

Can Satellite Imagery Help Us Evaluate the Kim Jong-un Economy?

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I . Overview

The North Korean economy has experienced many changes in the nearly five years that Kim Jong-un has been leader. While seeking to evaluate the state of the North Korean economy under his government, however, we continue to encounter the same basic problem we have grappled with for decades: We lack access to detailed, comprehensive data.

Despite the sharp increase of information on North Korea that has become available over the last decade, the country remains one of the world's most opaque societies. Foreign visitors and residents are permitted limited access to the country and its people, and the government does not publish many comprehensive or reliable statistics that can be used to gauge the country's economic performance.

As a consequence researchers and policy makers are forced to compare and analyze the disparate sources of data that are available and extrapolate conclusions using, in many cases, unorthodox methods. Sources we can observe include: Official information released by the North Korean media (such as their state budget reports or old net-material product tables), North Korean publications, international trade statistics collected by the DPRK's trading partners, defector interviews, and illicitly-collected data such as North Korea's commodity prices and the black market exchange value of the currency.

Perhaps the most rigorous effort to use this data to generate a comprehensive

understanding of North Korea’s macro-economy is undertaken by the Bank of Korea. Although the exact methodology the bank uses is not available to the public for scrutiny, we do know it is based on older models that attempted to evaluate the Soviet economy with modifications that allow it to be applied in a North Korean context. Although this model represents a sincere approach to measuring economic activity in North Korea, it suffers from many notable flaws that do not have any obvious solutions. Perhaps the most glaring problem is that the effort omits “services” as a category of production which would not only include many legitimate occupations, but also most black market activity. The lack of such important sectors will bias the findings—in this particular case, downwards.

However, over the last decade the growing use of satellite imagery, both freely and commercially available, has allowed us to collect and verify data on aspects of the North Korean economy that previously remained unknowable. Insights gleaned from the use of satellite imagery can help fill in some of the information gaps that we encounter when trying to evaluate the North Korean economy with established techniques. For example, as satellite imagery can be used to observe parts of the country which remain off-limits to direct observation, it allows researchers to determine if projects announced in the official media are being completed on schedule; to corroborate data released by the North Korean government such as damage from natural disasters; to observe changes that are not announced in the official media; to confirm or disprove rumors and unverified information from inside North Korea; and even to learn how particular facilities are managed.

II. What does satellite imagery show us about North Korea's economic policy and performance?

At its most basic use, commercial satellite imagery can be used to measure policy implementation progress, such as new building construction. Since coming to power, Kim Jong-un has launched a surprisingly large number of construction initiatives that he hopes will establish his domestic legitimacy for decades to come. These initiatives include construction of new parks (공원), roller skating parks (로라스케이트장), amusement parks (유희장), and water parks (물놀이장), 3-D Rhythmic Cinemas (림체률동영화관), new gymnasiums (체육관), vacation resorts (휴양소), construction of new orphan schools (육아원, 애육원, 초등학교, 중등학교), large new housing construction projects (particularly in Pyongyang), and new veterans hospitals (전쟁로병보양소) in each province.

Satellite imagery of some of these construction sites reveals administrative weaknesses unique to North Korea. For example, an economically wasteful aspect of the system can be observed when Kim Jong-un alters building plans after construction on a new facility has already begun, as was the case with the new Pyongyang International Airport and the Sci-Tech Complex. In a similar case, Kim Jong-un ordered the construction of a new 3-D Rhythmic Cinema in the provincial of Phyongsong on a site where a new skate park had just been completed. The new skate park was promptly torn down to make way for the new cinema.

Another aspect of the system we can observe is the uneven implementation of Kim Jong-un's construction priorities. Kim has directed that so many new kinds of facilities be built in Pyongyang and the provincial capitals that they appear to be stretching the limits of local government finances and construction capacity. As a result, some provincial capitals have made faster progress at building the required projects than others. Monitoring these sorts of regional construction variations could help us understand the relative fiscal positions of North Korea's provincial governments.

Finally, we can observe economic waste from Kim Jong-il's uncompleted policy priorities.

Under the plan to achieve a “Strong and Prosperous Country” (강성대국) by 2012, Kim Jong-il sought to build 100,000 new housing units in Pyongyang. Much of this housing was concentrated in Hyongjesan (형제산구역) and Rakrang Districts (락랑구역). However, construction was eventually abandoned as 2012 arrived and the apartments could not be completed by the politically determined deadline. Today, even though Pyongyang has experienced a significant building boom under Kim Jong-un, many of these partially-completed buildings remain neglected on the outskirts of the city. We do not know when or if these apartments will ever be finished.

Since coming to office, Kim Jong-un has also allowed the promotion of 24 new special economic zones (SEZs). Fourteen were announced in 2013; seven were announced in 2014; three in 2015; and 0 in 2016. Because these SEZs are generally located in remote areas of North Korea, and few foreigners are permitted to visit the sites, satellite imagery is one of the only tools we have of observing and measuring any activity. To date, very little progress has been made on most of these new SEZs. The Sinuiju-River Amnok Tourist Zone has been constructed in Sinuiju; the Kalma Airport has been constructed in Wonsan; and a new housing and border crossing appear to have been constructed for the Mubong Tourist Zone in Samjiyon.¹⁾ But these developments do not come close to offsetting the revenue losses that the DPRK suffers from the closure of the Kaesong Industrial Zone. According to the North Korean web-portal Naenara, the DPRK now appears to be focusing attention on just two of the SEZs: The Rason Economic and Trade Zone and the Unjong Cutting-Edge Technology Development Zone.

Another important use of satellite imagery is that we can track economic developments that are not announced in the official media, such as the growth official markets (종합시장). Foreigners are only permitted to visit two markets in Pyongyang and one market in Rason. Using satellite imagery, we can count the total number of markets and track new market construction in the years that Kim Jong-un has been in office. According to current imagery on Google Earth, 20 new markets have been built in the Kim Jong-un era, and approximately 71 have been renovated. This is not a perfect count since many markets in North Korea are so remote that we do not have regular satellite imagery

1) Abrahamian, Andray and Curtis Melvin, “North Korea’s Special Economic Zones: Plans vs. Progress.” *38 North*, November 23, 2015. Accessed at <http://38north.org/2015/11/sez112315/>

of them to determine if they have been improved, but it does help us establish a lower-limit for analysis.

We can also observe additional “informal” markets (장마당) that can periodically be documented in satellite imagery. Informal markets are administratively different than general markets in that the people who work in them are not officially employed and vendors’ earnings are not captured by the local governments. Informal markets also do not have permanent support infrastructure, so they are harder to identify. Although most informal markets are in populated areas, we can periodically observe large, informal markets in rural settings where people must travel great distances by bus or bicycle. Currently, satellite imagery analysis is the only method for identifying and measuring these types of gatherings.

Satellite imagery can also be used to track unannounced developments in North Korea’s energy sector, such as the construction of a new coal-powered power plant in Kangdong County on the outskirts of Pyongyang. Since 1989 when North Korea completed the East Pyongyang Thermal Power Station, the country has focused its energy investments in renewable energy, particularly hydro-power. However, satellite imagery reveals that North Korea is building a new coal-power plant to supplement energy production from its aging Pukchang Thermal Power Plant (북창화력발전연합기업소). When completed, this new power plant will likely produce 100–300 MW, depending on the technology employed, and provide power to the Junghwa transformer station in North Hwanghae Province and Songmun District of Pyongyang.²⁾

Finally, North Korea’s official military budget is a state secret. Although the country’s Cabinet reports maintain that the military composes approximately 16% of the national budget, by using satellite imagery analysis of military factories combined with other open source information, we can demonstrate that the KPA also earns revenue through numerous off-budget economic projects such as the manufacture and sale of regular consumer goods. The December 7 Factory in Rakrang District a typical example of a military factory that produces consumer goods for the civilian economy. Also known as KPA Unit 1501, it manufactures maxi pads, playground equipment, conducts boat

²⁾ Melvin, Curtis, “Pyongyang’s Perpetual Power Problems.” *38 North*, November 25, 2014. Accessed at: <http://38north.org/2014/11/cmelvin112514/>

repair and refurbishment, and conducts R&D for new stealth naval patrol vessels.³⁾

And although the military budget line items also remain a secret, we can also observe comprehensive improvements in military infrastructure throughout the country that indicate conventional military spending is probably increasing under Kim Jong-un. We can directly observe renovation of military bases across the country, construction of new military units, renovation of West Sea Island Units, Air force base runway renovation, construction of new runways for Kim Jong-un and other senior leaders, KPA fishery and livestock farm construction, new special operation training facilities and obstacle courses, improved sea infiltration facilities, new service facilities (gymnasiums, theaters and restaurants), and new naval vessel development.

Some have theorized that once North Korea develops a credible nuclear deterrent it could reduce its conventional military spending and devote more resources towards economic development. Satellite imagery data indicates this is not yet taking place. It appears that North Korea is taking advantage of its economic position to have more of both “guns and butter”.

III. Conclusion

Making credible economic assessments about North Korea is a difficult job, but the analysis of satellite imagery in conjunction with additional sources allows us measure nation-wide policy implementation, track unannounced developments, study the micro-economies of local jurisdictions, and learn about the operations of particular factories (just to name a few of the applications). Although this technology has only been accessible to the public for the last ten years, it has opened new avenues of information to researchers and policy makers. In years to come use of this technology will make it increasingly harder for North Korea to hide the true state of its economy from the outside world.

3) Bermudez, Joseph and Curtis Melvin, “The December 7 Factory: Producer of Maxi Pads and Naval Stealth Technology.” 38 North, April 9, 2014. Accessed at: <http://38north.org/2014/04/melvinberm040814/>

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