

Development of the IT Industry and Structural Transformation: Focused on IT Cooperation with Russia, Kazakhstan and Uzbekistan

Minhyeon Jeong Associate Research Fellow, Russia and Eurasia Team, Center for Area Studies (mjeong@kiep.go.kr)

Jiyoung Min Senior Researcher, Russia and Eurasia Team, Center for Area Studies (jymin@kiep.go.kr)

Dongyeon Jeong Senior Researcher, Russia and Eurasia Team, Center for Area Studies (dyjeong@kiep.go.kr)

I. Introduction

This study was designed as a primary study to analyze the economic significance and potential of cooperation with Russia, Kazakhstan and Uzbekistan in the IT sector, and to derive implications for new directions between Korea and the three countries with the advent of the fourth industrial revolution era. The goal of the study is to discuss what the development of the IT industry means for the three economies, examine the characteristics of each country, and gain policy implications on how cooperation with Korea should proceed in the future.

To this end, this study is consisted of the following four components. First, the economic significance of IT technology cooperation with Russia, Kazakhstan, and Uzbekistan is viewed from the perspective of structural transformation. Second, the effect of IT cooperation between Korea and Russia on the

Russian economy is quantitatively estimated through the analytical framework of structural transformation. Third, to supplement the limitations of theoretical discussions and derive customized cooperation directions for each country, the current status and policies of the IT industry in the three countries are examined in detail. Fourth, IT technology subsectors promising for cooperation between Korea and Russia are identified, from the patent citation analysis and network analysis.

II. Innovation in the IT Sector and Industrialization of Middle-income Countries

History tells us that economies with late “take-off” into long-term growth experience a compressed form of structural transformation. In other words, with the “catching-up” strategy, they converge to a certain level of

development realizing structural transformation, which can lead to long-term growth. Thus, it could be merely a matter of time for low-income or middle-income countries to catch up with high-income economies.

However, not all countries achieve structural transformation in a desirable manner. In many cases the traditional structural transformation is not well represented and often delayed, as has lately been the experience of many middle-income countries. This can best be explained from a multiple equilibria perspective. Good equilibrium is assumed a desirable development path (moving from the agricultural sector to the labor-intensive manufacturing sector, medium and high value-added manufacturing sector, and finally to the service sector), which is currently the pattern of high-income economies' structural transformation. Contrary to this, bad equilibrium indicates cases where low-income or middle-income countries fail to transform their industrial structure in the above-mentioned order.

Based on this view, we examine the structural transformation of the three countries: Russia, Kazakhstan, and Uzbekistan. Regrettably, they are facing economic slowdown, delayed diversification and advancement in industrial structure, and decline in capital and labor inputs and productivity.

Lastly, we analyzed how IT technology innovation can play a role in resolving the delay in structural transformation. In order to do so, a theoretical model was constructed based on the intuition that IT technology innovation has

a positive effect on improving productivity in the service sector. Furthermore, by numerically approximating the theoretical model for Russia with the data available, we quantitatively estimate how helpful IT technology innovation can be to address the delay in the structural transformation that Russia needs to solve. With the new structural transformation model employed in this paper, we theoretically establish that the proportion of production in general manufacturing, including the IT sector, increases when IT technology innovation helps improve service industry productivity. The increase in productivity in the service industry we expect to see with advances in IT technology is based on the intuition that IT technology innovation can alleviate search and matching friction existing in the service industry. The quantitative analysis showed how positive cooperation with Korea in IT technology affected the long-term growth rate of the resource-dependent middle-sized countries observed. If the positive effect of current productivity improvement in the Russian manufacturing sector rises by 173%, Russia's long-standing delay in industrial structure can be resolved. Due to statistical availability, the study only deals with the Russian case. However, it is expected that similar results would be yielded in the cases of Kazakhstan and Uzbekistan as well.

III. Current State of the IT Industry and Development Policies in Russia, Kazakhstan and Uzbekistan

In this section, we examine the individual characteristics of Russia, Kazakhstan, and Uzbekistan to compensate for the limitations of

generality and universality within the theoretical approach. Upon comparing and reviewing the current status of the IT industry in the three countries using the best data available, we conclude that the level of development in the IT industry was similar in Russia and Kazakhstan, while Uzbekistan was relatively lagging (See Tables 1, 2, and 3).

Table 1. Share of IT Industry

(Unit: % of GDP)

| | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|------------|------|------|------|------|------|---------|
| Russia | 2.9 | 2.8 | 2.8 | 2.7 | 2.9 | 2.8 |
| Kazakhstan | 3.9 | 3.5 | 3.4 | 3.3 | 3.4 | 3.5 |
| Uzbekistan | - | 1.8 | 1.9 | 1.7 | 1.5 | 1.7 |

Source: Росстат, Агентство по стратегическому планированию и реформам Республики Казахстан Бюро национальной статистики, Государственный комитет Республики Узбекистан по статистике, etc.

Table 2. IT Workers' Share in IT Industry

(Unit: % of total employee number)

| | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|------------|------|------|------|------|------|---------|
| Russia | - | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| Kazakhstan | 1.99 | 1.88 | 1.67 | 1.69 | 1.69 | 1.8 |
| Uzbekistan | 0.25 | 0.26 | 0.28 | 0.3 | 0.35 | 0.3 |

Source: Росстат, Агентство по стратегическому планированию и реформам Республики Казахстан Бюро национальной статистики, Государственный комитет Республики Узбекистан по статистике, etc.

Table 3. IT Industry Share in Fixed Capital Investment

(Unit: % of total fixed capital investment)

| | 2016 | 2017 | 2018 | 2019 | 2020 | Average |
|------------|------|------|------|------|------|---------|
| Russia | 3.1 | 3.0 | 3.5 | 4.0 | 4.3 | 3.6 |
| Kazakhstan | 0.7 | 0.9 | 0.9 | 0.8 | 1.4 | 0.9 |
| Uzbekistan | 2.3 | 2.6 | 0.7 | 1.1 | 2.3 | 1.8 |

Source: Росстат, Агентство по стратегическому планированию и реформам Республики Казахстан Бюро национальной статистики, Государственный комитет Республики Узбекистан по статистике, etc.

These differences in industrial development are revealed by differences in transition strategies to the digital economy and IT industry development strategies of the three countries. In particular, Russia and Kazakhstan, which are highly dependent on natural resources, appear more interested in transforming their economic structures through development of the IT industry. Specifically, Russia's policy focus is on improving the existing IT infrastructure and related systems and enhancing the practical competitiveness of the Russian IT industry in the global market. In the meantime, Kazakhstan has a policy focus on improving

existing IT infrastructure and related systems, but no specific policy has been prepared to develop the IT industry. Finally, in Uzbekistan, the establishment of IT infrastructure should be prioritized, and accordingly this becomes the most important policy goal, but there is still no national policy for developing the IT industry like Kazakhstan. Both Kazakhstan and Uzbekistan lack IT companies to secure competitiveness in the global market, and as a result the national strategies and policies for developing the IT industry in these countries can be expected to differ from Russia's (See Table 4).

Table 4. IT Development Policies Comparison

| | Digital economy transformation policies | IT industry development policy |
|------------|---|---|
| Russia | National program "Digital Economy" (2017) | Currently "Development strategy for IT in 2019-2025 and until 2036 (draft)" is under consideration. |
| Kazakhstan | - Digital Kazakhstan 2018-22 (2018) - DigitEL 2021~25 (2021) | None |
| Uzbekistan | Digital Uzbekistan 2030 (2020) | None |

Note: as of Oct. 2021.

Source: ВШЭ, Правительство Республики Казахстан, Министерство по развитию информационных технологий и коммуникаций Узбекистана. etc.

IV. Technological Complementarity between Korea and Russia in IT Sector

This section identifies which areas of IT technology can maximize the effectiveness of cooperation between Korea and Russia. We statistically analyze technology patent data registered by Korea and Russia over the past five years (2015~19). Based on this analysis, forms

of technological cooperation which have a strong synergy effect and a positive propagation effect are identified, inferring the immediate need for technological cooperation.

The results of our patent citation analysis indicate that the cooperative synergy between Korea's semiconductor-related technologies and Russia's digital computing or data processing could be high in terms of both

countries' technological comparative advantages. In addition, the network analysis presents that such technological cooperation has a high scope in terms of the propagation effect and immediate influence, as well as synergy effect.

V. Conclusion

Based on the above analyses, the authors reach the following conclusions for cooperation between Korea and the Northern economies. First, more specific studies should be conducted on technological complementarity between Korea and the three countries in the IT sector, and how IT cooperation with Korea can contribute to the three economies' delayed structural transformation. Second, customized IT cooperation strategies for each country should be established. Russia, Kazakhstan and Uzbekistan have different levels of IT industrial development and IT strategies. Since Russia is relatively competitive in IT, Korea can promptly initiate technological cooperation with Russia. Cooperation in the IT sector is expected to produce good opportunities to expand the scope of technological cooperation between the two countries down the road. In the meantime, Kazakhstan is in need of improvement and expansion of its IT infrastructure, meaning Korea could provide related goods to Kazakhstan. For Uzbekistan, Korea can transfer development know-how for its e-Government and infant IT industry. This means intergovernmental exchange could be the key in Korea-Uzbekistan cooperation. **KIEP**