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Brazil's App Economy

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February 2017



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FEBRUARY 2017

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INTRODUCTION

Apple's introduction of the iPhone in 2007 initiated a profound and transformative new economic innovation.

While central bankers and national leaders struggled with a deep financial crisis and stagnation, the fervent demand for iPhones, and the wave of smartphones that followed, was a rare force for growth. Today, use of mobile data is rising at 50% per year globally, a stunning number that shows the revolutionary impact of the smartphone.¹

More than just hardware, the smartphone also inaugurated a new era for software developers around the world. Apple's opening up of the App Store in 2008, followed by Android Market (now Google Play) and other app stores, created a way for iOS and Android developers to write mobile applications that could run on smartphones anywhere.

The iPhone and the App Store were the beginnings of a global App Economy: an army of app developers writing mobile applications for billions of users.² For the most part, these developers are not hobbyists writing games in their basements. Instead, as more and more people are linked to the Internet through their

smartphone and mobile data connections, mobile apps have become an essential way for businesses, nonprofits, and governments to interact with their customers, members, and citizens. One report notes that from 2015 to 2016, on a global basis, "time spent in apps grew by 25%, driving app store revenue paid out to publishers from Google Play and the iOS App Store up by 40%."³

Moreover, the long-term growth prospects of the App Economy are still strong. Yes, the great surge of new game, media, and ecommerce apps is probably close to its peak. However, the rise of the Internet of Things means that more and more objects and physical processes will be connected to the Internet.

Increasingly, individuals will be using mobile apps as their interface to their home, their travel, their entertainment, their car, their schools, their health providers, and their state and local governments. Employees in many enterprises are using mobile apps to monitor or control work processes. These apps will be highly functional and sophisticated, serving an essential role in interacting with our environment.

THIS PAPER

In this paper we examine Brazil's App Economy. We find that Brazil has 312,000 App Economy jobs as of January 2017. This large number is particularly striking because it comes after two years of economic contraction, including sharp job losses in the electronics industry.⁴

Based on global trends, it is likely that manufacturing jobs will continue to shrink, while the need for App Economy workers increases. In the United States, App Economy jobs are growing at 30 percent annually. Brazil's App Economy shows great promise for similar growth. The national demand for apps

is soaring: The percentage of adults in Brazil owning a smartphone nearly tripled from 2013 to 2015, according to a 2016 Pew Research Center report.⁵ In 2015, 61% of Brazilians aged 18-34 owned a smart phone.

These apps will be highly functional and sophisticated, serving an essential role in interacting with our environment.

A recent analysis of app store revenues observed: "While mature markets experienced strong growth in 2016, emerging markets, including India, Indonesia, Mexico and Brazil, saw even more impressive gains."⁶ Brazil leads Latin America in app usage, according to one study.⁷

The question is whether Brazil's tech sector can take advantage of this enormous market opportunity. One positive sign is that the amount of money invested annually in Brazil tech startups has increased since 2011, and is now over \$1.3 billion per year.⁸ That will enable the creation of new tech companies using mobile apps as the core of their business model.⁹ Overall in 2017, Brazil's IT sector is predicted to grow 5.7 percent compared to 2016.¹⁰

Another important issue is whether government policies are conducive to the growth of App Economy jobs in Brazil. Additionally, we identify steps the Brazilian government could take to encourage the growth of its mobile app sector.

SIGNIFICANCE OF THE GLOBAL APP ECONOMY

This paper is part of our long-term effort to track the growth of the App Economy globally in order to see which countries are benefitting the most. Our goal is to produce a set of globally-consistent and credible estimates

for App Economy employment by individual countries and by broad geographical regions, such as states and major cities. Ideally, we should be able to link App Economy growth to policy measures undertaken by governments.

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The App Economy is less than a decade old, having only started after the introduction of the iPhone in 2007. The App Economy started in California's Silicon Valley, home to Apple and Google, but has since spread around the world—to Europe, to Asia and the Pacific Rim, to Latin America.

By our definition, the App Economy is the whole ecosystem of jobs, companies and income connected with mobile apps. Brazil has a rapidly growing number of app developers—these are the people who design and create the apps distributed domestically and internationally.

Moreover, Brazil companies that develop apps also have to hire sales people, human resources managers, office staff, and other types of employees. Finally, each app developer, by spending money in the local economy, supports a certain number of local jobs.

Many people mistakenly think of mobile apps as just games, but in reality, mobile games are only a small part of the App Economy. Games are important, but apps are also developed and used by major multinationals, banks, media companies, retailers and governments. Indeed, apps have become the storefront of the Internet.

The demand for new mobile apps is only going to grow up in the future. One of the biggest

changes coming is the Internet of Things, which is the use of the Internet to help control physical devices and our physical environment.¹¹ Farmers will increasingly use apps to aid their agricultural production, nurses and doctors will use apps to manage patient care and manufacturers will use apps to control their factories.

TRACKING APP ECONOMY JOBS GLOBALLY

As the App Economy grows in significance globally, it becomes essential to have a consistent set of App Economy job estimates so that policymakers can compare their country's performance with that of other countries. For that reason, we have developed a new, standardized methodology for estimating App Economy employment.

This methodology was originally developed in 2012 to estimate the size of the United States App Economy.¹² Since then, it has been refined and broadened to provide estimates for a wider range of countries and regions, including the European Union, Mexico, Argentina and Columbia.

The methodology uses online job postings for workers with app-related skills as a real-time measure of App Economy employment. For Brazil, we use the job postings collected by Indeed, and reported at www.indeed.com.br.¹³

We benchmark this data against estimates of overall tech employment in order to eliminate many of the well-known problems connected with using big data to measure economic variables.¹⁴

Job search engines are a wonderful source of data about the current labor market in a country. Companies post their openings on their website or use job boards to place job postings, and those online job postings are collected and

indexed in real-time by job search engines such as Indeed. That is, the job seeker can input relevant criteria into the job search engine, such as skills, location, and so forth. And then the job search engine will return a list of all the current job postings that match the criteria. In Brazil, the postings may either be in English or Portuguese and the methodology used accounts for this.

The main positive is that job postings (or want ads) typically contain detailed information about the skills that the employers are looking for. For instance, if a job posting requires that the job candidate have experience developing apps for iOS—the iPhone/iPad operating system—then we can reasonably conclude that the job is part of the App Economy. Similarly, if a job posting calls for experience developing apps for Android, Windows Phone/Mobile, or Blackberry, we can be reasonably sure that the job is part of the App Economy as well.

What's more, the search engine results are continually updated. And especially in tech fields, the expectation is that the potential employees will search for jobs using the Internet, so many companies are willing to post open positions online, because that's where they will find their workers.

On the other hand, job search engines do have certain problems. In Brazil many open positions are not listed on online job postings, especially since many people still don't have smartphones. Still, analyzing the results of job search engines gives us information about the tech labor market that can't be found any other way.

Job search engines are a wonderful source of data about the current labor market in a country.



MEASURING APP ECONOMY EMPLOYMENT

For this study, a worker is in the App Economy if he or she is in:

- An information and communications technology (ICT)-related job that uses App Economy skills—the ability to develop, maintain, or support mobile applications. We will call this a “core” App Economy job. Core App Economy jobs include app developers; software engineers whose work requires knowledge of mobile applications; security engineers who help keep mobile apps safe from being hacked; and help desk workers who support the use of mobile apps.
- A non-ICT job (such as human resources, marketing, or sales) that supports core App Economy jobs in the same enterprise. We will call this an “indirect” App Economy job.
- A job in the local economy that is supported by the income flowing to core and indirect App Economy workers. These “spillover”

jobs include local retail and restaurant jobs, construction jobs, and all the other necessary services.

To estimate the number of core App Economy jobs, we use a multi-step procedure based on data from the universe of online job postings. Our first observation is that online job postings typically describe the skills and knowledge being sought by the employer.

In practice, we compiled a short list of key words and phrases that would generally be associated with App Economy-related skills. These include iOS, Android, Blackberry, "Windows Phone," "Windows Mobile," and app. We applied these search terms to the real-time database of job postings reported at www.indeed.com.br, which gave us an unadjusted count of job postings for core App Economy jobs.

However, that's only the start. Job postings for an occupation are only a fraction of the number of people employed in that occupation, since most positions are not empty. We develop an estimate for the ratio between the number of job postings for ICT jobs and overall ICT employment. This ratio is applied to the number of App Economy job postings to generate a provisional estimate of core App Economy employment. Crucially, we use a validation procedure to ensure that we are only counting job postings that correspond to core App Economy jobs. We use a conservative estimate of the indirect and spillover effects.¹⁵

THE BRAZIL APP ECONOMY

So how large is the Brazilian App Economy today? Based on our analysis we estimate that Brazil had 312,000 App Economy jobs as of January 2017 (Figure 1).

FIGURE 1: Brazil's App Economy



Data: Progressive Policy Institute, Indeed. Public data only.

App Economy workers are found in every sector of the Brazilian economy. For example, as of February 2017, QuintoAndar, an online marketplace for residential rentals in Brazil, was seeking a Senior Android Software Engineer in São Paulo. EduK, a venture-funded online teaching platform and the largest education startup in the country, was seeking an iOS Software Engineer, also in Sao Paulo. Doghero, a peer-to-peer pet boarding marketplace that was founded in 2014, was seeking a Backend Developer with Android and iOS skills to develop and maintain its app.

App Economy workers are found in every sector of the Brazilian economy.

In finance, NuBank, a venture-funded startup seeking to digitize Brazil's financial services industry, was seeking a Mobile Software Engineer in February 2017 to build and support its mobile app. Magnetis, an online investment advisory firm founded in 2012, was seeking a Full Stack Product Engineer to build new web and mobile apps.

In retailing, Amaro, an online women's fashion brand, was looking for a UI/UX Designer with Android and iOS knowledge. PlugApps,

a startup founded in 2013, was seeking an Android Developer in Curitiba. Monkey'n Apps, a company specializing in web and mobile apps, was seeking iOS and Android Developers. X-Apps, a startup who develops systems and applications for companies, was looking for a Mobile and Web Designer.

We note that many of these companies are also posting for indirect App Economy jobs as well. For example, Movile, the leading mobile commerce company in Latin America, based

in São Paulo, was posting for jobs such as Performance Marketing Manager for PlayKids, which bills itself as the “#1 children’s app in more than 25 countries.” Jobs such as this one would not exist without the App Economy.

APP ECONOMY JOBS BY STATE

The top state for App Economy jobs is São Paulo, with 146,000 App Economy jobs. That’s followed by Rio Grande do Sul, Rio de Janeiro, Paraná and Minas Gerais. (Figure 2).

FIGURE 2: App Economy Jobs by State

	ESTIMATED APP ECONOMY JOBS, THOUSANDS, JANUARY 2017
BRAZIL TOTAL	312
SÃO PAULO	146
RIO GRANDE DO SUL	32
RIO DE JANEIRO	28
PARANÁ	26
MINAS GERAIS	16
SANTA CATARINA	9
DISTRITO FEDERAL	9
PERNAMBUCO	8
CEARÁ	8

Data: Progressive Policy Institute, Indeed. Public data only.

For example, in February 2017 in the South Region, Avidity, a web and mobile developer with offices in Sweden and Brazil, was seeking a Ruby/Python Developer in Porto Alegre to develop applications for iOS and Android. Senior Sistemas, a large software development firm, was hiring a Systems Programmer with mobile development experience in Blumenau, SC. Red Fuel, a teaching company, was seeking a Full PHP Programmer with Android and iOS experience in Curitiba, PR.

In the Southeast Region, JuridicoCerto, an app that matches users to legal professionals, was seeking a Senior Android Developer in São Paulo. Kanamobi, a mobility and creative technology startup in São Paulo, was hiring an iOS Developer. AM4, a new media company, was hiring a Mobile Developer in Belo Horizonte, MG. SystemSat, a firm that develops tracking systems, was looking for an Android Developer in Niterói, RJ. Google was looking for a software engineer in Belo Horizonte, MG, with knowledge of mobile application development.

In February 2017 iTriad Systems, an IT firm, was seeking an Android Developer in Manaus, AM in the North Region. Software developer AIS was seeking an iOS Developer in the Federal District.

Rea.ch, a personal management and collaboration app, was looking for a Software and Data Architect with web and mobile development experience in Salvador, BA in the Northeast Region. Virtual Vision, a business technology company, was seeking a Java Web/Android Developer in Recife, PE. Joyjet Brazil, a digital product agency with offices in France and Brazil, was looking for an Android Developer in Fortaleza, CE.

APP JOBS BY OPERATING SYSTEM

We can take the analysis further by assessing the distribution of mobile operating systems in Brazil's App Economy since many App Economy job postings note a specific mobile operating system or multiple mobile operating systems that the job candidate is expected to be familiar with.

As of January 2017, we estimate that just under 85 percent of App Economy workers in Brazil (roughly 265,000 jobs) belong to the Android ecosystem (Figure 3). This figure includes Android specific jobs as well as jobs supporting both Android and other operating systems. This compares with the iOS ecosystem at 53 percent of Brazilian App Economy workers (approximately 166,000 jobs). This figure similarly includes iOS specific jobs as well as jobs supporting both iOS and other platforms. In general, analysts agree that iOS apps tend to generate significantly more revenue for developers on a comparative basis.

The numbers sum to more than 100 percent because quite a few jobs specify more than one operating system, requiring both iOS and Android skills.

FIGURE 3: Brazil App Economy Jobs by Major Operating System

OPERATING SYSTEM	ESTIMATED APP ECONOMY JOBS, THOUSANDS	SHARE OF TOTAL APP ECONOMY JOBS*
ANDROID ECOSYSTEM	265	84.9%
IOS ECOSYSTEM	166	53.2%

Data: Progressive Policy Institute, Indeed. Public data only.
 *Percentages sum to more than 100 because the same position can participate in multiple ecosystems.

LONG-TERM POTENTIAL AND OBSTACLES

Brazil has the largest economy in Latin America, with an estimated 2016 GDP of more than R\$6.2 trillion. Measured in dollars and adjusted for price levels, Brazil's estimated 2016 GDP was \$3.1 trillion, substantially larger than either Mexico (\$2.3 trillion) or Canada (\$1.7 trillion).¹⁶ Yet the country's task is to find new sources of growth to help lift the living standards of its population, especially coming out of recession.

To complement its existing IT manufacturing base, app development may offer an important route to economic and employment gains in Brazil. The large and growing size of Brazil's domestic market for apps means that app developers can get the benefits of scale. That's a real advantage of Brazil compared to many European countries, where the native language markets are much smaller, and there are still barriers to cross-border sales.

Moreover, Brazil is potentially an attractive launching pad for global apps. Once Brazil can create a critical mass of app developers, the country's size means that apps can be developed at home and then exported to the rest of the world.

The large and growing size of Brazil's domestic market for apps means that app developers can get the benefits of scale.

According to a 2016 report from the World Economic Forum (WEF), Brazil already has some advantages that help to support its growing mobile ecosystem.¹⁷ Individual usage rates are high – in mobile subscriptions, Internet use, and fixed broadband subscriptions. Additionally, Brazil rates highly on mobile network coverage. These are vital components to have in place for a thriving App Economy.

However, Brazil's regulatory framework and its business and innovation environment stand as potential barriers to growth facing the country, with both areas having ranked poorly in the WEF report. These are also important components for a thriving App Economy and must be improved upon in order for Brazil to realize its potential as a mobile development hub.

For example, third party manufacturing laws in Brazil require many tech producers to use other local suppliers. While the Brazilian government has postponed these requirements in some cases, laws like these raise the cost of smartphones to consumers and developers. This slows down the development of the App Economy.

Another question is whether "over-the-top" (OTT) services such as Netflix and WhatsApp should be regulated as legacy telecom companies, as some have proposed. First, in today's world of multiple pipelines, strict telecom regulations are less necessary than in the past. Second, the rapidly changing OTT space in particular has sufficient competition to reduce the need for regulation, since entry is relatively easy. Third, telecom-type regulations would impede innovation in the rapidly changing OTT space, slowing economic growth and job creation in the knowledge economy. In particular, such regulation would have the effect of slowing down the adoption of apps, and therefore impeding the growth of App Economy jobs. The global evidence suggests that regulation of OTT services should not be undertaken without compelling reasons.

Brazil's high taxation of the mobile sector serves as another barrier to growth. A recent study from GSMA found that Brazil has one of the highest tax burdens for the telecommunications

sector in the world.¹⁸ For example, the ICMS, a state-based value-added tax, imposes a 25 to 35 percent rate on mobile calls, texts, and data, depending on the state.¹⁹ In addition, the municipal ISS tax applies to mobile services that are not covered by the ICMS.

We note that one interesting program is BEPiD (Brazilian Education Program for iOS Development, or Programa de Educação Brasileiro para Desenvolvimento em iOS).²⁰ BEPiD programs across the country help young Brazilians build experience designing and developing solutions for iOS devices. The result has been a creation of apps for the public good in health, finance, public safety, education and law just to name a few. For example, a group of BEPiD students developed an app that lists

all the medical facilities and specialists near the user.²¹ Another group created My Piggy, an app that helps customers control their personal finances.²²

More importantly, such programs start building a firm base of knowledgeable app developers. This creates a virtuous circle of more domestic app development, which means more hiring for app developers, which means more young people are willing to get experience.

CONCLUSION

Mobile apps are becoming the front door to the Internet. With its large economy and its strong domestic demand for apps and its existing IT base, Brazil has the opportunity to become a major player in the global App Economy.

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