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# Korea's App Economy

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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, there are five billion mobile broadband subscriptions globally, an unprecedented rate of adoption for a new technology.<sup>1</sup> Use of mobile data is rising at 65 percent per year, a stunning number that shows its revolutionary impact.<sup>2</sup>

The smartphone era helped power Korea's economic growth over the past decade. Samsung announced its first Android phone in April 2009, eventually becoming the largest smartphone maker globally measured by volume.<sup>3</sup>

But the smartphone was about more than hardware. Apple's opening 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 beginning of a global App Economy: an army of app developers writing mobile applications for billions of users.<sup>4</sup> 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. (Indeed, data shows that people spend most of their Internet time interacting with apps.)

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

Increasingly, individuals will be using mobile apps to interface with their homes, their travel, their entertainment, their cars, 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**

This paper analyzes the growing Korean App economy primarily from the perspective of jobs. We show how Korea's App Economy makes an important contribution to the broader economy, complementing Korea's strength in hardware. As of April 2018, we estimate that the Korea App

Economy totals roughly 420,000 jobs, including app developers with global reach such as Kakao and NAVER.

We estimate the number of App Economy jobs by major mobile operating system. We find roughly 300,000 App Economy jobs in the Android ecosystem, reflecting the importance of Android smartphone manufacturers in Korea. At the same time, we find about 200,000 App Economy jobs in Korea's iOS ecosystem.

We compare the size of Korea's App Economy with that of Germany, Japan, the United Kingdom and the United States, measured both in absolute terms and as a share of total employment (what we call "app intensity"). We find Korea's app intensity is higher than the United States.

Finally, we consider the global potential of Korea's App Economy.

### **CONTEXT**

In this paper we focus on App Economy employment in Korea. However, this paper is part of a larger research project examining App Economy employment in different countries and regions, including the United States, the European Union, Japan, Australia, Mexico, Brazil, Colombia, Thailand, Vietnam, Chile, Argentina and Indonesia.

There are several reasons we have focused on App Economy jobs. First, the invention and popularization of the smartphone was one of the two most important technological innovations over the past decade, in terms of economic impact, so it's natural to want to know how many jobs it is creating.

Second, the App Economy is one of the main forces propelling the global boom in tech-related jobs. Recent research shows that the 10 leading U.S. tech/telecom companies employ 1.6 million workers, up 82 percent from 10 years earlier. Many of these new jobs are connected with the mobile broadband and smartphones.<sup>5</sup> The same is true in Europe as well.

### The App Economy is one of the main forces propelling the global boom in tech-related jobs

Third, we focus on the App Economy because it can be a potent force driving export-oriented growth. Mobile apps can be easily developed in a country such as Korea, and then shipped around the world.

#### MEASURING THE APP ECONOMY

We have chosen to use employment as our preferred metric for measuring the economic impact of the App Economy. Our methodology (described in the Methodology appendix) is based on analyzing databases of online job postings. These job postings typically contain information about the skills required for the job and the location of the job. We are then able to search for jobs that require App Economy-related skills, such as knowledge of iOS or Android. In this way we can develop an estimate of App Economy jobs by country and region.

Our methodology for using online job postings to estimate the size of the App Economy was originally introduced in 2012, in a widely-quoted paper that reported the first estimate of U.S. App Economy jobs.<sup>6</sup> In December 2015 we extended and standardized the original methodology so it could be applied to a wide variety of countries, languages, and economic environments. Our

goal was to produce a set of globally-consistent and credible estimates for App Economy employment by individual countries, broad geographical regions, and, where possible, by the largest cities. (As noted in the Methodology appendix, we modified our procedure slightly to account for the importance of Samsung).

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

- An IT-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 use of mobile apps.
- A non-IT job (such as sales, marketing, finance, human resources, or administrative staff) 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 either by the goods and services purchased by the enterprise, or by the income flowing to core and indirect App Economy workers. These “spillover” jobs include local professional services such as bank tellers, law offices, and building managers; telecom, electric, and cable installers and maintainers; education, recreation, lodging, and restaurant jobs; and all the other necessary services. We use a conservative estimate of the indirect and spillover effects, as discussed in the Methodology.

## RESULTS

Table 1 provides the number of App Economy jobs in Korea. As of April 2018, we estimate that the Korean App Economy includes 420,000 jobs.

This includes core App Economy jobs, indirect App Economy jobs, and a conservative estimate of spillover jobs.

TABLE 1: Korea App Economy Employment

	THOUSANDS OF JOBS (APRIL 2018)
<b>Korea</b>	420

Data: Progressive Policy Institute, Indeed

Obviously, Korea's App Economy employment level falls far short of the United States, just on the basis of size. However, Korea's App Economy compares favorably to Germany, Japan, and the United Kingdom (Table 2).<sup>7</sup>

Moreover, we can also look at app intensity, which we define as the number of App Economy

jobs as a percentage of all jobs. We see that Korea has an app intensity of 1.6 percent, higher than the United States. However, it is worthwhile noting that California, the U.S. state that includes Silicon Valley, has an app intensity of roughly 2.5 percent.

TABLE 2: Comparing Korea's App Economy

COUNTRY	THOUSANDS OF APP ECONOMY JOBS	APP INTENSITY*	DATE OF ESTIMATE
<b>Korea</b>	420	1.6%	April 2018
<b>Germany</b>	311	0.7%	January 2017
<b>Japan</b>	579	0.9%	April 2016
<b>United Kingdom</b>	330	1.0%	January 2017
<b>United States</b>	1729	1.1%	December 2016

\*App intensity is the number of App Economy jobs divided by total employment

Data: Progressive Policy Institute, Indeed

### GLOBAL REACH VERSUS DOMESTIC STRENGTH

How much global reach does the Korean App Economy have? To answer this question, we use the analysis published by the app market data company App Annie in its 2017 retrospective.<sup>8</sup> The report identified the companies that had the most downloads in each major market in 2017. In Korea, 8 of the top 10 companies, ranked by downloads, were Korean, led by Kakao and NAVER. Two companies in the top 10 were based in the United States.

That makes Korea one of the most powerful domestic markets for apps. By contrast, in Germany, only one of the top 10 downloaded companies were German in origin. One was from China, and eight were from the United States. In the United Kingdom, three of the top 10 downloaded companies were UK in origin.

Korean companies also have a global presence. J2 Interactive, a Seoul-based app developer with a popular video player, appears on the list of the top 10 downloaded companies in India. Samsung Group appears on the Netherlands and Singapore top download lists. NAVER appears on the Taiwan, Thailand and Vietnam lists.<sup>9</sup>

Thus, Korea's global app presence compares favorably with Germany, Japan and the United

Kingdom, but ranks behind the United States and China. For example, German companies appear in the top 10 download lists of three major markets outside of Germany, compared to six major markets for Korean companies.

### OPERATING SYSTEM

The two major smartphone operating systems today are iOS and Android. Employers looking for app developers often specify in which operating system or systems they want their hires to have expertise. This enables us to assign jobs to either the iOS ecosystem or the Android ecosystem – or both. (As noted in the Methodology appendix, we had to modify our methodology somewhat to account for Samsung's role in the App Economy.)

Table 2 shows the distribution of App Economy jobs in Korea by mobile operating system. The numbers sum to more than 100 percent because some jobs specify more than one operating system – say, both iOS and Android skills. We also looked for evidence of an app ecosystem built around Tizen, which is an open-source mobile operating system supported by Samsung.<sup>10</sup> However, we did not find enough activity to justify breaking the category out separately. One caveat: We did not have much visibility into Samsung's internal Tizen efforts.

TABLE 3: Comparing South Korea's App Economy

	THOUSANDS OF JOBS	SHARE OF ALL APP ECONOMY JOBS
<b>iOS ecosystem</b>	202	42%
<b>Android ecosystem</b>	309	65%

Data: Progressive Policy Institute, *Indeed*

## EXAMPLES

The Korean app economy is rich in terms of both diversity and depth. Of course, the tech sector is hiring app economy workers. As of May 2018, digital marketing company Incaco Communications was looking for Android app developers in Chuncheon. As of April 2018, cybersecurity company AhnLab was advertising for a mobile developer in Bundang-gu. Tech company Aurum Planet was hiring an Android developer in Seoul. IT firm Maxpia was looking for Android and iOS developers in Seoul. Software giant NAVER was hiring Android and iOS developers at its Korea headquarters.

As of April 2018, app development company UserHabit was looking for mobile app developers in Seoul. Software development firm 2beone Solutions was hiring an Android developer in Uiwang. Tech company Seongsan was advertising for iOS and Android developers in Busan. IT firm Pharos was looking for mobile program developers in Cheongju. IT consulting company iBank was hiring iOS and Android developers in Seoul.

The entertainment sector was also hiring app economy workers. As of May 2018, Soul Games was looking for a mobile developer in Bundang-gu. Social network service Cyworld was advertising for a mobile apps developer in Seoul. Gaming firm Dev Sisters was hiring developers with mobile development experience in Seoul. Africa TV was looking for mobile app developers in Bundang-gu. As of April 2018, e-book company RIDI Corp was advertising for a mobile app developer with iOS and Android experience in Seoul. DoubleUGames was looking for a mobile developer in Seoul.

The Korean app economy has spilled over into the healthcare sector too. As of May 2018, Medical Standard, which provides medical equipment and services, was looking for Android and iOS mobile developers in Seongnam. Lemon Healthcare, which develops medical software, was advertising for developers with Android and iOS experience. As of April 2018, EOFLOW, which manufactures medical equipment, was hiring Android and iOS developers in Bundang-gu. Hanmi Healthcare was looking for developers with mobile experience in Seoul.

The education sector was hiring app economy workers as well. As of April 2018, NHN Edu was looking for Android and iOS app developers in Bundang-gu. Peppercon, an educational app for kids, was advertising for a mobile application developer in Bundang-gu. Kakao, the Korean Internet giant, was hiring an iOS developer for its kids-oriented subsidiary.

And here are some examples from other industries: As of May 2018, Handycar, which provides a platform that connects users and vehicles with connected car services, was advertising for a mobile app developer in Bundang-gu. As of April 2018, dating company Nextmatch was looking for senior Android and iOS developers in Seoul. Scanning company Ascan was looking for iOS and Android developers in Seoul. Financial data firm Wisefn was advertising for Android and iOS developers in Seoul.

### LONG-TERM GLOBAL POTENTIAL

The global App Economy is moving into the next phase. As physical industries such as manufacturing, transportation and healthcare become digitized, mobile apps will become essential as the main interface to more and more of our daily life.<sup>11</sup> In an important sense, nations now need a strong App Economy in both the Android and iOS ecosystems in order to compete successfully on the global stage.

There are some issues, of course. According to the U.S. trade representative's office, Korea is one of the few markets in the world that restricts the export of location-based data.<sup>12</sup> Such restrictions make app-based growth more difficult.

However, Korea's strengths in the App Economy are clear. First, the App Economy is clearly

complementary to the country's strength in hardware innovation. Being able to develop apps in parallel with new products is a real advantage.

Second, Korea obviously has a powerful position in the global Android ecosystem because of the presence of Samsung and LG. This is a potent source of jobs for the future.

Third, the current size of Korea's iOS ecosystem provides a compelling platform for future growth in huge iOS markets such as the United States, Europe and Japan.

Korea can be a global app powerhouse. Today's 420,000 App Economy jobs in Korea are only the beginning.

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# Appendix

## METHODOLOGY

Our methodology consists of six distinct steps. Step 1 and Step 6 are modified for Korea because of the presence of Samsung, the world's largest Android smartphone manufacturer.

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### 1. Identification of App Economy job postings

Using summary statistics generated by searches on kr.indeed.com, we identified job postings for App Economy jobs containing one of the following keywords: iOS, Android, Java, Swift, and Korean equivalents for related phrases such as "mobile developer." We also included the keyword "Tizen," the open-source mobile operating system supported by Samsung.

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### 2. Validation

Invariably, some job postings identified in Step 1 will not fit the criteria of an App Economy worker (e.g., a job posting for a truck driver using an app). We therefore validated the sample by manually examining a sample of the job postings from Step 1 to eliminate those that do not fit our criteria of an App Economy worker. This allows us to estimate a validation ratio that we applied to the results of Step 1.

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### 3. Identification of IT job postings in Korea, and estimation of the ratio of job postings to employment for overall IT occupations

We constructed a keyword list to identify job postings for IT occupations in Korea. This included a core list of Korean and English words and phrases commonly found in job postings for IT occupations.

We then validated the outcome using the same methodology as Step 2, manually examining a sample of job postings to assess which actually correspond to IT occupations. Then the resulting number was used to estimate the ratio of job postings to employment for overall IT occupations.

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#### 4. Estimation of App Economy core jobs for Korea

We multiplied the ratio generated in Step 3 and the validated number of App Economy job postings generated in Step 2. The result gave us the estimate of core App Economy jobs for Korea in April 2018.

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#### 5. Estimation of total App Economy employment for Korea

Using the same multipliers as in our previous work, we estimated the total number of App Economy jobs in Korea. We assumed that each core App Economy job is supported by one job-equivalent at the same company (e.g., managers, human resources, accounting). Then we assume that each company job generates one job in the rest of the economy. This is a very conservative assumption for spillovers.

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#### 6. Estimation of the total employment in the iOS and Android ecosystems in Korea

Out of the set of job postings containing the terms “iOS” or “Android,” we identified the share that contain terms belonging to the iOS ecosystem (Apple, iPad, iPhone, iOS) and the share belonging to the Android ecosystem (Android, Google).

Typically our methodology calls for applying these shares to all App Economy employment. For Korea, however, we have only limited visibility about the job openings at large companies such as Samsung.

So we modified our methodology. We applied the job posting share data to App Economy jobs at small and medium size companies. For large companies, such as Samsung, we assumed that the proportion of App Economy jobs by operating system matched the overall use of mobile operating systems for Korea, which is roughly 25 percent iOS and 75 percent Android.<sup>13</sup>

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## About the Author

Dr. Michael Mandel is the Chief Economic Strategist at the Progressive Policy Institute and a senior fellow at Wharton's Mack Institute for Innovation Management

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Founded in 1989, PPI started as the intellectual home of the New Democrats and earned a reputation as President Bill Clinton’s “idea mill.” Many of its mold-breaking ideas have been translated into public policy and law and have influenced international efforts to modernize progressive politics.

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