Preparing Russia for the Future of Production

By making the right moves now, the country can play a leading role in the Fourth Industrial Revolution.
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1 Executive Summary

New technologies, such as the Internet of Things, artificial intelligence, augmented reality, and 3D printing, are catalyzing a Fourth Industrial Revolution, which will transform how materials, goods, and even services are produced. This report assesses Russia’s readiness and examines how it could play a role.

Russia risks becoming less competitive if it does not improve its institutional framework, its technology and innovation, and its demand environment.

This report’s analysis is based on the 2018 Readiness for the Future of Production report published by WEF in collaboration with A.T. Kearney. Additionally, and to conduct a specific deep-dive analysis for Russia, A.T. Kearney drew on inputs from multiple industries, Russian government entities, and public and private sector leaders. This report uses 59 key performance indicators in the Country Readiness for the Future of Production Scorecard to assess Russia’s readiness for the future of industrial production and identify the steps needed to prepare. The Scorecard considers six drivers of production, which together form the enablers for a country to capitalize on emerging technologies and transform its production systems.

1. **Technology and innovation**: the ability to innovate and to diffuse new technology into productive ecosystems
2. **Human capital**: the capacity, capability, and future-readiness of the labor force
3. **Global trade and investment**: the ability to participate in international trade and attract foreign investment
4. **Institutional framework**: the effectiveness and efficiency of institutions and regulations, facilitating technological and business innovation
5. **Demand environment**: access to foreign and local demand and the sophistication of the consumer base
6. **Sustainability of resources**: sustainable use of resources in production

The aggregate score is mapped against a country’s structure of production (the complexity and scale of its manufacturing base) to classify it as a leading, high-potential, legacy, or nascent country.

Today, Russia is classified as a legacy country, with its relatively strong industrial base (rank: 35 out of 100 countries) offset by some key gaps in the drivers of production. As a result, Russia’s economy risks becoming less competitive over time if it does not make major improvements to its institutional framework, its technology and innovation, and to some aspects of its demand environment. Chapter 3 of this report considers each driver in turn, explaining Russia’s status today and how it can improve, but A.T. Kearney’s key recommendations can be summarized as follows:
Technology and innovation

Russia benefits from widespread adoption of ICT but makes insufficient investment in companies that are developing emerging technologies (only 1.5 percent of nonfinancial assets investment is allocated to investment in new intellectual property), while research intensity is low, at about half the global average.

- Russia’s government needs to ensure that all of its regions have access to advanced ICT technologies and can evolve into R&D hubs, while positioning government institutions as role models in the employment of new technologies. Policymakers should also look to raise awareness of the importance of the Fourth Industrial Revolution.

- The public and private sectors together should set clear, long-term priorities for R&D for the most competitive sectors of the economy, jointly investing in priority business-oriented projects, with a defined risk-sharing mechanism. The government could also introduce tax incentives to increase R&D spending and efficiency, which would raise R&D expenditure to between 3 and 4 percent of GDP from 1.1 percent today.

- Deregulation, privatization, and reduced state involvement in business would increase competition and spur innovation and the adoption of new technologies. The government could also create a “playbook” suggesting which technologies businesses should use and how to implement them.

Russia’s government needs to ensure that all of its regions have access to advanced ICT technologies.

Employment and skills

Russia has a strong workforce and a steady supply of educated labor, but its workplaces don’t currently prioritize staff development. It lacks both high-quality professional training and reskilling programs and investment in employee development and working processes designed to foster innovation, especially in state-owned companies. Another issue is a shortage of the digital-skills businesses that are needed for high-value tasks, such as product design.

- With a rise in internal migration needed for Russia to take full advantage of its geography, the government could give greater autonomy to the regions, encouraging them to compete with each other for human resources and private investment.

- Policymakers could better align educational courses with business requirements by developing a list of the top 10 jobs needed for the future of production. At the same time, the university system needs an upgrade to meet modern standards, while the establishment of business-driven education centers would foster cooperation between companies and universities.

- Russia needs to ensure its living and working environment will attract talented people from home and abroad, including capable Russian expats, and motivate them to come back to Russia and contribute to the development of the country.
Global trade and investment

Today, Russia's exports of components and finished products are a fraction of what they could be. Its companies have a limited presence in global manufacturing chains and are only loosely integrated into the global economy, curbing their access to foreign technology.

- To encourage greater global integration, the government could support Russian companies’ partnerships with global players, while boosting protection for foreign investment.
- Russia’s production system needs to be better aligned with global standards so that its manufacturers can become more integrated into global supply chains.

The ongoing technological disruption to the global economy presents opportunities to expand into new markets and increase revenues. By preparing now, Russia can drive economic growth, create jobs, increase prosperity, and foster stability.

Institutional framework

Russia’s Achilles heel is its flawed institutional framework. Existing laws and regulations can be impractical and outdated, while several leave a lot of room for interpretation. Meanwhile, increasingly restrictive regulation could impede innovation in the digital sector. A major systemic problem in Russia is a failure to uphold the rule of law. This is due to gaps in legislation and a lack of compliance and manifests itself in bribery and corruption.

- Russia needs a high-quality, transparent, and predictable regulatory framework that will enable the development of a strong entrepreneurial ecosystem.
- Russia should seek to increase regulatory efficiency, reduce government involvement in business operations, strengthen the rule of law, and bolster the protection of intellectual property (IP).

If Russia can make these improvements, it will be well-positioned to capitalize on the game-changing technologies that are driving the Fourth Industrial Revolution. For Russian companies, the ongoing technological disruption to the global economy presents opportunities to expand into new markets and increase revenues. By preparing now for the future of production, Russia can not only drive economic growth and create jobs, but also increase the prosperity of its citizens and foster stability.
2 Introduction

Written for policymakers and business leaders, this report assesses Russia’s readiness for the Fourth Industrial Revolution. It identifies the country’s strengths and weaknesses, and highlights learnings from comparable countries. By providing insights and encouraging engagement and coordination, the study is designed to catalyze action that will help Russia prepare for the future of industrial production.

The Fourth Industrial Revolution is characterized by the automation and enhancement of manufacturing through data analytics and machine learning.

The Russian deep-dive study employs an assessment framework (developed originally by the WEF and A.T. Kearney in a global context) based on consistent, objective criteria. This identifies the levers decision-makers can use to improve readiness for the future of production at country level. The framework is also designed to accelerate engagement by encouraging dialogue, monitoring, and agenda setting between multiple stakeholders.

2.1 The Fourth Industrial Revolution

New technologies, such as the Internet of Things, artificial intelligence, augmented reality, and 3D printing, are bringing about a Fourth Industrial Revolution by blurring the lines between the physical and digital spheres. This revolution is characterized by the automation and enhancement of manufacturing through data analytics and machine learning. It is further supplemented by new business models arising from the technological transformation of production, and new cost structures.

Robots and software will increasingly take over monotonous and repetitive tasks, while both human beings and computers will harness real-time data, artificial intelligence, virtual reality, and augmented reality tools to inform decisions, such as when to replace equipment and change processes. Traditional factory-floor jobs requiring employees to perform a specific task in a fixed location will increasingly be superseded by engineering, design, and IT roles focused on increasing the efficiency and effectiveness of robots and software. These changes will, of course, require both individual companies and entire economies to acquire new sets of capabilities and develop truly collaborative strategies.

If it concentrates power and wealth in the hands of a tech-savvy elite, the Fourth Industrial Revolution will have far-reaching implications for both domestic and international stability. To avoid excessive inequality, governments, together with businesses and members of civil society, will need to drive the inclusive adoption of technologies, helping all segments of the population gain the digital skills that will be in demand in the future. At the same time, the resulting productivity gains and employment shifts could require individual countries to play new roles in international value chains, altering their economic significance and geopolitical power.
2.2 Methodology

The readiness assessment that underpins this paper draws on four main sources:

- A diagnostic model, the Future of Production Capabilities Scorecard, which uses 59 key performance indicators along six dimensions to assess how well countries are positioned today to shape and benefit from the changing nature of production
- More than 30 C-level interviews with industrial, technological, and financial companies and academic and government representatives
- The output from a workshop attended by 18 senior representatives from the private and public sectors, including C-level executives, research institute leaders, and a senior government representative, which included several breakout groups
- Desk research for supporting evidence and statistics

Countries need to reskill and upskill their workforce as manufacturing shifts from a labor-intensive model to a skills-intensive one.

2.3 The diagnostic model

For each country, the Country Readiness for the Future of Production Scorecard, developed jointly by the World Economic Forum and A.T. Kearney, maps the drivers of production (defined as the country’s level of readiness to capitalize on emerging technologies and transform its production systems) against the structure of production (the complexity and scale of the country’s manufacturing base). There are six main drivers of production, each with their own weighting in the Scorecard:

1. **Technology and innovation** (weighting 20 percent): the ability to innovate and to diffuse new technology into productive ecosystems

   There is a chasm between the top 20 countries in technology and innovation and the remaining 80. This driver encompasses both technical innovation (high patents and R&D spend), which is limited to a small set of countries, and frugal innovation (such as disruptive business models), which is attainable for most countries. Countries need to consider their position as a technical innovator, technology adopter, or frugal innovator.

2. **Human capital** (weighting 20 percent): the capacity, capability, and future-readiness of the labor force

   There are legitimate concerns about technology replacing human capital; however, human capacities and skills remain the key to unlocking technology benefits. Countries need to reskill and upskill their workforce as manufacturing shifts from a labor-intensive model to a skills-intensive one.
3. **Global trade and investment** *(weighting 20 percent): the ability to participate in international trade and attract foreign investment*

Leading countries tend to be embedded into the global trade and investment environment; openness to global trade and investment fuels exports, increases knowledge and capabilities—which can expand complexity—and enables technology transfers. However, realizing the full benefits of global trade and investment requires other countries to have a similarly open approach.

4. **Institutional framework** *(weighting 20 percent): the effectiveness and efficiency of institutions and regulations, facilitating technological and business innovation*

The countries that are best positioned for the future of production have a trusted institutional framework with robust legal systems, intellectual property protection, and data security.

5. **Demand environment** *(weighting 15 percent): access to foreign and local demand and the sophistication of the consumer base*

Are they solely price-led or do they also look for quality?

6. **Sustainability of resources** *(weighting 5 percent): sustainable use of resources in production*

Countries with a high score on the drivers of production and the structure of production are classified as leading, while those that only score highly on the drivers of production are classified as high-potential (see figure 1). Legacy countries have built up relatively complex industrial bases, but don’t score highly on the drivers of production, while those in the nascent category lag on both metrics.

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**Figure 1**

The Future of Production Scorecard classifies a country’s readiness position

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**Favorable drivers of production**

<table>
<thead>
<tr>
<th>High-potential</th>
<th>Leading</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Limited current base</td>
<td>- Strong current base</td>
</tr>
<tr>
<td>- Positioned well for the future</td>
<td>- Positioned well for the future</td>
</tr>
</tbody>
</table>

**Unfavorable drivers of production**

<table>
<thead>
<tr>
<th>Nascent</th>
<th>Legacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Limited current base</td>
<td>- Strong current base</td>
</tr>
<tr>
<td>- At risk for the future</td>
<td>- At risk for the future</td>
</tr>
</tbody>
</table>

Source: A.T. Kearney analysis
2.4 Global findings: economic complexity is key

Generally hailing from Europe, North America, and East Asia, the leading countries account for 78 percent of manufacturing value added (MVA) today and are well-positioned to increase their share in the future.\(^1\) Although Germany, Japan, South Korea, the United States, and China all have major strengths, no single country has yet reached the frontier of readiness or harnessed the full potential of the Fourth Industrial Revolution.

Indeed, there is a wide variance in the scores across this category (see figure 2). South Korea, for example, scores very highly on the structure of production and Australia is particularly strong on the drivers of production, while the US scores highly on both metrics. Although most developing countries are classified as nascent, there is also a wide variation in their scores.

Figure 2

Country readiness assessment: Europe, North America, and East Asia lead the Future of Production Scorecard

<table>
<thead>
<tr>
<th>Drivers of production</th>
<th>Structure of production</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-potential countries</td>
<td>Limited current base</td>
</tr>
<tr>
<td>Leading countries</td>
<td>Strong current base</td>
</tr>
<tr>
<td>Nascent countries</td>
<td>Limited current base</td>
</tr>
<tr>
<td>Legacy countries</td>
<td>Strong current base</td>
</tr>
</tbody>
</table>

Source: A.T. Kearney analysis

Small economies are not necessarily at a disadvantage. In fact, economic complexity may be a better indicator of a country’s readiness for the Fourth Industrial Revolution than scale. The ability to gather, combine, and use the knowledge embedded in people and technology to create a range of unique products will become an increasingly important competitive advantage.

More broadly, not all countries will seek to pursue advanced manufacturing. Instead, each one will likely choose to take on a distinctive role that capitalizes on its comparative advantages, while cooperating with international partners and making smart trade-offs in weaker areas.

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\(^1\) A.T. Kearney analysis for the Readiness for the Future of Production Report 2018. The manufacturing value added (MVA) of an economy is the net output of all resident manufacturing activity units.
Although traditional industrial policy has typically been driven by the notion of national competitiveness, the evolution of globalization now requires governments to think more broadly and strategically. Some of the key enablers of the Fourth Industrial Revolution cannot be developed in isolation: interoperability and global standards are crucial for unlocking the full potential of the future of production, as described in the *Readiness for the Future of Production Report 2018*.²

### 3 Russia Today and How It Can Improve

Today, the Scorecard classifies Russia as a legacy country. Although its structure of production is higher than average (rank: 35 out of 100 countries), the country’s drivers of production (rank: 43 out of 100) aren’t strong enough to position it in the leading category (see figure 2 on page 7). As these drivers reflect the country’s future industrial potential, Russia must take steps to improve in several areas.

Russia has one of the highest mobile phone penetration rates in the world and 73.4 percent of the population has access to the Internet.

Russia’s strongest production drivers are the demand environment (rank: 20/100) and employment and skills (rank: 25/100). In terms of technology and innovation, Russia scores better than average (rank: 39/100), but is below most other G20 countries. It also lacks integration with the global economy—Russia ranks 49/100 in terms of global trade and investment. But the driver dragging Russia down into the legacy countries group is its weak institutional framework (rank: 87/100).

### 3.1 Technology and innovation: a mixed outlook

Russia’s relative strength in technology and innovation is a reflection of its solid broadband coverage and digital infrastructure (see figure 3 on page 9). It benefits from widespread adoption of information and communications technologies (ICT): the country has one of the highest mobile phone penetration rates in the world (163 cellular subscriptions per 100 inhabitants) and 73.4 percent of the population has access to the Internet. Russia’s average Internet connection speed of 11.8 Mbps is 60 percent higher than the global average.

Cybersecurity is another area of strength. Russia is ranked 10th out of 164 in the Global Cybersecurity Index, which measures the commitment of countries to protecting their systems, networks, and data from cyberattacks. Russia has a substantial homegrown cybersecurity industry, including the world-class Kaspersky Labs. Moreover, each government entity in Russia is required to perform an annual audit of its own networks and systems in line with the Information Security Doctrine, introduced in 2000.

² Joint report from the World Economic Forum and A.T. Kearney
However, Russia also has some significant weaknesses that curb its ability to innovate. There is insufficient investment in companies developing emerging technologies (only 1.5 percent of nonfinancial assets investment is allocated to investment in new IP). Crucially, research intensity is low—at about half the global average—and Russia performs poorly in terms of the number of patents filed, a crude indicator of research output. Today, Russia spends just 1.1 percent on R&D, whereas Australia and the United States spend between 2 and 3 percent and South Korea invests more than 4 percent.

Today, this driver isn’t a high priority for policymakers and business leaders. The Russian government has yet to formulate an integrated technology strategy, while its taxation framework doesn’t incentivize investment in innovation. What’s more, weak competition in some sectors has left public companies in dominant positions, meaning they don’t need to innovate or develop long-term strategies that seek to harness new technologies. Aspiring entrepreneurs are held back by inadequate access to financing caused by the poor investment climate, high borrowing costs, and underdeveloped financial markets.

**Recommendations to advance technology and innovation**

Russia would benefit from further developing its digital infrastructure, providing all regions of its vast territory with reliable access to broadband and online services. Ideally, it will track and deploy the latest global technologies to ensure its digital infrastructure stays up to date. At the same time, Russia could make a role model of its government institutions by using ICT and new technologies to provide public services.
Russia also needs greater competition to spur innovation. This could be achieved through further privatization in selected industries, the removal of subsidies for loss-making companies, and better ways of managing the tendering processes for government-related purchases.

The development of use cases and awareness programs would also help highlight the importance of the Fourth Industrial Revolution for manufacturers, as would closer ties between innovative small and medium-size enterprises (SMEs) and large companies. SMEs could, for example, become centers of competence for certain technologies and products. Large companies should seek to appoint technology experts to their board of directors, paving the way for digital transformation, and underpin this by outsourcing IT services to qualified firms.

Russia’s government could create incentives for the private sector to increase R&D spend and become more efficient with it. To that end, the state needs to establish clear long-term priorities with a focus on the technological development of the country’s most competitive sectors and adjacent industries. These include mining, chemicals, minerals, agriculture, agricultural machinery, construction materials and machinery, transport and components, defense and space, and food. In particular, R&D should be targeted more toward robotics, the Internet of Things, 3D printing, and artificial intelligence, as these technologies will have a direct impact on the efficiency and performance of Russia’s core industrial base. There is also a need for a better balance of R&D funding between the public and private sectors.

In the longer term, Russia could give its regions responsibility for their own, customized innovation systems, enabling them to become R&D hubs in their own right. The government could also stimulate technology spend by lowering corporate taxes and making financing more accessible, while encouraging universities to seek partnerships with business to fund part of their spending.

The government could also create awareness and promote the value of emerging technologies for business by publishing playbooks to give guidelines on the future of production and provide additional information through the chamber of commerce and industry, professional bodies, and local universities. At the same time, the establishment of a specialist university–business agency would help to increase companies’ exposure to R&D.

3.2 Human capital: relatively strong

Russia’s human resources are a potential competitive advantage (see figure 4 on page 11). It has a strong workforce and a steady supply of educated labor: a high proportion of Russians have a tertiary education (53 percent of the population age 25–64), thanks to public funding for university attendance. The Soviet education system inherited by Russia continues to produce high numbers of STEM (science, technology, engineering, and math) specialists. Its PISA Math score (494) is above the OECD average (490), with a positive trend.

Still, the education system also has certain deficiencies: some universities continue to take an old-fashioned approach to teaching, despite Russia’s membership in the Bologna process to harmonize education standards, and correspondingly its PISA Science score (487) trails the OECD average of 493.

At the same time, the country’s workplaces aren’t yet prioritizing staff development. There is a lack of both high-quality professional training and reskilling programs, and investment in employee development and working processes designed to foster innovation—especially in state-owned companies. Without continuing professional education, there is a risk that Russia’s citizens won’t be able to adapt to the Fourth Industrial Revolution, which could lead to lower salaries and a higher rate of unemployment.
Another issue is a shortage of the digital-skills businesses that are needed for high-value tasks, such as product design. This is a symptom of a “brain drain” of experienced resources and Russia’s relative unattractiveness as a destination for foreign IT specialists: only 5 percent of the engineers working in Russia are foreigners (versus 24.3 percent in the US).³

This issue is compounded by the fact that Russia’s birth rate has recently declined substantially, while the age pyramid is getting more and more unfavorable. At the same time, limited migration within the country has resulted in uneven development across Russia’s regions. Technology companies in particular tend to be located in large cities, so potential employees need to be prepared to migrate from the countryside. In comparison, internal migration in the United States has been a key engine of regional development.

Today, Russia’s education expenditure stands at 3.9 percent of GDP, whereas the figure is more than 5 percent in Australia, the United States, and South Korea.

**Recommendations to enhance employment and skills**

Russia needs to focus on developing the skills that will be required for the future of production. It can do this by raising awareness in the education sector of the top 10 roles that will be needed to fuel the Fourth Industrial Revolution, while modernizing courses and providing hands-on training for engineers. At the same time, policymakers and business leaders could establish training centers and corporate universities for spreading skills and retraining workers, making the costs tax-deductible.

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³ The American Immigration Council
In the medium to longer term, Russian schools should look to improve science courses, teach entrepreneurship, and prepare students for the Fourth Industrial Revolution, while placing more emphasis on collaborative problem solving. They may also need to encourage students to migrate within the country in search of good jobs. Moreover, the most promising students could follow a specially customized curriculum to make them outstanding.

To increase the birth rate, Russia could boost support for families by providing parents on maternity or paternity leave an income as close as possible to what they would be earning in their job. Today, monthly payments are limited to 40 percent of salary and capped nationwide, despite large regional differences in the cost of living.

To attract more skilled immigrants, Russia could invest further in international exchange programs for students and professionals, or even establish a program for training placements in foreign manufacturing enterprises. To attract and retain STEM specialists and highly skilled expats to work there, Russia also needs to consider how it can offer greater monetary benefits and improve the quality of life in the longer term. Immigration authorities could use a points system (similar to those employed in Australia and Canada) to identify highly skilled applicants and fast-track their acceptance. Furthermore, greater financial autonomy for Russia’s regions could help to strengthen responsibility and competition between different parts of the country, leading to local improvements in the quality of life and greater workforce mobility.

In partnership with businesses, regional universities could develop and deliver tailored reskilling and on-the-job training programs directed at relevant future-of-production skills. The government could also support the establishment of joint business and university education centers.

### 3.3 Global trade and investment: more integration required

If it is to reap the benefits of the Fourth Industrial Revolution, Russia needs to become more open to the world (see figure 5). Today, its components and finished products exports are a fraction of what they could be. Its companies have a limited presence in global manufacturing

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**Figure 5**

**Global trade and investment: Russian companies aren’t sufficiently integrated into the global economy**
chains and are only loosely integrated into the global economy, curbing their access to foreign technology. Since 2014, Russia’s role within global value chains has actually weakened: overall trade turnover decreased from US$805 billion in 2014 to US$473 billion in 2016 because of lower commodity prices and the Russian sanctions imposed on some EU and US goods in 2014. At the same time, the proportion of GDP accounted for by international trade continues to fall. Russia is also hampered by a weak investment climate resulting in part from inadequate protection of investors’ rights. In particular, corporate law overregulates the establishment and amendment of entities with several stakeholders, while legal “back doors” pose a risk to founders and investors.

Since 2014, Russia’s role within global value chains has actually weakened.

Another key issue is the high cost of capital due to a historically high inflation rate, which makes it necessary for Russia’s central bank to keep interest rates high (though the recent slowdown in inflation may lead to improved borrowing conditions). Still, Russia’s financial markets remain underdeveloped: private equity and venture capital companies have been deterred by the weak investment climate, poor investor rights protection, and, recently, international sanctions.

Recommendations to increase global trade and investment

The government needs to consider introducing special development funding for some sectors, flexible regulations tailored to each industry (see next section), and greater investor rights protection through an efficient judicial system and regulatory framework.

The government could also encourage or support Russian companies to partner with global players on selected financial and legal projects, while providing export advice, market information, skills development programs, legal and certification help, easy export processing, guaranteed VAT refunds, and nondiscriminatory access to the logistics infrastructure. In the longer term, cultural barriers could be lowered through a greater focus on foreign language skills in both the education system and the workplace.

Borrowing costs also need to fall, which will depend on a lower level of inflation. The government could also catalyze the development of financial markets by making them more accessible for foreign investors and integrating them with global exchanges, while stimulating the growth of private equity and the venture capital industry.

3.4 Institutional framework: needs an overhaul

Russia’s real Achilles heel is its flawed institutional framework (see figure 6 on page 14). Existing laws and regulations can be impractical and outdated, while several leave a lot of room for interpretation. Russia lacks a consistent and clear approach to regulations, and its deviations from global standards can create barriers to exports. In the digital area, increasingly restrictive regulation could impede innovation. In particular, increasing state control of digital information could curb the exchange of information and freedom of expression by restricting the use of information portals and social networks.
A major systemic problem in Russia is a failure to uphold the rule of law, resulting from gaps in legislation and a lack of compliance, which manifests itself in bribery and corruption. Despite some improvements, intellectual property isn’t well protected and about 64 percent of the software in use across Russia is pirated, according to the Business Software Alliance.

A further weakness is Russia’s institutionally slow and cumbersome approval processes. For example, it takes 10 days to open a business there versus three days in Singapore. An over-reliance on manual processes in the public sector reduces transparency for entrepreneurs, making business decisions difficult. Gaps in legislation have led to some tech start-ups registering abroad and many large businesses establishing offshore affiliates rather than a Russian base.

**Recommendations to improve the institutional framework**

At a high level, Russia needs to enforce the rule of law. Ideally, it should create clear and unambiguous laws and ensure they are upheld. In the industrial arena, this would mean adopting a transparent and systematic approach to technological regulations and standards, as well as harmonizing local standards with global standards.

As a priority, IP protection needs to be enhanced and extended to a point where it meets global standards, as a precursor to an overhaul of the patenting system that eliminates bureaucracy. The government could also provide legal and financial support for Russian companies applying for foreign patents.

Over the next three to five years, Russia could create strategic industrial consortiums of producers, consumers, and government to develop flexible regulations tailored for different industries and informed by feedback from the companies impacted. Where World Trade Organization rules permit, the government could also provide subsidies for export-oriented companies to secure international accreditation.

Russia should also look to strike a balance between addressing digital security concerns and efficient business operations. Although the government clearly needs to control and regulate cybersecurity compliance, it should equally respond to feedback from enterprise and alter the regulations accordingly.
3.5 Demand environment: strong consumer sector

A large country with an educated workforce, Russia has a relatively strong demand environment, underpinned by the ninth-largest population in the world (see figure 7). With 69 percent of the population age 15–64, Russia’s people are generally interested in emerging technologies, with computers, smartphones, and online shopping now an integral part of everyday life. In 2016, according to the World Bank International Comparison Program database, Russia’s GDP per capita on a purchasing power parity basis was US$24,788, compared with a global average of US$16,214. However, there is a considerable gap between the richest and poorest sections of society—the average income of the top 20 percent of Russia’s population is almost nine times that of the bottom 20 percent (Rosstat).

Figure 7

Demand environment: Russia has a very large domestic market with a fairly sophisticated consumer base

However, the enterprise market trails behind its consumer equivalent, as a lack of competition can reduce the incentives for companies to deploy new innovations. Additionally, Russia has relatively few SMEs, indicating that the economy isn’t sufficiently competitive or dynamic.

Today, SMEs account for less than 15 percent of the Russian economy, compared with 25 to 45 percent of GDP in the United States and South Korea and more than 45 percent in Australia.

Recommendations to improve the demand environment

To boost domestic demand, Russia could use tax incentives to make innovation—along with ICT goods and services—more affordable for both consumers and businesses. It could also encourage innovation by reducing corporate tax rates for companies that invest in emerging technologies, offset by an increase in personal tax rates. A reduction in interest rates would also make it easier for enterprises to invest in technologies and innovations while stimulating consumer demand. Finally, public agencies and state-owned companies could make targeted purchases of emerging technologies developed in Russia.

The above measures would create a more competitive environment in more industries across Russia, while helping fuel demand for innovations and technology in the enterprise market.
3.6 Sustainable resources: almost self-sufficient

Russia has 30 percent of the world’s natural resources, including abundant supplies of oil, natural gas, timber, and precious minerals (see figure 8). As a result, it is almost self-sufficient in energy and a large-scale exporter of fuels. It also produces a relatively low level of harmful emissions, ranking 32 out of 180 in the Environmental Performance Index, with high scores in air quality (84.76) and health impact (92.2).

Russia’s one significant weakness in this domain is a low penetration of renewable energy, at 3.5 percent of total energy consumption versus a global average of 18.9 percent. As consumers around the world demand more environmentally friendly energy, Russia’s low production of renewable energy sources could impact its competitiveness in the future.

Recommendations to further develop sustainable resources

As a first step, Russia should seek to comply with global environmental standards, which would further boost its sustainability. In the longer term, it could further reduce greenhouse gas emissions and increase energy efficiency by offering tax incentives to encourage the construction of more sustainable buildings and the development of an electric vehicle infrastructure. Similarly, it could introduce incentives to encourage consumers to buy electric vehicles.

Corporate taxes could be cut for companies adopting sustainable practices (for water, waste, and power management). At the same time stricter environmental requirements and controls should be introduced. This will not only bring better environmental conditions to industrial centers, but also stimulate major investment in new—and potentially local—technology. In addition, clear and competitive feed-in tariffs would encourage the adoption of alternative energy as well as creating incentives for Russian companies to develop these technologies. In the longer term, they could also be exported to other markets, as has happened in Germany and China. Each region of Russia could also develop a focused and customized approach to renewable energy.
Moves such as this would help Russia reduce its level of greenhouse gas emissions (from 5 percent to less than 1 percent of global emissions) and prevent harmful consequences in the long term, while making its own industry more competitive abroad.

### 3.7 Structure of production: relatively sophisticated

In terms of the structure of its production, Russia is in a stronger position than most other countries. It has the necessary scale and its manufacturing base is relatively sophisticated. Moreover, Russia ranks 12th among the other G20 nations in economic complexity—a measure of a society’s knowledge expressed by the products it makes.

However, Russia trails well behind some nations, such as China, in one important aspect. Whereas China produces large numbers of complex competitive products, Russia’s strength is in peripheral industries, such as minerals, oil and gas, coal, metals, agriculture, chemicals, defense, and space. As things stand, it is almost impossible for Russia to make a big technological jump because of the limited level of advancement within these industries. China’s score on the Economic Complexity Index is 0.94, while Russia’s is just 0.41, according to *The Atlas of Economic Complexity* by Harvard’s Center for International Development (see figure 9).

**Figure 9**

Economic complexity: Russia’s strength is in its peripheral industries, but their ability to make a technological leap is severely restricted

**China**

(ECI: 0.94)

$2.18T

**Russia**

(ECI: 0.41)

$247B

Note: ECI is Economic Complexity Index.

Today, manufacturing accounts for 14 percent of Russia’s GDP, compared with 29 percent in South Korea, where the economy is highly integrated into global production value chains. By contrast, the economies of both the United States and Australia rely mainly on the service sector, which generates between 70 and 80 percent of their GDP. The share of the manufacturing sector in these countries is low because they outsource production of goods to Asian countries and concentrate their domestic output on sophisticated manufacturing and high-value-added activities.

**Recommendations to strengthen the structure of production**

The best option for Russia is to technologically advance its existing competitive industries and their relatively complex adjacent sectors, such as agricultural equipment and machinery, construction materials and equipment, furniture, transport and transport components, and food products (see figure 10). In most cases, it will need to apply a mixture of robotics, artificial intelligence, and the Internet of Things. These technologies can help improve efficiency while opening up new business opportunities.

**Figure 10**

**Promising industries, regulations, and applicability of I4.0**

**Competitive industries**

<table>
<thead>
<tr>
<th>Minerals (7.65% of GDP)</th>
<th>Agriculture (4.87% of GDP)</th>
<th>Forests (0.81% of GDP)</th>
<th>Chemicals (1.19% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum, oils, gases, sulfur, precious metals, coal, magnesium, bituminous mixtures, electrical energy, lead ore</td>
<td>Wood (and wood products, including particle boards and plywood, paper), fur skins, wheat, barley, corn, sunflower seeds, cereal grains, legumes, starch, seed and vegetable oils, margarine, fish, tobacco and cigars</td>
<td>Nickel, iron, cobalt, titanium, aluminum, copper, flat-rolled products, tubes and pipes, wires, railway construction materials, containers, bars</td>
<td>Radioactive chemicals, carbonates, synthetic rubber, fertilizers, hydrazine and hydroxylamine, peroxides, sulfates, detonators, phosphates, ammonia, acrylic alcohols and hydrocarbons</td>
</tr>
</tbody>
</table>

**More complex industries (technologically similar)**

| Agricultural machinery and equipment (0.04% of GDP) | Construction materials and machinery (0.33% of GDP) | Furniture (0.21% of GDP) | Transport and components (1.66% of GDP) | Medicaments (0.22% of GDP) | Food products (1.78% of GDP) |

**Applicable I4.0 technologies**

- Bio
- HET
- Rob
- Al
- IoT
- 3Dp

**Regulations:**
- Health and safety, quantity, pricing, R&D support
- Health and safety, R&D support, export support
- Health and safety

**Note:** I4.0 is Industry 4.0.

**Source:** A.T. Kearney analysis
Recommendations for individual businesses

Individual businesses in Russia (and elsewhere) need to take their own steps to become future-proof—the Fourth Industrial Revolution poses substantial challenges and opportunities for any company. Russian businesses specifically need to invest more in emerging technologies, integrate themselves into the global economy, and strengthen their workforces to be competitive at home and abroad. In particular, they should gain an early understanding of technology trends in their own industry (such as impact on customer demand, product and solution development, competitor landscape and dynamics, partnership needs, operating model transformation, and so on) and identify the areas where they need to act and build competencies.

At the same time, individual Russian companies should increasingly automate production processes through the use of robotics and artificial intelligence to lower costs and improve production precision and quality. This will require the gathering and analysis of vast amounts of data. Finally, companies need to employ more environmentally friendly production technologies in line with growing sustainability requirements.

Russian businesses need to invest more in emerging technologies, integrate themselves into the global economy, and strengthen their workforces.

Developing new technologies and IT solutions locally also represents a business opportunity for Russia’s companies. To best capture it, businesses can collaborate with local R&D centers and seek tax incentive agreements with local government for innovative research and production methods, and the early adoption of new technologies.

As companies adopt these emerging technologies, they will face significant workforce management challenges. Consequently, businesses will need to work with universities to identify relevant talent early on, while pushing continuous workforce development either in company-owned centers or with other companies and academic institutions.

4 Conclusions and Recommendations

Russia is better prepared than many countries for the future of production. On the Country Readiness for the Future of Production Scorecard, it ranks 43rd out of 100 on the drivers of production and 35th out of 100 on the structure of production. However, as a G20 nation and the world’s sixth-largest economy in purchasing power parity (PPP), it needs to aim higher.

Continuing challenges in Russia’s economic environment could also see the country slide down the Future of Production rankings, while some countries in lower positions are on track to become more competitive and innovative in the next five to 10 years. Russia therefore needs to speed up the development and implementation of measures that can make it an industrial production leader in the long run.
Although Russia has a very different economy from that of the United States, Germany, South Korea, China, Canada, and Australia, it could benefit from pursuing some of the qualities that have made these countries relatively well prepared for the future of production. The strengths of the United States and Germany, for example, include a large number of SMEs, close attention to education and scientific progress, a high level of economic freedom, and integration into the global economy. South Korea and China are export-oriented, invest in the development of the domestic labor force, and have attractive business and trade environments characterized by low taxes and openness. Australia and Canada are blessed with considerable natural resources, but also invest in their human capital, while prioritizing free trade (other than agriculture) and economic freedom.

To close the gap and catch these leaders, Russia needs to improve its institutional framework and increase competition, thereby creating stronger demand for technology and innovation (see figure 11).

**Figure 11**

**Key changes Russia can make to prepare for the future of production**

Summarizing our recommendations, Russia’s key priorities should be:

**Technology and innovation: time to step up**

The government needs to ensure all regions of Russia have access to advanced ICT technologies. It should also seek to raise awareness of the Fourth Industrial Revolution, partly by turning government institutions into role models in the use of new technologies.
Working together, business and government should set clear long-term priorities for R&D for the most competitive areas of the economy and underpin this with investment in high-priority, business-oriented projects that have a defined risk-sharing mechanism. The government could also introduce tax incentives to increase R&D spending and efficiency. Ultimately, Russia needs to increase its R&D expenditure from 1.1 percent of GDP to between 3 and 4 percent.

An increase in competition, fueled by deregulation, privatization, and a reduction of state involvement in business, would help spur innovation. This more competitive environment would incentivize the adoption of new technologies and innovation. The government could also create a playbook for businesses, detailing which technologies to use and how to implement them, perhaps through the chamber of commerce and industry. Greater collaboration between universities and enterprises would also increase exposure to new technologies.

**Employment and skills: retaining and retraining talent**

To capitalize on its natural resources and geography, Russia needs to increase internal migration and strengthen its regional economies. One way to do that would be to enable greater regional autonomy, increasing competition for human resources and private investment. The ultimate goal for each region should be to create a living and working environment that will attract talented people and enable them to learn the skills that will be needed in the future.

Although Russia’s spending on education is likely to stay below 5 percent of GDP, it needs to increase the efficiency of this spending.

Russia needs to move toward open trade, albeit while protecting certain industries.

The Russian educational system could better align its courses with business requirements by developing a list of the top 10 jobs needed for the future of production. Businesses should have input in this process and help design courses. More broadly, the university system needs to be upgraded to meet modern standards, supplemented by company-driven education centers and greater cooperation between enterprise and academia.

**Global trade and investment: greater alignment and integration**

Policymakers need to consider how they can reduce and ultimately eliminate the obstacles to global integration. Key initial steps would be to support Russian companies’ partnerships with global players, improving the protection of investors’ rights, and aligning the Russian production system with global standards. Ultimately, Russia needs to move toward open trade, albeit while protecting certain industries.

**Institutional framework: robust, transparent, and predictable**

To be globally competitive, Russia really needs a high-quality, transparent, and predictable regulatory framework that will enable the development of a strong entrepreneurial ecosystem.
In particular, Russia should seek to increase its regulatory efficiency, strengthen the rule of law, bolster the protection of intellectual property, and reduce government involvement in business operations.

Specifically related to this latter point, Russia should seek to lower the level of government involvement in the economy to a point where it acts as a regulator of individual industries.

**Demand environment: increase competition**

To boost domestic demand, Russia could use tax incentives to make innovations—along with ICT goods and services—more affordable for both consumers and businesses. Russia also needs to create a more dynamic and competitive environment. To that end, it should seek to restructure its economy so that SMEs account for between 25 and 45 percent of GDP, compared with less than 15 percent today.

**Sustainable resources: more renewable energy**

As part of the global effort to cut greenhouse gas emissions and combat climate change, Russia could step up its use of renewable energy solutions. Corporate taxes could be cut for companies adopting sustainable practices (for example, in water, waste, and power management), while clear and competitive feed-in tariffs would encourage the adoption of alternative energy sources. Such incentives would also encourage Russian companies to develop renewable energy technologies locally, which could then be exported to other markets.

**Structure of production: move further into services**

Russia should seek to increase the role of services in its economy to between 70 and 80 percent of GDP (an increase of 10 percentage points), while focusing its manufacturing base on the areas where it is most competitive.

The targets outlined above are ambitious. But achieving them will ensure that Russian companies, both large and small, are well prepared for the future of production and can compete effectively on the international stage. If Russia can fully harness its considerable human and natural resources, it has the potential to join the leading countries at the forefront of the Fourth Industrial Revolution, providing better employment prospects, greater prosperity, and a higher quality of life for its people.

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