

Development of the IT Industry and Structural Transformation: Focused on the Russian IT Industry and Korea-Russia IT Cooperation

Minhyeon Jeong Research Fellow, Russia and Eurasia Team, New Northern Policy Department (mjeong@kiep.go.kr)

Jiyoung Min Senior Researcher, Russia and Eurasia Team, New Northern Policy Department (jymin@kiep.go.kr)

Dongyeon Jeong Senior Researcher, Russia and Eurasia Team, New Northern Policy Department (dyjeong@kiep.go.kr)

Sang Hwan Kim Director of Business Incubation Center, Korea Techno-Venture Foundation (shkim@kist.re.kr)

I. Introduction

Russia has been chronically suffering from a structural problem that its economy heavily relies on energy resources. The long-standing and excessive economic dependence on the energy sector decayed qualitative growth through productivity, necessary for long-term growth as the economic transition to mid- and high-value-added manufacturing gets delayed. In other words, Russia's economic growth since 2008 can mostly be attributed to quantitative growth driven by physical capital and labor input.

This study analyzes the impact of innovation in the IT sector on the Russian economy from a structural transformation perspective. More specifically, the research theoretically examines how technological innovation in the IT sector helps address the structural transformation delays that middle-income countries have suffered, and investigates the possibility of IT cooperation between Korea and Russia in policy and technological aspects.

II. IT innovation and economic growth: focusing on transformation of industrial structure

The authors diagnosed the growth problem in the Russian economy as a coordination failure caused by the non-convexity of the production function. The delays in structural transformation from a resource-dependent economy to a high value-added manufacturing one is a case of so-called "bad equilibrium" from the multiple equilibria perspective. In this case, technological innovation in the IT sector may help address the structural transformation delays that Russia has suffered. This theoretical inference hinges on the intuition that advances in IT technology positively improve productivity in the service sector, seen for instance in how online banking, e-commerce, and transportation services benefit from online matching. If the IT technology enhancements increase productivity in the service sector, the

added value of IT industry production increases, which moves more economic resources (production factors) toward the mid- and high-value-added manufacturing industries, including the IT industry.

Moreover, this structural transformation to the mid- and high-value-added manufacturing industries can be expedited by the substitution effect when the service sector's productivity grows faster than other sectors. Consequently, in the context of the so-called “big push” theory, IT innovation can function as a big push inducing structural transformation in developing countries with abundant natural resources such as Russia.

III. IT industry in Korea and Russia and bilateral cooperation

In Russia, the ICT industry displayed a steady growth in value-added terms during 2011–19, mostly thanks to the IT services and software sector. In 2019, the structure of the ICT industry consisted of hardware (20%), telecommunications services (35.6%), and IT services and software (44.4%). In short, the major feature of the ICT industry in Russia is that the ICT services sector is showing more outstanding performance than the ICT manufacturing sector.

Table 1. Russia's ICT industry (Value-added terms)

(Unit: billion rubles)

	2011	2015	2016	2017	2018	2019
Hardware	256.3	528.2	487.5	509.9	524.2	543.2
Telecommunications services	832.1	948.1	913.6	922.3	945.3	967.9
IT services and software	308.2	677.5	772.2	924.5	1,059.20	1,206.80
ICT Industry	1,396.60	2,153.90	2,173.30	2,356.70	2,528.70	2,717.90
Share in GDP	2.70%	2.90%	2.80%	2.80%	2.70%	2.80%

Note: Calculated by author using data on the ICT industry in Russia, combining the areas of C26 (Hardware), J61 (telecom services) and J62-63 (IT services, software), according to the Russian Economic Activities Classification System.

Source: Росстат, Национальные счета, <https://rosstat.gov.ru/accounts> (Accessed on: 2020. 9. 28).

The IT industry in Korea also recorded continuous growth in 2011–18, excluding the year 2014. The share of the IT industry in GDP stood at 11%

in 2018. In contrast to Russia, Korea has competitiveness in hardware production, or IT manufacturing, which takes 76% of the total IT production.

Table 2. Korea's IT production (Value-added terms)

(Unit: billion won)

	2011	2015	2016	2017	2018
Hardware	115,942	112,839	113,735	136,743	145,990
IT services	19,787	22,338	26,977	26,916	28,732
Software	8,608	11,276	14,900	14,419	16,681
IT industry	144,337	146,453	155,612	178,078	191,403
Share of GDP (%)	11.4	9.6	9.8	10.6	11

Note: Telecommunications services are included in “IT services.”

Source: Ministry of Science and ICT, KOSIS (Accessed on: 2020. 10. 14).

Korea's IT goods trade balance with Russia has been in black for many years. This reaffirms the relative competitiveness of Korean goods over Russian goods. Unfortunately, the volume of surpluses in recent years has become smaller than in the early 2010s. In the meantime, Korea's IT services trade balance with Russia first turned red in 2017 and the deficit volume has been increasing.

IV. Korea-Russia IT development strategy and technological reciprocity

Russia has been trying to strategically develop the IT industry since 2009. In the beginning, IT was perceived as a tool to realize the e-government and increase transparency. However, after the outbreak of the Ukraine crisis in 2014 it was considered as an instrument to overcome a number of national challenges. In the President's May decrees, it is mentioned that development of IT can help Russia to: 1) reach 100 billion dollars in its services exports volume, 2) record higher economic growth than world's average and create more high-tech jobs, 3) diversify exports, increase labor productivity and improve investment environment, 4) digitalize the economy, and 5) secure digital sovereignty, enhancing cyber security and national defense, and etc.

Table 3. Main points of IT development strategy in 2019-25 and forecast till 2030

Categories	Main points
Principles	<ol style="list-style-type: none"> 1. Ensuring digital sovereignty and increasing the technological independence of the Russian Federation 2. Scientific and technological cooperation for the development of joint technologies with partner countries
Goals	<ul style="list-style-type: none"> • promoting domestic production by prioritizing Russian goods when the government and businesses purchase IT products • supporting the development of various products, improving quality and competitiveness, formulating monitoring roadmaps and national IT map and updating these on a continuous basis • promoting public-private partnerships to produce quality Russian goods in major IT subsectors • encouraging exchanges between IT-related ministries, industrial associations, clusters, platforms and other organizations
Expected results	<ul style="list-style-type: none"> • increasing the share of the IT industry in GDP • raising the share of IT specialists in total employment • improving labor productivity in the IT sector • expanding exports of computer and information services
Policy directions	<ol style="list-style-type: none"> 1. Developing human resources and education 2. Creating highly qualified jobs 3. Popularizing IT 4. Improving institutions for the development of IT 5. Encouraging international cooperation and exports 6. Research activities in the IT sector 7. R&D in the priority areas of the IT sector 8. Developing SMEs 9. Accelerating the emergence of IT global leaders in Russia 10. Informatization of the economy and government's long-term procurement 11. Cyber security 12. Increasing IT literacy 13. Providing statistics and updating classifications of the IT industry

Source: Министерством цифрового развития, связи и массовых коммуникаций РФ (2018), "Стратегия развития отрасли информационных технологий в Российской Федерации на 2019-2025 годы и на перспективу до 2030 года (Проект)."

Korea possesses world-class competitiveness in the ICT sector, thanks to successfully implemented policies against the third industrial revolution (informatization). Now the country has a new IT development strategy to face the fourth industrial revolution, which will help Korea to be equipped with strengthened capacity of technological innovation, advanced network, highly-qualified core talents, and etc.

According to our quantitative analysis of an ample dataset, including analysis of Russian IT patents, along with an extensive literature survey and reference, we found that both Korea and Russia share the same policy direction:

they have exerted national policy efforts to discover new growth engines restoring growth potential through IT technology innovation. From a technological perspective, when we follow the common practice of categorizing the IT industry into the areas of IT hardware, software, and services, Korea has a clear-cut competitive edge in IT hardware while Russia is advanced in non-hardware sectors. This comparative advantage is particularly prominent in the IT industry's labor supply for both countries, namely competitive personnel in the areas of IT hardware and non-hardware for Korea and Russia, respectively.

Table 4. 13 Innovative growth engines

Intelligence infrastructure	Big Data		Next generation telecommunications		Artificial Intelligence	
	Opening and utilizing Big Data		Commercializing 5G, IoT		Developing core AI technology	
Smart mobile vehicles	Autonomous driving			Drones (unmanned aerial vehicles)		
	Level 3 autonomous driving			Distributing public and commercial unmanned aerial vehicles		
Convergent services	Customized healthcare		Smart city		VR/AR	
	Customized precision medicine		Reducing city problems		Converging industries with VR/AR	
Industrial base	Intelligence semiconductors		High-tech materials		Innovative new drugs	
	Developing semiconductors for AI		Lightweighting aircraft parts and automobiles		Developing candidate list of 100 substances	
					New & Renewable energy	
					Increasing the share of renewable energy in power generation	

Source: Press release by Ministry of Science and ICT (2017. 12. 22).

V. Conclusion

Taken together, the economic, policy, and technological conditions for IT cooperation between Korea and Russia are all in place. Therefore, we conclude that voluntary and persistent IT cooperation between the private sectors of both countries can be guaranteed to some extent once the cooperation gets started. **KIEP**

References

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