

industry comprises of 1.6% of overall employment in Australia (versus 1.2% of the US workforce).

Commentators have also noted the potential for digital economy-industries to supplement the flagging resources sector in the nation.¹⁰⁶ Employment in Australian computer systems have risen 38% since 2008, as compared with 8% in the rest of the economy. By way of international comparison, the US has seen a 22% gain in computer systems employment, versus 10% in the UK. Also notably, NSW is Australia's largest source of App Economy jobs, with 77, 000 employees working in the sector.

7.6.3 Vietnam

Vietnam is noteworthy for having the top-rated App Economy in Southeast Asia (see Figure 30 below). Vietnam has a fast-growing number of app developers. The use of apps in the country is only set to continue, as smartphone penetration rises and individuals use of mobile apps increases. The Vietnamese government is seeking to support industry growth by sponsoring initiatives like 'Vietnam Silicon Valley' - a group intended to help the growth of startups.¹⁰⁷

7.6.4 Employment

There are currently 29,000 App Economy jobs across the country¹⁰⁸. However, app developers who are using Vietnamese workers often are building apps that appear in other countries. The Japanese-based app developer company 'Mulodo' has an office in Ho Chi Minh City, as does Singapore-based entities Hoiio and Vinova. Multinational companies are also using Vietnamese workers to develop applications and software in their supply chains.¹⁰⁹

¹⁰⁶ www.progressivepolicy.org/wp-content/uploads/2014/07/2014.07-Mandel_Jobs-in-the-Australian-App-Economy.pdf

¹⁰⁷ www.progressivepolicy.org/wp-content/uploads/2015/09/2015.09-Mandel_Vietnam-and-the-App-Economy1.pdf

¹⁰⁸ *ibid.*

¹⁰⁹ *ibid.*

Table 9: Vietnam: leading the app economy

Vietnam's App Economy Leads Southeast Asia	
Country	SE Asia App Economy Index, adjusted for omitted job postings*
Vietnam	1.83
Singapore	1.37
Indonesia	1.37
Philippines	0.90
Malaysia	0.75
Thailand	0.35

**SE Asia App Economy index = number of job postings containing terms 'iOS' or 'Android' for that country divided by the average number of job postings containing terms 'iOS' or 'Android' for all six SE Asia countries. Indonesia and Malaysia data adjusted to eliminate spurious results from one job board. Index except for Vietnam adjusted for omitted job postings.*

Data: Indeed summary job postings, collected as of August 5, 2015, analyzed by the Progressive Policy Institute. Based only on publicly available data—no personal individual or business data used.

Source: Progressive Policy Institute 2015

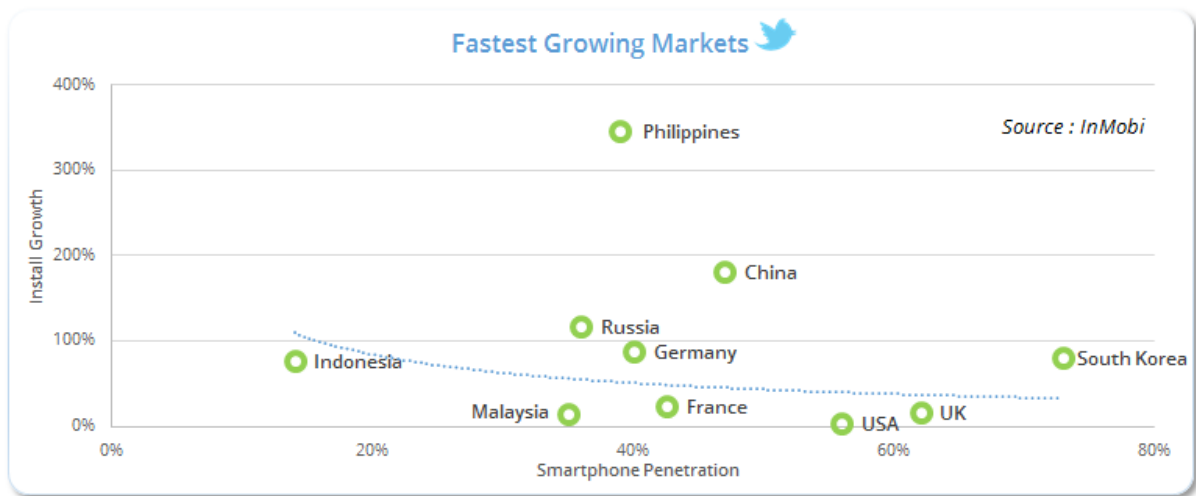
7.7 Indonesia

Indonesia's App Economy is relatively under-developed. Nevertheless, the number of developers in the country are beginning to increase. It is estimated that there are 22,000 App Economy jobs across the country¹¹⁰. Despite low current smartphone penetration rates, audiences are eager to download and install apps. As smartphone penetration rates increase, the Indonesian App Economy will develop further. Indonesia is marked as a significant growth market, noted as one of the most upcoming app install destinations of the world.¹¹¹ (see Figure 39).

¹¹⁰ www.progressivepolicy.org/wp-content/uploads/2015/09/2015.09-Mandel_Indonesia-Road-to-the-App-Economy.pdf

¹¹¹ www.inmobi.com/blog/2015/04/16/inmobi-insights-the-dynamics-of-a-booming-app-economy

Figure 39: Smartphone Penetration and Install Growth



Source: InMobi 2015

7.8 Belarus

7.8.1 6.9.1 Developing market

Despite a struggling economy and a restrictive political environment, Belarus has become a top performer in the IT sector, with the value of its companies' exports reaching over USD800 million in 2015.¹¹²

Testifying the growth of the Belarusian app economy, Facebook recently acquired Masquerade Technologies, a young Belarusian start-up whose live photo filters and face-swap technology picked up 15 million users in just three months. This is the fifth acquisition of a Belarusian high-tech firm by a notable foreign giant, another notably acquisition being popular instant messaging and VoIP app Viber by Rakuten.¹¹³

Employment

The turning point for the IT industry in Belarus came in 2005 when the government set up its Hi-Tech Park (HTP), a new hub established to promote the information and software development industry. Due to the legislative initiative of the Belarus government, IT companies in this hub are exempt from all corporate taxes, including value-added tax, profit, real estate and land taxes.¹¹⁴

As of 2014, there were 106 companies in the park, employing roughly 12,500 app developers. As of 2016, there are 152 companies registered as HTP residents, with more than half being foreign companies and joint ventures. Notably, most of the residents of

¹¹² <http://phys.org/news/2015-12-programmers-boom-belarus.html>

¹¹³ www.spiegel.de/international/world/the-minsk-tiger-lukashenko-s-high-tech-ambitions-for-belarus-a-668405.html

¹¹⁴ www.park.by/

the park largely act as foreign sub-contractors for their Western counterparts, rather than as full-cycle IT product developers.¹¹⁵

The app developers that work in this hub enjoy a wide range of perks. In a decade, their monthly salary at the tech park has risen from \$236 to \$2,000, significantly higher than other countries in the region. The employees also pay a fixed lower rate of income tax and receive Western-style benefits packages. It is hoped by the Belarusian government through these incentives that the HTB hub will be comparable to Silicon Valley in the USA.¹¹⁶

7.9 Brazil

7.9.1 Developing market

Brazil's smartphone user base is estimated at 89.5 million, the 5th largest in the world, and is growing at an annual rate of around 22% per year. Additionally, Brazil is expected to grow app revenue 40% in 2016 despite an increasing economic slowdown in other sectors, a trend reminiscent of the strength of the U.S. smartphone and app market during the Global Economic Crisis of 2008.¹¹⁷

As of 2015, there are 138 app developing companies in Brazil, with a majority only present in their own domestic market. However, despite a growing app marketplace with many start-ups gaining increasing market awareness, a true app ecosystem is yet to form in earnest in Brazil.¹¹⁸ These app developers are still in their infancy in terms of revenue generation, with Brazilian smartphone users downloading apps largely from foreign developers. Certainly, the whole of Latin America contributes only minimally to the total world app market value.¹¹⁹ These facts may be attributed to issues around poor data network quality, consumer trust, low credit card penetration rates and a lack of skilled-labour to supply the local app economy in Brazil. Despite these trends, it has been argued that the volume and scale that the Brazilian market offers positions them as one of the most important markets for growth globally.¹²⁰

¹¹⁵ Ibid.

¹¹⁶ www.spiegel.de/international/world/the-minsk-tiger-lukashenko-s-high-tech-ambitions-for-belarus-a-668405.html

¹¹⁷ <http://venturebeat.com/2016/02/10/the-app-economy-could-double-to-101b-by-2020-research-firm-says/>

¹¹⁸ www.mobileecosystemforum.com/2015/04/28/10-things-you-need-to-know-about-the-mobile-market-in-brazil/

¹¹⁹ Ibid.

¹²⁰ www.idgconnect.com/blog-abstract/14241/app-economy-research-poorer-countries-losing

8 APPENDIX B: THE LARGE APP ECONOMY PLAYERS

8.1 Introduction

In this section, thirteen (13) companies part of the app economy have been selected and analysed, with more in-depth case summaries of each provided in Appendix B.

These cases have been chosen due to their dominance in a regional marketplace, on a global scale, or due to their disrupting capabilities. Each company's area of focus alongside its key metrics has been outlined in the tables below. This section highlights matters that are important to acknowledge in formulating an approach to the regulation of the app economy.

8.2 Global Market Titans

Table 10: Listing of Global Market Titans

Name	Area of focus	Key Metrics
Apple	iOS App Store	<ul style="list-style-type: none">World's largest information technology companyApp Store generated approximately USD6 billion in operating profit for Apple in 2015
Google	Android App Store	<ul style="list-style-type: none">Apple App store's main competitor200 million app downloads in 2015, largely driven by Android's growth in emerging markets such as Brazil, India and Indonesia
Facebook	Social Media Platform	<ul style="list-style-type: none">Most ubiquitous social network with more than one billion active users daily from around the worldMarket capitalisation of approximately USD294 billion in 2015

8.3 Market disrupters

Table 11: Listing of Market disrupters

Name	Area of focus	Key Metrics
Uber	Transport/Ride-Sharing	<ul style="list-style-type: none"> Valued at over USD60 billion 5 billion worth of venue in 2015 Currently does not make a profit due to marketing, driver incentives and cost of legal and regulatory disputes
Airbnb	Accommodation	<ul style="list-style-type: none"> As of May 2015, Airbnb has over 1.4 million properties available for tenants Not publicly traded, however its valuation as of its last funding round was USD24-25 billion.
Skype	Social media & communication platform including instant messaging, video chat and VoIP	<ul style="list-style-type: none"> Acquired by Microsoft in 2011 for USD8.5 billion As of 2014, estimated that Skype accounts for 40% of all international calling
Netflix	Movie and television online streaming	<ul style="list-style-type: none"> Over 74 million subscribers As of January 2016, Netflix can be accessed in 130 countries Revenue of approximately USD6.1 billion in 2015
iSignthis	Identity verification for online transactions	<ul style="list-style-type: none"> Services are available to more than 3 billion customer accounts across more than 200 countries Best performing small cap on the ASX in 2015
Tencent	Internet conglomerate providing services such as instant messaging, online games, and taxi hailing	<ul style="list-style-type: none"> Largest internet company in Asia by market capitalisation at USD184 billion One of the largest instant messaging platforms globally, with peak simultaneous usage exceeding 100 million active users on more than one occasion

8.4 Regional Market Exemplars

Table 12: Listing of Regional Market Exemplars

Name	Area of focus	Key Metrics
Alibaba	E-commerce	<ul style="list-style-type: none"> Market capitalisation over USD200 billion, making it one of the largest companies globally as well as in its home market of China One of the world's most visited websites
Flipkart	E-commerce	<ul style="list-style-type: none"> India's biggest electronic commerce company Services available exclusively to India Estimated valuation of USD15.5 billion at the end of 2015
LINE	Instant Communication	<ul style="list-style-type: none"> Used globally, however most dominant in Japan, Thailand and Taiwan. LINE's revenue for 2015 is expected to exceed USD800 million
SocietyOne	'Peer-to-peer' lender	<ul style="list-style-type: none"> Based in Australia Facilitated loans worth AUD30 million by May 2015 SocietyOne's revenue is approximately 5 percent of the loans originated

8.5 Conclusions related to the case studies

A brief outline of these three categories of app-economy companies highlights issues that should be reflected in an approach to regulation of the app-economy. All companies chosen are vastly popular and successful, reflecting the immense benefit to consumers that their new and innovative services provide.

However, each are disrupting in their own sense, whether that be transcending borders, dominating regional areas or challenging the traditional approach to areas such as telecommunications, transport, and broadcasting. The best approach to regulation of the app-economy will reflect the complexity of the issues highlighted in these case summaries, with the aim to minimise disruption to the market without impacting the app-economy's growth and the immense value that it provides to society.

APPENDIX C:

OECD BASE EROSION AND PROFIT SHARING ('BEPS') REFORMS

A.1 Introduction

The 2015 Organisation for Economic Co-operation and Development (OECD)/G20¹²¹ Base Erosion and Profit Sharing ('BEPS') policy package seeks to close the gaps in international tax rules which allow Multinational Nation Enterprises ("MNEs") to artificially shift profits and avoid paying taxes. Enterprises operating in the digital economy, particularly OTT content providers, are noted as unique business models that enable global profit - splitting and -shifting.

The 2015 OECD report concludes that broad reforms are sufficient to address general BEPS issues in the digital economy. The project also identifies possible technical options to deal with further specific tax issues created by digital economy enterprises. However none are formally adopted as internationally-agreed standards. As the project shifts into an implementation and monitoring phase in 2016, these options may be adopted formally in the future.

A.2 Background

Globalisation has created opportunities for MNEs to reduce the taxes they pay through BEPS. BEPS refers to legal strategies that exploit the gaps and discrepancies between national tax regimes. BEPS arrangements allow profits to be shifted to low or no-tax locations.

The OECD estimates that between 4-10% of global revenue from corporate income tax is lost through BEPS by MNEs.¹²² Existing international tax instruments have not kept up with global economic developments, to the detriment of domestic market competition and taxpayers.

¹²¹ https://en.wikipedia.org/wiki/G-20_major_economies

¹²² OECD, 2015, 'Information brief: summary', see www.oecd.org/ctp/policy-brief-beps-2015.pdf

A.3 The Project

The OECD/G20 BEPS Project commenced in 2013. Member states agreed upon the need for multilateral efforts to improve international tax rules in response to the uniquely global problem created by BEPS. The project sought to develop mechanisms to ensure that MNEs report profits where economic activities occur and where value is created. The overall aim of the BEPS package is to close the gaps in international tax rules that allow MNEs to artificially shift these profits.

The project is the product of broad international cooperation. It was carried out by OECD and non-OECD G20 countries on equal footing. Extensive consultation was also undertaken with stakeholders, developing nations, and regional tax authorities.

A.4 Final recommendations

The OECD's BEPS project delivered its final recommendations in October 2015. The final BEPS measures include 15 central actions for nation-states to implement. Central arms of policy and reform include:¹²³

1. Reinforcing transfer pricing rules. The OECD Transfer Pricing Guidelines have upgraded the 'arm's length principle' to ensure what dictates results is an economic rather than paper reality (Actions 8-10). The requirements for transfer pricing documentation have also been substantially increased. This effort seeks to promote greater transparency around MNE operations (12, 13).
2. Strengthened tax treaty provisions. Changes to the Model Tax Convention have been agreed upon to ensure treaties are not used complex BEPS efforts. Treaty benefits will only be granted to those entitled to them (6). The definition of Permanent Establishment has also been modified to better reflect today's business reality (7).
3. Reforming domestic regimes. The report recommends that domestic governments eliminate preferential regimes that attract paper income over substantial business activities (5).
4. Bridging gaps among domestic laws. The report includes model rules and provisions to tackle hybrid mismatch arrangements, through more effective controlled foreign corporation rules ("CFC") in countries where headquarters are located (2-3).

In sum, the reforms aim to improve coherence, tighten the substance, and ensure more transparency in international taxation.

¹²³ OECD, 2015, *Executive Summaries*, see www.oecd.org/ctp/beps-reports-2015-executive-summaries.pdf

A.5 Digital economy-specific recommendations

The digital economy accelerates and changes the spread of global value chains in which MNEs integrate their worldwide operations.¹²⁴ Some of the features of the digital economy exacerbate BEPS risks. Digital economy MNEs also present further specific taxation challenges. As noted by the report, often it is difficult to capture digital economy enterprises within existing value-added tax collection mechanisms. This includes global OTT providers with businesses based on cross-border transactions.¹²⁵

During the consultation process, targeted policy measures were considered to meet these specific challenges. These include:

- A new nexus requirement, in the form of a ‘significant economy presence’;
- A withholding tax on certain types of digital transactions; and
- An equalisation levy.

The final report however, recommended that the broad BEPS actions would address BEPS issues exacerbated by the digital economy. In particular the ones on Permanent Establishment (“PE”), transfer pricing and controlled foreign company (“CFC”) rules were developed with digital economy business models in mind.¹²⁶ No digital economy-specific reforms were adopted as an internationally-agreed standard.

As the project shifts into an implementation phase in 2016, businesses will have to meet these stricter regulatory requirements. As implementation is evaluated, further reforms may be adopted for the digital economy space. Additionally, the report recommends that national governments monitor markets, and adopt any of the 3 options above as additional safeguards, as required.

¹²⁴ OECD, 2015, ‘Action 1 – Addressing the Tax Challenges of the Digital Economy’, Final Report, see www.keepeek.com/Digital-Asset-Management/oecd/taxation/addressing-the-tax-challenges-of-the-digital-economy-action-1-2015-final-report_9789264241046-en#page1

¹²⁵ OECD, 2015, ‘Action 1 – Addressing the Tax Challenges of the Digital Economy’, Executive Summary, see www.oecd.org/ctp/beps-reports-2015-executive-summaries.pdf

¹²⁶ OECD, 2015, ‘Policy brief’, see www.oecd.org/ctp/beps-reports-2015-information-brief.pdf

9 APPENDIX D: COMPANY CASE STUDIES

B.1 Introduction

In this section, case studies of selected global market leaders, regional market leaders and market disruptors will be elaborated on from Chapter 8. This section provides detail on the companies' history, services, structure and revenue of Airbnb, Alibaba, Apple, Facebook, Flipkart, Google, iSignthis, LINE, Netflix, Skype, SocietyOne, Tencent, and Uber.

B.2 Airbnb



Founded in 2008 and also headquartered in California, Airbnb operates as a market platform for users to list, find and rent lodgings, primarily on a short-term basis. Airbnb is not publicly traded, however its valuation as of its last funding round was USD24-25 billion, although aggressive growth assumptions underpin this figure 127. This makes it more valuable than the Marriott and Starwood hotel chains, and only slightly behind the Hilton group. Airbnb does not currently generate profit, although its revenue forecast for this year is approximately USD900 million. The lack of profit is caused by intense spending in order to secure continued growth in listings, footprint and bookings and is expected to change.

Airbnb operates as a market in which properly verified property occupiers can list their property, or part of it, as being available for guests to rent. Rentals can range from one night to more than a month and are at the discretion of the person listing the property. Prospective guests must also be properly verified in order to use the service, including providing a scan of a government-issued ID.

The service operates by having those looking for accommodation apply for listed properties, with the owner or head-lessor of the property then able to approve, or deny, the application. Airbnb generates revenue by collecting 6-12% of the price of the booking from the person seeking accommodation depending on the value of it and an additional 3% payment processing fee from the amount received by the person listing the property. As of May 2015 Airbnb has over 1.4 million properties available for tenants, from single rooms in apartments to private islands and more esoteric options such as windmills. In principle, any property can be listed for rental if the person listing it is properly verified.

¹²⁷ www.wsj.com/articles/the-secret-math-of-airbnbs-24-billion-valuation-1434568517

Like Uber, Airbnb has faced regulatory and legal headwinds in some cases. Cities such as New York, Santa Monica, Berlin and Tokyo have either proposed or put in place regulatory restrictions on short-term rentals. Common among these are minimum rental periods of 7, 28 or 30 days in specified areas or for specified types of dwellings. Airbnb has an average rental period of 5.5 days so the majority of its bookings would be prima facie illegal in these locations. A driving force behind these restrictions has been Airbnb not paying hotel taxes which other operators must pay, and the difficulty of regulating the standard of accommodation that is provided. At least one municipality has stated that it would be impossible to properly inspect and verify all the properties listed on Airbnb within its jurisdiction. While successful it is not without controversy, there have been reports of entire buildings being leased by a single person and then sub-leased via Airbnb for a profit.

Nevertheless, like Uber, Airbnb has had some success in having these regulatory barriers lessened or removed. It has done so in several ways. Firstly by demonstrating the value of its rentals to local economies, potentially millions of dollars per year. Secondly, by demonstrating positive social impacts, such as allowing low-income home-owners and renters to avoid foreclosure or eviction by sub-leasing parts of their properties. Finally, in many cases it has agreed to pay the relevant hotel taxes of the location a rental takes place in. Airbnb also supports a growing industry in property management, with companies that specialise in managing Airbnb listings on behalf of the owner or head-lessor now operating in several jurisdictions.

Despite some initial regulatory headwinds Airbnb appears likely to continue growing as a major disruptor to the existing hospitality industry, in particular traditional hotel operators with many already seeing the impact of competition from Airbnb listed properties.

B.3 Alibaba



Alibaba is a Chinese e-commerce company which provides consumer-to-consumer, business-to-consumer and business-to-business sales services via different web portals. Since its founding in 1999 it has also expanded to provide ePayment services, a shopping search engine and commercial cloud-computing services. Alibaba was initially founded a business-to-business sales portal which was used to connect Chinese manufacturers directly to international customers.

Alibaba operates Taobao, a consumer-to-consumer portal similar to eBay which has a catalogue of over 1 billion products and is one of the world's most visited websites. Alibaba group websites account for more than 60% of parcels delivered in China and more than 80% of China's online sales. Its annual 'Singles' Day' shopping event generated sales of USD14.32 billion in 24 hours on November 11 2015.

In September 2014 Alibaba listed on the New York Stock Exchange raising USD25 billion and giving a market capitalisation of more than USD250 billion. This was the largest IPO in US history and one of the largest in global history. Since listing its shares have declined in value, but its market capitalisation is still over USD200 billion.¹²⁸

In addition to the subsidiaries created organically such as Taobao and Alipay, Alibaba Group has purchased stakes in companies such as Weibo and Lyft and was a stakeholder in Kuaidi Dache prior to its merger with Didi Dache.

Taobao is Alibaba's major platform and functions as a consumer-to-consumer online shopping portal similar to eBay. It has achieved massive popularity by offering commission free transactions using a third-party payment platform. In lieu of generating revenue by taking commissions it does so by charging for advertising on the platform. Its annual sales exceeded 1 trillion Yuan (USD160 billion) in 2012 and have continued growing since.

Alipay is a third-party online payment platform launched in 2004. It charges no transaction fees and also provides escrow services to buyers and sellers. Alipay was spun off by Alibaba Group in 2010 and now accounts for more than half of China's online payment market.

As part of its tenth anniversary in 2009 Alibaba launched a commercial cloud computing service called Aliyun which includes e-commerce, data processing, data mining and data customization services. It has R&D centers in Hangzhou, Beijing and Silicon Valley and is the largest providing of high-end cloud computing services in China. In 2014 Alibaba acquired a controlling stake in ChinaVision Mediatv which was subsequently renamed Alibaba Pictures. As of 2015 it is the largest Chinese film company by value.

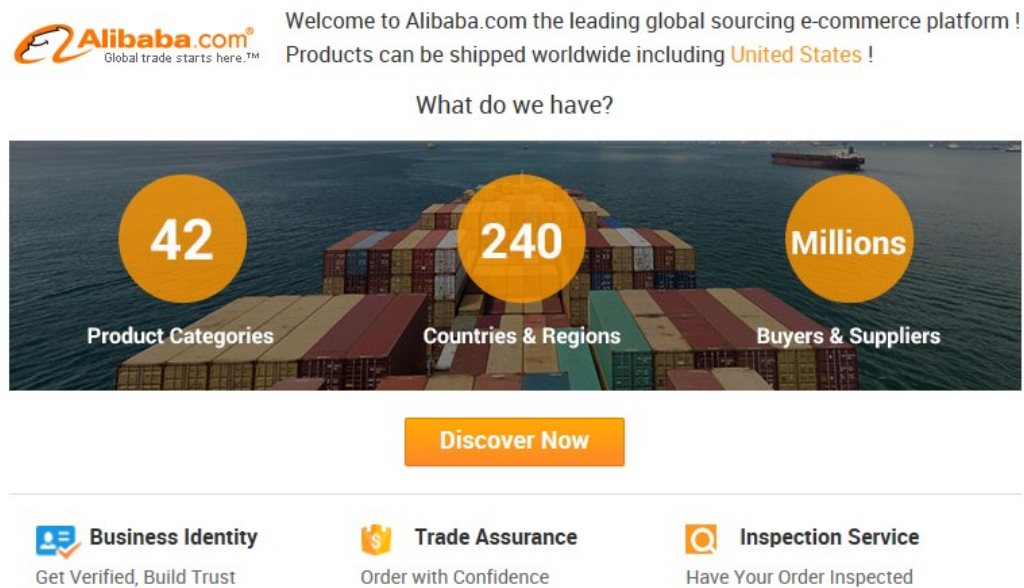
Alibaba has become one of the largest companies globally and in particular in its home market of China by breaking from the usual business models of similar companies. Its largest services operate at no or low cost to users and instead generate revenue from third parties. This has allowed Alibaba to process extreme volumes of transactions, representing dominant market share within China.¹²⁹ By monetizing the popularity of its services, rather than the services themselves, Alibaba has managed to continue achieving major growth in users both among consumers and the businesses using its services.

Like many companies which reach such a size it has now diversified away from its core of e-commerce and expanded beyond its home market of China. While there have been fluctuations in its share price, and consequently market capitalisation, it has regained its place as one of China's most valuable companies as of December 2015.

¹²⁸ Source: NYSE 22 December 2015.

¹²⁹ <http://qz.com/501241/alibabas-stock-price-is-taking-a-beating-but-that-doesnt-mean-alibaba-will-too/>

Figure 40: Alibaba home page



Alibaba.com®
Global trade starts here.™

Welcome to Alibaba.com the leading global sourcing e-commerce platform!
Products can be shipped worldwide including **United States**!

What do we have?

42 Product Categories

240 Countries & Regions

Millions Buyers & Suppliers

Discover Now

Business Identity
Get Verified, Build Trust

Trade Assurance
Order with Confidence

Inspection Service
Have Your Order Inspected

Source: Alibaba, 2016

B.4 Apple



Founded in 1976 and with its headquarters in California, Apple is the world's largest information technology company that designs, develops and sells consumer electronics, computer software and online services. Soon after the release of the iPhone in 2007, Apple launched the first App Store with 552 apps.

The App Store is a digital distribution platform for mobile apps on iOS, a mobile operating system created and developed by Apple and distributed exclusively for Apple hardware. The service allows users to browse and download applications that are developed with Apple's iOS software development kit (SDK). Apple takes 30 percent of all revenue generated through apps, with 70 percent going to the app's publisher. The apps can be downloaded directly to iOS devices such as the iPhone smartphone, the iPod Touch handheld computer and the iPad Tablet computer, or onto a personal computer via iTunes.

From its launch in 2008, the App Store has seen exponential growth both in revenue generated and apps created. Within one month after its release, the number of apps downloaded reached 60 million, with the top 10 developers earning USD 9 million. In the past seven years, Apple has paid almost USD 40 billion to app developers, 33% of which was generated in 2015. It is estimated that the App Store generated approximately USD 6 billion in operating profit for Apple in 2015, which would make up close to half of the company's total operating profit growth in that year. The iTunes Store, which contains the App Store, is the only line from Apple's vast array of services and products that has been consistently growing above 10 percent in revenue for the past 8 years. It is therefore predicted that the App Store will be a significant growth driver of operating income in oncoming years for the company.

Alongside contributing to Apple's growth in revenue, nearly three-quarters of the 1.9 million jobs created by Apple in the U.S. are attributable to the community of app creators, software engineers and entrepreneurs building apps for iOS, as well as non-IT jobs supported directly and indirectly through the app economy.¹³⁰ The iOS app economy has additionally created 1.2 million jobs in Europe and 1.4 million jobs in China.

The strongest markets for Apple's iOS are the U.S, Japan, Canada and Western Europe, which show proportionally higher ratios of developers using the iOS platform. Although Apple envisions the App Store to be a global product, in reality its market is restricted to national boundaries, a division that helps to ensure that the associated commerce abides by all country-specific content policies and tax laws. Thus, there are potentially as many distinct App Stores as are countries in the world.

B.5 Facebook



Facebook was launched in 2004 and is headquartered in California, USA. It has a market capitalisation of approximately USD294 billion and had revenue of USD12.44 billion in 2014.¹³¹ It has over 12,000 employees based primarily at four major sites in California, Hyderabad, Dublin and Texas, along with several data centres globally. Facebook is the world's most ubiquitous social network with more than one billion active users daily, including more than 1.4 billion mobile users monthly. Facebook's primary source of revenue is advertising with an emphasis on being able to target advertising to specific users and groups of users. It is noteworthy that mobile users accounting for approximately 60% of generate approximately 78% of advertising revenue.¹³² Revenue and profitability has grown year on year, at least partially driven by increased investment in advertising technologies and user experience.

¹³⁰ Job creation estimate based on research by Dr. Michael Mandel, Progressive Policy Institute. "App Economy Jobs in the United States," January 6, 2016

¹³¹ Source: NASDAQ, December 22 2015.

¹³² www.nytimes.com/2015/11/05/technology/facebook-q3-earnings.html?_r=0

Facebook is primarily a social networking platform which leverages its ubiquity and its wealth of user data to generate revenue through advertising on its site. Currently the majority of this is advertising in side bars and banner ads, however it has expanded into video advertising and shown significant growth in this area. Facebook has also worked directly with some advertisers in order to create more bespoke or widespread advertising campaigns than its standard products.

In recent years, it has joined other major technology companies as an acquirer of start-ups which it believes align with its business model or which have significant long term potential. Currently, Facebook is the head company of photo social network Instagram, messaging app WhatsApp and virtual reality headset manufacturer Oculus VR.

Currently, Facebook has not monetized any of its subsidiaries, and analysts believe that there may be potential upside for Facebook's revenue figures in future if it does decide to do so. It has recently commenced including advertising in the Instagram platform, although as yet neither WhatsApp nor Oculus VR generate any revenue. A focus on the long-term value of these acquisitions has been costly in the short term but is likely to pay off in the longer term if they are monetized sustainably as a result. There would be little point generating short-term ad revenue from WhatsApp if the result was customers abandoning the service.

The majority of Facebook's revenue comes from advertising on its mobile app, which also accounts for a significant number of its users. In addition, two of its major subsidiaries are app-based services (Instagram and WhatsApp), while only one is hardware based (Oculus VR). It also supports a secondary industry in game and app development for use within the Facebook website and mobile app (see, for example, Farmville).

Facebook is not a disruptor in the sense that it is causing a restructure of an established industry, however its total ubiquity as a social network, to the point that it largely does not have any direct competition, makes it a key player in the app economy. The major thing holding Facebook back is its having been outlawed in some countries (for example China) and local preference for home-grown social networks in others (for example Russia). In future Facebook may face competition from local competitors in significant markets such as Weibo in China as take up rates there increase. However, continued investment in new technologies and subsidiaries which have the potential to augment its future revenue leaves it in a strong position. Facebook has been willing to takeover start-ups with significant potential upside even outside its core of advertising, so it is likely to diversify over time if these subsidiaries grow and become profitable.

B.6 Flipkart



Flipkart is India's biggest electronic commerce company, established in 2007 by two former Amazon employees. Headquartered in Bangalore, Flipkart's services are exclusively available to India.

The company began by selling books and soon expanded to a wide variety of goods. Flipkart has since launched its own product range under the name 'DigiFlip', with goods including tablets, USBs and laptop bags. Flipkart has also launched 'Flyte', a paid music download service.

Flipkart first raised funds through venture capital funding. As the company grew in stature, more funding arrived. In the financial year 2009-09, Flipkart had made sales of approximately USD600,000. This soon increased to just under USD3 million the following year. As of May 2015, the company's valuation is at USD15.5 billion.¹³³ In addition, Flipkart has acquired other e-commerce websites such as Myntra.com and LetsBuy.com to better their presence in the Indian market.

Until 2013, Flipkart sold goods directly to consumers. Flipkart has since turned to a marketplace model, allowing third party businesses to list their products and sell on their platform. The company offers stocking and shipping service to the merchants selling their products on Flipkart, a service called 'Flipkart Advantage.' The merchants stock their products at Flipkart's warehouses before the orders are placed, with Flipkart informing the merchants of the quantity of products based on intelligence gathered from the history of demand for that product. As products are available with Flipkart at the time the order is placed, quality checks and expedited shipping is possible.¹³⁴ Customers of Flipkart consequently receive 30-Day hassle-free returns on products as well as expedited delivery options such as Same-Day Guarantee Delivery.¹³⁵

Flipkart also pioneered cash on delivery and payment by card on delivery services to its consumers, an option in which most online shopping websites in India offer today.

Two-thirds of Flipkart's 8 million monthly shipments come from cities and small towns, where most people do not have access to desktop computers and broadband Internet. This means that smartphones are the primary platform for e-commerce in India, with the country being the third largest market for smartphones in the world. Acknowledging these trends, Flipkart plans to shutdown its website in 2016 and transition completely to a mobile app to deliver its services.

¹³³ www.wsj.com/articles/flipkart-valued-at-15-billion-after-latest-funding-1432088548

¹³⁴ <http://trak.in/tags/business/2014/09/18/flipkart-advantage-stocking-shipping-service/>

¹³⁵ *ibid.*

B.7 Google



Google Inc. is an American multinational technology company specialising in Internet-related services and products. Google entered the smartphone industry in 2005 through the acquisition of Android Inc. The Android platform is a fully integrated mobile 'software stack' that consists of an operating system, middleware, user-friendly interface and applications. It is the first open and comprehensive platform for mobile devices, made available under open-source licences that give mobile operators and device manufacturers flexibility in designing their own products.

Google Play, which was originally born under the name Android Market in 2008, is Google's official store and portal for Android apps, games and other content for Android powered phones, tablets or Android TV devices. It allows users to browse and download applications developed with the Android SDK and published through Google. Apps are available through Google Play either free of charge or at a cost. They can be downloaded directly to an Android or Google TV device through the Play Store mobile app or by deploying the application to a device from the Google Play website. Google, like Apple's App Store, keeps 30% of revenue from the apps sold on Google Play, with the remaining revenue passed onto the publisher.

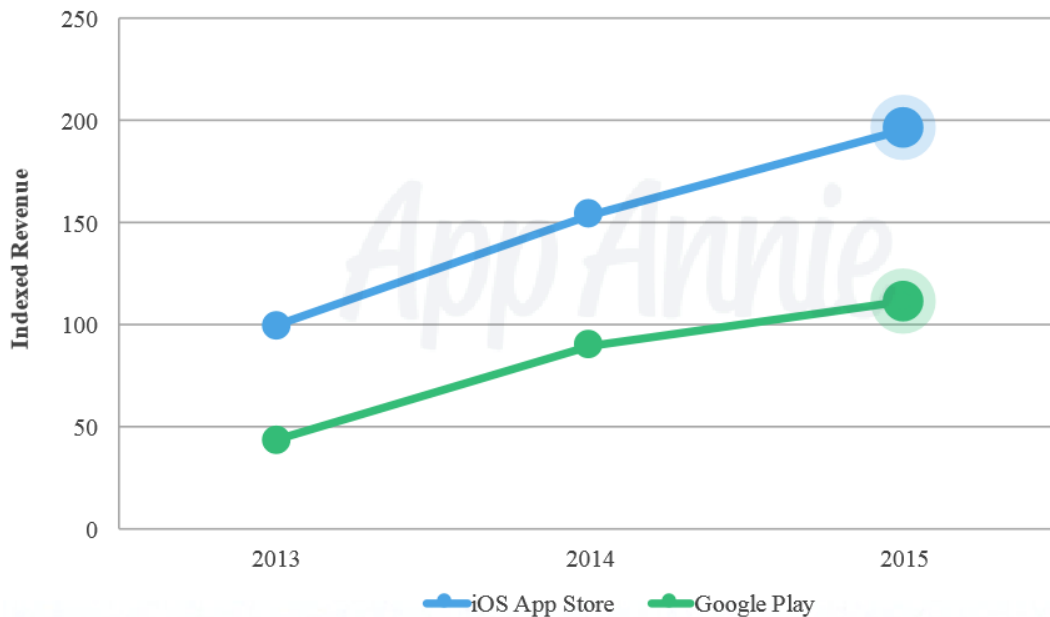
Google launched the Android Market in 2008 with only a handful of apps. By May 2012, the number of available apps in the Google Play Store surpassed 1 million, and was placed at 1.8 million apps in November 2015. In the third quarter of 2015, Google Play had 100% more app downloads than Apple's App Store, a figure largely attributable to bolstered demand in emerging markets such as India, Brazil and Indonesia alongside the globally dominant use of Android smartphones by end-users and developers. Despite these numbers, Apple's App Store continues to generate approximately 80% more revenue than Google Play for developers. This trend is exhibited in the graph below.

Two reasons have contributed to this revenue between the App Store and Google Play. Primarily, as Apple handsets are more expensive, it is hypothesised that their more affluent owners are prepared to spend more money on apps than the 'average' Android user.¹³⁶ Furthermore, Google has removed a majority of its services in the Chinese market after the company refused to continue self-censoring its search results in 2010. This means that the Google Play store gains no revenue from the Chinese market, whereas the Apple App Store does. However, Google has announced its plans to launch the Chinese version of its Google Play smartphone app store in 2016, presumably in an attempt to fill this gap in revenue.¹³⁷

¹³⁶ www.androidauthority.com/google-play-store-vs-the-apple-app-store-601836/

¹³⁷ www.reuters.com/article/us-alphabet-china-idUSKCN0T91K420151120

Figure 41 Annual worldwide App revenue (millions USD)



Source: App Annie

B.8 iSignthis



iSignthis Limited (ASX: ISX) is based in Melbourne, Australia with a European presence in Amsterdam and Cyprus, the United Kingdom and representatives in the US and Asia.¹³⁸ Founded in 2013, its initial focus was preventing Card Not Present (CNP) fraud in order to protect consumers and merchants from the growing problem of online fraud.

iSignthis is now a global leader in online, dynamic verification of identity and financial transactions via regulated e-payment instrument authentication. The automated, online identification of persons remote to the transaction is made possible via a patented electronic verification method, and is available to more than 3.5 billion financially included persons, no matter where they are located. iSignthis also assists merchants with CNP liability shift, within the framework of the card scheme rules and applicable regulatory regimes. . ISX was the best performing small cap on the ASX in 2015.

iSignthis provides the legal basis for compliance to meet customer identification requirements for anti-money laundering (AML) obligated entities, as well as operational benefits for any online business looking to reducing customer on-boarding friction, mitigating CNP fraud, monitoring transactions and streamlining operations. It has a number of patents and patents pending in this area.

¹³⁸ One of the authors of this report, Scott Minehane is currently a non-Executive Director of iSignthis Limited.

B.9 LINE



Line is a proprietary application for instant communication on smartphones, tablets and personal computers. It enables the instant exchange of texts, images and videos as well as free VoIP voice and video calls between users. It was designed and is owned by a subsidiary of Korean internet search company Naver.

LINE was first launched in Japan in 2011 and reached 100 million users within 18 months and 200 million users within 2 years of its initial launch. LINE became Japan's largest social network in 2013 and passed 600 million worldwide users by February 2015. It is expected to have surpassed 700 million total global users by the end of 2015. Originally released on Android and iOS, LINE is now also available for BlackBerry, Nokia Asha, Windows Phone, Firefox OS, iOS tablets and as a Google Chrome browser application.

LINE was initially developed as an internal communications system for NHN Japan employees in the wake of the 2011 Tohoku earthquake, which severely damaged telecommunications infrastructure and left the company reliant on internet-based communications while the infrastructure was restored. After its development NHN decided to release LINE to the public and explosive growth immediately followed. As a result of this success a dedicated subsidiary Line Corporation was set up to manage LINE and related products.

Initially only a messaging service, LINE has developed in the direction of a social network, with users now able to make use of bulletin boards, timelines and homepages on which they can post, upload pictures, and like and comment on other people's posts and uploads. LINE allows users to purchase 'stickers' in an online store, which act as super-sized emojis that can be sent in messages and used in chat sessions between users. More than 1 billion of these stickers are sent daily by LINE's users worldwide.

For users in China LINE conforms with government-imposed censorship requirements which prevent discussion of topics such as Tiananmen Square and controversial discussion of Tibet and Hong Kong.

While it is used globally, LINE has particular significance in some specific markets. In particular, it is the dominant messaging and social network service in Japan and Thailand with 50 million and 22 million users respectively, and is a significant market force in Indonesia, Taiwan, Spain and India with 16 million or more users in each.

In addition to its instant-messaging function LINE also has a significant cultural impact, particularly in Japan, with television shows based around it produced in recent years. Its ubiquity has also led to it being depicted in international television shows and music videos as the messaging service used by characters in the show.

In 2015 LINE launched a taxi service in Tokyo, intended as a competitor to Uber. It also launched an app which allows for group calls of up to 200 participants in June 2015. It also recently enabled the use of end-to-end encryption for one-to-one messaging on its

platform where both parties to the conversation have the appropriate option enabled in their LINE app.

LINE's revenue for 2015 is expected to exceed USD800 million, while this represents significant growth on that in 2014 it appears to have stagnated with little growth in revenue between quarters in 2015.¹³⁹ LINE remains dominant in Japan, Thailand and Taiwan but has not seen the same rapid uptake in other markets that it initially did in these core three. LINE has addressed this issue by releasing new services such as an iOS keyboard app and a 'lite' version of its app for emerging markets.

B.10 Netflix

NETFLIX

Netflix was founded in 1997 as an online DVD rental service using the traditional model of a per-rental fee. Since then it has morphed into a monthly-subscription based video-on-demand provider which produces its own content and is responsible for approximately 30% of all internet traffic in some of the countries where it operates.

This transformation has been gradual. In 1999 Netflix began offering a monthly-subscription service for DVD rentals, with different tiers of membership allowing different numbers of DVDs per month. In 2000 it stopped offering per-rental services and became solely monthly-subscription based. In 2007 Netflix offered its initial video-on-demand service free of charge to monthly-subscribers, with viewing limits based on the DVD rental subscription tier they held. Due to increasing demand for streaming, Netflix began offering streaming-only subscriptions to customers in November 2010. Its current model is based on streaming subscriptions with an optional surcharge to also gain access to DVD or Blu-Ray rentals.

Beginning with Canada in 2010, then Latin America, Europe, and Australia, Netflix has progressively expanded its global footprint. As of January 2016, Netflix can be accessed in 130 countries including Vietnam, Indonesia, Saudi Arabia and Russia, with China standing as the only major country that does not have access to the media-streaming service.

Netflix now has approximately 74 million subscribers worldwide, of which about half are in the US. Considering its recent global expansion in 2016, it is probable that these numbers will substantially increase. The total number of users is likely to be significantly higher than the subscription figure listed as a single subscription allows up to four profiles to be created, and each profile may be viewed by multiple people simultaneously, much as one television serves an entire family. Netflix had revenues of approximately USD 6.1 billion in

¹³⁹ <http://techcrunch.com/2015/07/29/chat-app-lines-revenue-falls-for-first-time-amid-struggle-for-global-growth/>

2015¹⁴⁰ and currently has a market capitalisation of almost USD 50 billion.¹⁴¹ Netflix is headquartered in California and currently has over 2,400 employees.

¹⁴⁰ http://files.shareholder.com/downloads/NFLX/1305047504x0x854558/9B28F30F-BF2F-4C5D-AAFF-AA9AA8F4779D/FINAL_Q3_15_Letter_to_Shareholders_With_Tables_.pdf

¹⁴¹ Source: NASDAQ 22 December 2015

Beginning in 2011 Netflix is now a producer of its own content, not solely a provider of access to content owned and produced by other parties. The airing of House of Cards in 2013 marked the beginning of the availability of Netflix's self-produced content. This content is a mix of original movies and television shows, and some cases where Netflix has secured the rights to produce new series of existing shows after they have been dropped by their original producer.

Netflix is credited with bringing about significant change in consumer preferences and in the way consumers watch video content. Its streaming service allows users to 'binge' watch programming, without being locked into the nightly or weekly airing schedule of traditional programming. This has in turn allowed a shift in the way television shows are produced, with no need for cliffhanger endings which entice viewers to return the following week. It has also allowed a break with traditional requirements of fitting content into 30 or 60 minute windows with space for advertising built in.

Netflix has also become involved in the debate surrounding net neutrality, largely as a result of the amount of bandwidth used on its streaming services. Currently Netflix pays some ISPs in order to ensure its customers have sufficient bandwidth and usage caps to use its services. Netflix would be a major beneficiary of any net neutrality legislation.

B.11 Skype



Initially launched in 2003 Skype is a VoIP, video chat, and instant messaging platform which is available on Windows, Mac, Linux, Android, Blackberry, iOS and Windows Phone operating systems, as well as associated tablets. Skype was created by Swedish and Danish developers with assistance from Estonian programmers and initially shared its backend systems with the music sharing application Kazaa.

In September 2005 eBay acquired Skype from its original owners for USD2.6 billion. In 2009 65% of Skype was acquired for USD1.9 billion. This acquisition was made by a combination of investors including the Canada Pension Plan Investment Board. In 2011 Microsoft acquired Skype for USD8.5 billion and incorporated it as Skype Technologies, a wholly owned subsidiary. The Skype division of Microsoft is headquartered in Luxembourg, but a substantial proportion of its development team and employees are based in Estonia.

Skype operates using a freemium model in which Skype-to-Skype calls are free for both caller and receiver, while calls to landline or mobile phones are charged via a debit-based system. In some cases network administrators have banned the use of Skype on corporate, government or education networks for reasons such as inappropriate use of network resources, excessive bandwidth usage, particularly for video calling, and security concerns.

Since its acquisition by Microsoft Skype is powered by Microsoft proprietary infrastructure, in contrast to its beginnings as a peer-to-peer/client-server system hybrid. Microsoft has continued the development of existing Skype services as well as incorporating Skype technology into its own offerings. For example, as of 2013 Skype has replaced Microsoft's Windows Live Messenger globally except for China.

Skype provides each user with a unique Skype name which can be stored in a Skype Directory and which users can use to add each other to address books. Skype allows one-to-one voice and video calling using a proprietary codec as well as voice and video conference calling between up to 25 users, all of which is free between Skype users. Skype also provides a service which allows users to receive calls on their computers which originate on conventional telephony networks. It does so by providing a local number which is linked to the users Skype name. This service is available in specific countries only, although the number where it is available is significant.

As of 2014 it is estimated that Skype accounts for 40% of all international calling with continued growth in total minutes from the 214 billion recorded for 2013.¹⁴² This is likely attributable to its freemium model whereby users with any computer, tablet or smartphone can communicate with any other user with a similar device, for free using the Skype app.

Figure 42: The Skype effect on international voice growth rates



Source: Telegeography 2014

Skype is not directly available in China, however a localized version is available.

¹⁴² www.telegeography.com/products/commsupdate/articles/2014/01/15/skype-traffic-continues-to-thrive/

Skype has been widely used for educational purposes, including pairing native speakers of different languages with each other to facilitate conversations which alternate between each language in order to promote learning. Skype is also used to provide eLearning programs, whereby conference calls allow a teacher to communicate with students spread across different geographical areas, including remote areas, at the same time.

Skype has significantly disrupted traditional telephony, and in particular conference calling, however it is unclear what percentage of its total minutes of use are free Skype-to-Skype calls and how many are paid Skype-to-traditional network calls.

B.12 SocietyOne



SocietyOne is one of a number of 'peer-to-peer' lenders which launched in Australia in August 2012. It facilitated loans worth AUD1 million by January 2013, AUD 4 million by March 2014 and AUD30 million by May 2015. While described as 'peer-to-peer' lending, the majority of SocietyOne's capital comes from institutional investors such as Westpac and News Corporation, and it is not yet open to retail investors.

Australian financial services disclosure requirements mean that it has restricted its ability to invest in loans to institutional, professional and sophisticated investors only, although retail investment offerings are planned. This has led to SocietyOne being termed a 'marketplace lender' rather than a true peer-to-peer lending platform.

SocietyOne operates as a platform on which borrowers can list their profile, including loan term, loan purpose, and financial information. Once they have done so lenders can bid to fund their loan in a reverse auction of the interest rate they are prepared to accept for lending to the borrower. In effect, SocietyOne provides a technology platform which matches borrowers with investors, ideally offering both a better interest rate than they would receive from traditional financial institutions.

SocietyOne has grown rapidly, as its loan origination figures indicate, however it still only accounts for a tiny percentage of the Australian consumer credit market. Since its launch SocietyOne has expanded its offering from exclusively unsecured consumer credit (personal loans), and now offers livestock loans as well. Money invested by lenders in SocietyOne is held in a bankruptcy-remote trust vehicle and cannot be used to pay debts or obligations of SocietyOne as an entity. SocietyOne's approval rate for loan applications is approximately 15%, and from inception to 2014 its default rate was 2.3%. This approval rate is around half of that of larger financial institutions for first-time borrowers and is deliberate in order to ensure that early-stage investors have positive results for their investment. By ensuring early success for investors SocietyOne should be able to secure increased investor interest in future, without which expansion will be impossible.

SocietyOne matches lenders and borrowers using proprietary technology developed by one of its co-founders and tested using traditional banking services. SocietyOne's revenue is approximately 5 percent of the loans originated comprised mainly of a 1.25% management fee paid by the investor and an origination fee paid by the borrower once a loan is originated, which averages 3.5%. Late payment fees are similar to major Australian banks and there are no servicing or prepayment fees.

SocietyOne's main competitor in Australia is Ratesetter, which launched in November 2014 and is part of the Ratesetter group, based in the UK and founded in 2010. ThinCats Australia is an offshoot of ThinCats, which is also based in the UK, and which specialises in peer-to-peer funded small business loans. MoneyPlace is a newer market entrant which was founded by a small group of executives from one of Australia's four major traditional banks. Its investment model involves fractionalising loans as a means of diversification and risk minimisation for investors. Finally, OnDeck is a New York based small business lender which announced a partnership with Australian listed accounting software provider MYOB commencing in December 2015. While still nascent, the Australian P2P lending market is predicted to reach AUD10.4 billion, or 6 percent of total consumer lending by 2020, while the global P2P lending market could grow to between USD150 and USD490 billion by 2020.¹⁴³

B.13 Tencent

Tencent 腾讯

Tencent is a conglomerate headquartered in Shenzhen, China which as of September 2015 was the largest internet company in Asia by market capitalisation. It was founded in 1997 and its initial success came from owning and operating the QQ instant messaging service. Tencent listed on the Hong Kong Stock Exchange in 2004 and was added to the Hang Seng index in 2008. After initially deriving revenue exclusively from advertising in and premium users of QQ Tencent has since expanded to become a major conglomerate, with subsidiaries and joint ventures including the JD.com e-commerce website, creation of online games, sale of virtual goods, media distribution, online auctions, taxi hailing, social media, online search and online payments.

Tencent is also the owner of the WeChat social mobile application, the most popular app in China. In 2011 Tencent acquired a majority interest in Riot Games, developer of the popular online battle game League of Legends. It also owns minority stakes in Epic Games, a major game production studio and Activision Blizzard, one of the world's largest video game production and publishing companies. These acquisitions increased its game creation portfolio beyond its domestically focussed, and to a lesser degree mobile focussed, origins.

¹⁴³ www.afr.com/business/banking-and-finance/societyones-30m-of-p2p-loans-the-tip-of-an-iceberg-20150522-gh7jca

Its original platform, Tencent QQ remains one of the largest instant messaging platforms globally, with peak simultaneous usage exceeding 100 million active users on more than one occasion. Combined with WeChat this makes Tencent one of, if not the largest, instant messaging service providers worldwide with more than 1 billion total users.

Tencent is also a major media distribution provider for the PRC, with exclusive Chinese distribution rights for Sony, Warner Music Group and YG Entertainment music, HBO television and for NBA basketball games in China.

Tencent is also a major operator in the taxi hailing market in China. In conjunction with Singapore's Temasek Holdings, Tencent led investment of USD700 million in ride-hailing app company Didi Dache. Similar to Uber, this app works by using gps-based location data to match customers and taxi drivers in an area. Didi Dache is dominant in the Chinese taxi-hailing industry, with market share of more than 60% and services extending to most major urban centres. Between 2013 and 2014 it doubled its registered consumer user base from 20 to 40 million. It processes more than 21 million cab rides each month and has a user base of more than 350,000 taxi vehicles and drivers. In early 2015 it was announced that Didi Dache would merge with its main rival Kuaidi Dache but continue to operate as a separate brand. Details of Tencent's holding in the merged entity are not publicly available.¹⁴⁴

Tencent has faced controversy, primarily on two fronts. It has been noted by some commentators that many of Tencent's products and services are similar to those already offered by competitors and several competitors have accused it of copying existing services and products. It has also faced challenges by anti-malware ranking websites, which have accused its software of being designed to game anti-malware testing so as to appear more benign than is actually the case.

Tencent currently has a market capitalisation of USD184 billion, and recently peaked at more than USD200 billion (note these figures are impacted by exchange rate fluctuations in addition to stock price movements).¹⁴⁵ Its 2014 revenue is listed as approximately USD12 billion and it has more than 27,000 employees worldwide.

More recently, Tencent has partnered with Apple and Twitter to provide enterprise cloud services, and with IBM to provide SaaS services. Another significant source of revenue is licensing of its iconic penguin character mascot.

B.14 Uber



Uber was founded in 2009 and is headquartered in San Francisco, California. Uber operates a mobile app which connects customers with smartphones to drivers using the corresponding app in order to provide them with transportation. Depending on the

¹⁴⁴ www.reuters.com/article/us-china-taxi-merger-idUSKBN0LI04420150214

¹⁴⁵ Source: Bloomberg, 22 December 2015

country, city and type of Uber service selected this can be in the form of registered limousine, ordinary private car, boat, air balloon or even helicopter.

Investors in Uber include Google Ventures, Tata, China Life Insurance Co, the Qatar Investment Authority and Baidu, which also provides Uber with mapping and traffic data in Chinese cities. Uber is valued at over USD 60 billion and its revenue is estimated at USD 2 billion for 2014, predicted to grow to over USD5 billion in 2015.¹⁴⁶ Uber does not currently make a profit, with its chief costs being marketing, driver incentives and the cost of legal and regulatory disputes and related lobbying efforts.

After a launching in San Francisco in February 2011 Uber has expanded rapidly and aggressively around the world, beginning with Paris in December 2011 following domestic US expansion. The Uber app currently allows customers to book rides in over 300 cities in more than 59 countries worldwide including most recently Nigeria, Kenya and Lithuania.

Uber generates revenue by collecting 20% of the fares earned by the drivers using its app. These fares are transferred between the customer and driver automatically using a credit card which must be registered with Uber in order for the customer to request a ride.

The vast majority of rides booked using Uber are for either registered limousines, or similar vehicles registered for commercial provision of transportation, driven by similarly accredited drivers, or for ordinary cars driven by drivers without professional accreditation. The latter service has proven to be significantly disruptive to the taxi industry and has been a major source of controversy. In many jurisdictions Uber's services, in particular those facilitating rides in vehicles without a commercial registration or taxi license, are against existing laws. Uber's business model has been to launch these services regardless and then use customer support as a platform for lobbying against the regulations which restrict its services. This strategy has been widely successful, with notable exceptions such as France, Spain and Thailand, which have banned its services outright.

A major source of controversy is the impact of these services on licensed taxi industries, which in many cases requires ownership of a taxi license, or medallion, which has significant capital value. These licenses are devalued by the introduction of competition from Uber, and some governments have authorised Uber on condition that it applies a surcharge to fares in order to compensate owners of taxi licenses which have lost their value.¹⁴⁷

Other sources of controversy include the safety of passengers using Uber services and the impact on the livelihood of taxi drivers and similar interest groups. There have been widespread protests and strikes by taxi drivers against Uber, with varying success.

Uber has partnered with finance companies who are prepared to lend to prospective drivers so they can purchase a vehicle and use their earnings from Uber to repay the loan. It has also run promotion in which Uber drivers deliver ice cream, or even kittens to

¹⁴⁶ www.reuters.com/article/us-uber-tech-fundraising-idUSKCN0QQ0G320150821

¹⁴⁷ www.abc.net.au/news/2015-12-17/uber-x-legalised-in-nsw-under-government-proposals/7037600

customers to play with. Uber is succeeding in its push to be legalized where it faces regulatory hurdles, and its projected growth is unlikely to stop or slow down.

A final point of controversy for Uber has been taxation. Uber repatriates profits earned to its US home, which has been a controversial practice in some jurisdictions. It has also been involved in taxation disputes in inter alia Australia, regarding incorporating VAT and similar taxes into its fare prices. As of late 2015 it now includes GST in Australian fares.