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The “left behind”: Smallholders in contemporary Russian agriculture

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Abstract

Smallholder production in Russia has been in decline for more than a decade. The likelihood is for continued marginalization. Smallholders confront four obstacles. First, path dependencies, which includes the fact that smallholders' production remains traditional and subsistence oriented. Second, institutions in the form of state policy restrict land and animals. Third, Russia's role in the third food regime means that smallholders are unable to help Russia's emergence as a global food superpower. Fourth, smallholders are being left behind in the ongoing technological revolution led by agroholdings. As technological advancement expands in scope, the gap between large farms and smallholders will widen.

KEYWORDS

household plots, post-communist agriculture, Russia, smallholders, technological transformation

1 | INTRODUCTION

Global agriculture is undergoing tremendous change driven by socio-economic and technological change brought about by globalization. On the one hand, smallholder agriculture produces more than 80% of the world's food on just 12% of agricultural land, but most smallholders remain petty commodity producers whose main goal is subsistence and whose activity involves the “commodification of subsistence” (Bernstein, 2010). On the other hand, we have witnessed the rise of global agribusiness and capital intensive companies that are vertically integrated and export oriented. These companies dominate the global food regime, discussed in more detail below. Despite high levels of food production, smallholders often face significant disadvantages. Shared obstacles across countries include lack of access to credit, isolation from domestic and foreign markets, and non-integration into supply chains. How smallholders fare in this bimodal model of global agricultural between big and small capital remains a subject of academic debate (Birner & Resnick, 2010; Durr, 2016; Goldsmith, 1985).

This paper focuses on smallholders in Russia, who coexist in an agricultural system with giant agribusiness. We follow the European Union, Food and Agriculture Organization, and the World Bank in their definition of smallholders

as family agricultural operations on less than 2 ha of land. Our analysis of smallholders in Russia focuses on household plots or *lichnoe podsobnoe khoziaistvo* (literally translated as personal subsidiary farming) as the representative of smallholders because this activity is the most economically significant among the different types of smallholder production.¹ Russian smallholders (*lichnoe podsobnoe khoziaistvo*) are defined not just by the size of land holdings, they also constitute a legal category of producer that is non-commercial, and therefore, production is not taxed. The article addresses three specific questions. (a) What is the role and place of smallholders in Russia's post-communist agricultural and food systems? (b) What factors impact the role and place of smallholders in Russia's agricultural system? and (c) What are future prospects for *lichnoe podsobnoe khoziaistvo*?

In addressing these questions, the paper analyses two sets of obstacles. The first set includes path dependencies; the institutional arrangement—state priorities, policies, and goals—which defines the contribution that smallholders are able to make and their place in the agricultural system; and Russia's role in the global food regime. These factors are generally known to analysts and have been discussed to varying degrees. The second set of obstacles has yet to appear in the literature: Smallholders are being left behind during Russia's technological revolution in agriculture. Smallholders in Russia not only have to overcome the problem of inadequate capital to obtain high-tech equipment, there is little prospect for *lichnoe podsobnoe khoziaistvo* to close the technology gap with agrohholdings, and smallholders are unable to use most advanced technologies and production techniques on their small plots of land.

The core argument is that smallholders are not just falling behind, they are being left behind. The “falling behind” refers to deficiencies and traditional obstacles—land, labour, and capital. The falling behind argument is based on smallholders' declining agricultural output since 2004 in volume of production and as a percentage of total output, although this decline is not the only evidence. Falling behind is evidenced as well by divergence in land holdings, revenue streams, and access to labour compared with large farms. The “left behind” hypothesis refers to the technological gap in agricultural production that smallholders have little chance of closing now or in the future. Smallholders' are unable to adapt to or participate in the technological revolution that is occurring in Russian agriculture. The decline of smallholders in Russia is similar to that in Central and Eastern Europe (CEE) after 2005 as analysed in this symposium (Burkitbayeva & Swinnen, 2018). The decline in CEE nations is somewhat surprising given that many former communist nations joined the European Union in the “big bang” of 2004 and became eligible for European Union subsidies and improved access to markets. Smallholders in Russia, however, stand in stark contrast to Central Asian states, where smallholder access to land and food production has increased (Lerman & Sedik, 2018). Their paper in this symposium argues that Central Asia is a success in terms of individualization of land and smallholder production.

Prospects for the majority of Russian smallholders are more challenging now than at any time in the post-communist period. Smallholders no longer face a semi-hostile state as during the Soviet period, but smallholders are steadily losing economic importance. Moreover, the likelihood of reversing economic decline and increasing economic influence is poor because smallholders lack political power. The paper by Falkowski in this symposium shows that political influence and economic power are intrinsically linked (Falkowski, 2018). Low political influence equates to low economic power and access to resources. That said, it is unlikely that smallholder production will disappear in the next 15–20 years as predicted by the Russian Ministry of Agriculture, citing long-term decline in household animal husbandry and milk production (V Minsel'khoze, 2017). There clearly is a possibility that *lichnoe podsobnoe khoziaistvo* will become mainly a recreational activity, and there is movement towards this outcome already, spurred by incomes of agricultural workers that are rising and high-paying non-agricultural jobs being created in the food chain; both occurrences dampen motivations to operate subsidiary agriculture (V APK, 2017). The irony is that *lichnoe podsobnoe khoziaistvo* survived decades of state discrimination during the Soviet period but is now entering its most precarious stage in the capitalist economy.

¹In the post-Soviet period, *lichnoe podsobnoe khoziaistvo* is referred to as household gardens, hobby gardens, or household farms, although the term “farm” belies their true nature because of their small size. In 2016, there were 17.5 million registered *lichnoe podsobnoe khoziaistvo* operations, of which 13.8 million were engaged in agricultural production. Less than 1% of households used agricultural production as their main source of income (Rosstat, 2017b).

2 | RUSSIA'S SMALLHOLDERS

There are many types of agricultural producers in Russia today, including agroholdings, large farm enterprises, medium farm enterprises, small farm enterprises, micro farms, private farmers of both large and small size, individual entrepreneurs, and various forms of smallholder production, all of which are non-commercial operations. One type of small-scale production is *sadovodstvo*, for which the main activity is growing of fruit—apples, pears, plums, cherries—although some vegetables may be grown too. Another type is *ogorodnichestvo*, where vegetable growing is the only production, most commonly cucumber, tomatoes, carrots, green onion, garlic, and squash. *Dacha* plots are a third form of smallholder production, which are weekend and seasonal homes for urban dwellers who want to escape the city and recreate. Each of these forms of smallholding usually operate on less than 0.5 ha. Further, the Russian Government includes private farmers as form of small farming, but there are significant differences. By definition, private farms are commercial enterprises, although a significant percentage of private farmers have land holdings that are closer to smallholders than large farm enterprises. The 2006 agricultural census, for example, found that 37% of private farms had less than 10 ha of land, whereas only 3.6% had more than 500 ha. Another 17% of private farms had no land whatsoever, instead engaging in rural services and as financial middlemen (Rosstat, 2008, pp. 162–163).

The most economically significant form of smallholding is in the form of *lichnoe podsobnoe khoziaistvo*, which existed in the pre-Soviet and Soviet periods, although admittedly the economic environment differed (Danilov, 1988).² Soviet-era smallholders were limited in land usage and number of animals permitted and faced both formal and informal biases (Kalugina, 1991; Pallot & Nefedova, 2007; Wadekin, 1973). In the Soviet period, both urban and rural dwellers were given use rights for *lichnoe podsobnoe khoziaistvo*, although the size of the land plot was generally limited to no more than 0.5 ha, depending on the occupation of the head of household (Wegren, 2009).

State policy towards *lichnoe podsobnoe khoziaistvo* varied over time. Ideologically anathema during the Soviet period, *lichnoe podsobnoe khoziaistvo* was seen as a vestige of petty capitalism. Yet even Stalin's policy was schizophrenic, on the one hand driving peasant households into collective farms and nationalizing land but on the other allowing collective farmers (and others) to use plots of land to grow food outside of the state plan. He also permitted urban farm markets to exist where smallholders could sell their production at unregulated prices (Volin, 1971, 244–248). Khrushchev first supported then discriminated against *lichnoe podsobnoe khoziaistvo* by introducing taxes and limits on animal holdings. Brezhnev tried to make household plots irrelevant by monetizing collective farmers' wages and by raising farm wages to replace income from *lichnoe podsobnoe khoziaistvo*. When the socialist sector encountered production shortfalls in the late 1970s and early 1980s, Brezhnev loosened restrictions and tried to boost household production by allowing closer integration between the private and public spheres of production and marketing (OECD, 1991, p. 42). In 1987–1988, Gorbachev made *lichnoe podsobnoe khoziaistvo* an “integral component” of socialist agriculture and removed limits on the number of animals (Wegren, 1998, p. 44).

In the post-Soviet period, *lichnoe podsobnoe khoziaistvo* is legally a non-commercial form of agricultural production. Smallholders who engage in *lichnoe podsobnoe khoziaistvo* may be divided into three categories, generally following Lenin's division of rich, middle, and poor households, each defined by its level of commercialization. The first group obtains nearly all its income from food sales. This first group consists of a very small percentage of operators (<1%), and it is they who are most affected by restrictions on land and capital, as well as poor access to credit. A second group sells some of its production to supplement the household budget, but such income consists of less than 50% of total income. The third group consists of households that consume all or almost all of their food production. Households in category three usually are located at the lower end of the income scale and need food production to

²In the post-Stalin period, household gardeners used less than 2% of agricultural land but produced an estimated 20–25% of the ruble value of food production. Typically, household production consisted of potatoes, carrots, cucumbers, and small fruits and berries for consumption. Soviet-era rural households may have kept a cow for milk, sheep or goats, a pig or two, and chickens, so meat production was also significant (Kalugina, 1991, 167–168). Over time, the desire by smallholders to raise large animals declined, depending on how much assistance a household could obtain from a nearby large farm (Goskomstat SSSR, 1989).

survive. These subsistence-oriented households are the least affected by limitations on land and capital and do not need access to credit (Uzun & Saraikin, 2012, pp. 42–46).

The turbulence of the post-Soviet economy in the 1990s witnessed a significant increase in production from *lichnoe podsobnoe khoziaistvo*. As the economy moved from non-market to market-based after 1992, new opportunities were opened for smallholders in terms of the acquisition of land and capital, which led to a significant increase in household food production (Pallot & Nefedova, 2007). Output from smallholders accounted for more than one-half of the ruble value of food production, reaching a high of 57% in 1997 after production from large farms had fallen for several years. As late as 2004, household gardens accounted for more than one-half of the ruble value of food production (Pallot & Nefedova, 2007, p. 18).

Since 2004, however, household production has declined in volume and as a percentage of national output. In 2016, *lichnoe podsobnoe khoziaistvo* accounted for less than 35% of the ruble value of food production (Rosstat, 2017a, p. 245). Russian smallholders have a higher percentage of food output compared with other European post-communist states, but most household production is self-consumed (Nefedova & Pellot, 2006). Russia is a large country with regional exceptions, but the contribution of household food production to regional food supply is generally lower in the agriculturally rich south. The level of food sales has been shown to rise as the income scale is ascended (Wegren, 2014). For most households, however, the overwhelming volume of household food production is self-consumed.

3 | ANALYSIS OF SMALLHOLDERS

How are we to understand the role of smallholders in Russia today? A political economy approach is used to analyse smallholders' place in the food system in post-Soviet Russia. This section analyses three factors: path dependency, institutions, and the global food regime. A fourth factor, the technological revolution in agriculture, is treated in a separate section.

3.1 | Path dependencies

Path dependencies are self-reinforcing mechanisms that reproduce characteristics and behaviours that hinder economic change (North, 1990). Contemporary smallholders are directly affected by discernible path dependencies from the Soviet period. Shared characteristics include smallholders use sustainable agricultural practices; most land holdings are very small; labour is manual; the majority of food production is not commercial sale; and the family is the basic unit of labour. As during the Soviet period, smallholders work only part-time on *lichnoe podsobnoe khoziaistvo*. Men aged 45–54 spend about an hour during their non-working day, whereas men aged 55 and over average 40 min on their free day (Rosstat, 2010). Another path dependency is the idea that *lichnoe podsobnoe khoziaistvo* is foremost a form of subsidiary agricultural production. This seemingly trivial point in fact has enormous importance because it indicates that other producers in the agricultural system have priority and are more important for national food security.

There are also path dependencies in terms of disadvantages. Russia's smallholders often have difficulty utilizing markets either because they lack transportation or do not have the labour to allocate for transportation to a market, manning the stall, and returning from the market, similar to the situation in CEE nations. Smallholders lack connections to food processors, and frequently, smallholder production fails to meet quality or sanitary standards, again similar to CEE countries (Burkitbayeva & Swinnen, 2018). Smallholder production is poorly connected to retail food chains and supermarkets, as well as supply chains, all of which have enormous transformative influence on production and integration (Dries, Reardon, & Swinnen, 2004; Reardon, Barrett, Berdegue, & Swinnen, 2009; Reardon, Timmer, & Berdegue, 2008). These disadvantages impact commercialized smallholders, whereas households that consume all or most of their production are less affected.

Another inherited disadvantage concerns land. Russia's smallholders are numerically dominant but in aggregate use a small amount of agricultural land. In 1990, operators of *lichnoe podsobnoe khoziaistvo* used 3.2 million ha of agricultural land, equal to 1.4% of all agricultural land, with an average area of 0.2 ha. During the 1990s, the area of land expanded for several years as both rural and urban dwellers sought to ensure their food security during economic collapse (Kalugina, 2000). By the end of 1999, the area of land used for *lichnoe podsobnoe khoziaistvo* totaled 6.1 million ha, or about 2% of agricultural land, with an average size of 0.4 ha per garden. The 2006 agricultural census found the area of agricultural land used for *lichnoe podsobnoe khoziaistvo* totalled 8.1 million ha, equal to about 4% of agricultural land, with an average size of 0.4 ha per garden. But of the 8.1 million ha, only 2.5 million ha were arable (Rosstat, 2008, p. 42).³ Even with an expansion in land used for *lichnoe podsobnoe khoziaistvo*, operators find it difficult to compete with agrohholdings. In 2017, for example, the top five agrohholdings controlled hundreds of thousands of hectares each.

Despite discernible path dependencies, contemporary *lichnoe podsobnoe khoziaistvo* is not merely a replication of Soviet-era smallholders. There are also discernible discontinuities. First, in the Soviet period, *lichnoe podsobnoe khoziaistvo* was at various times supported formally by state policy and more regularly by informal ties to state and collective farms that provided inputs and services to household gardeners who also were farm employees (Wadekin, 1973). Today, large farms and commercialized smallholders are competitors, so farm support is at a lower level and subject to many variables.

A second discontinuity is the high degree of stratification between adapters and non-adapters among contemporary operators of *lichnoe podsobnoe khoziaistvo*. Whereas most operators of *lichnoe podsobnoe khoziaistvo* have small plots of land that usually surround the dwelling, there is also a possibility to lease additional land away from the dwelling, although only a small percentage actually do so—those that do have significantly higher income (Wegren, 2014). Further, a small percentage of *lichnoe podsobnoe khoziaistvo* operators are adopting new practices that increase labour productivity. Some smallholders have attempted to form informal networks and to build through social capital through cooperation, although the process is fraught with difficulties (Golovina & Nilsson, 2011). Finally, specialization is occurring in some regions that allows *lichnoe podsobnoe khoziaistvo* operators to carve out a market niche by producing sustainable food and marketing “environmentally pure” products.

3.2 | Institutions

North defines institutions as “formal rules, informal constraints, and their enforcement characteristics” (North, 2005, p. 63). He argues that institutions are central in shaping behaviour. Institutions matter because they are “humanly devised constraints that structure human interaction” (North, 1990, p. 3). Institutions define the environment in which people behave and the “rules of the game” that they follow (or not). The direct measurement of institutional impact is often difficult, however, because the link between national level institutional change and micro-level behaviour is fraught with complications. That said, institutional arrangements in Russia's agricultural sector impact smallholder production by defining legal parameters. The size of smallholder land plots, for example, is regulated by regional land laws. There are regional variations, but the national average of a household garden is less than 1 ha, which places inherent limitations on production potential. Size limitations are important for households that derive a significant portion of their total income from food sales.

A second institutional impact concerns a limitation on animals. The household animal husbandry sector has been in decline for more than a decade. Currently, due to health and sanitation concerns over swine and bird flu, a growing number of regions have introduced numerical restrictions. Households are blamed for spreading of the swine flu virus by transporting pork meat from quarantined zones to neighbouring villages and selling the meat (Mudrats, 2017). The Ministry of Agriculture supports regional limits on pigs raised by *lichnoe podsobnoe khoziaistvo* (Kvedomosti.ru, 2016).

³Regional differences were significant—two southern federal districts accounted for 56% of all land used for household gardening. The northwest district, where land quality is poorer, had only 5% of agricultural land used for *lichnoe podsobnoe khoziaistvo*.

In spring 2017, the State Duma, the lower house of the Parliament, began to consider a bill that would establish national norms, requiring households to have a certain number of square metres per pig (Diatlovskaja, 2017). Numerical restrictions obviously impact production potential and make it difficult to compete with large farms for market share. Operators of *lichnoe podsobnoe khoziaistvo* who are fully or partially commercialized are affected by this second institutional restraint.

A third impact directly infringes upon smallholders' market share for vegetables. Smallholders produce a high percentage of the nation's vegetables, especially tomatoes. To reduce food imports, the federal government has supported the construction of technologically advanced greenhouses—industrial greenhouses that are based on automation and robotics. An ambitious effort to expand large-scale greenhouse construction and production is underway, especially in southern regions where tomato growing by households is popular (Kakushkin, 2017). The volume of production from industrial greenhouses increased about 25% during 2013–2016. Domestic investors and foreign investors are rushing to this sector, which has produced profitability rates above 20% in recent years (Maksimova & Ganenko, 2018). The number of greenhouse complexes and total land area used for greenhouse production is steadily growing. Greenhouse production of vegetables increased from 584 thousand tons in 2012 to 984 thousand tons in 2017 and is projected to rise to 1.15 million tons in 2018 (Diatlovskaja, 2018). The increase in industrial greenhouse production squeezes out all three categories of smallholders who try to market their vegetables at urban markets.

3.3 | Global food regime

The third food regime is characterized by a concentration of capital, the production of food surplus, the rise of commodity chains, and control of international food markets by corporate hegemony since 1980 (McMichael, 2013). This corporate food regime is based on industrialized agricultural production, dependent upon the application of chemicals and pesticides, irrigation, and large-scale mechanization. In terms of global food trade, the corporate food regime is dominated by food hegemony that dominates global food markets. Large global agri-firms control vertical and horizontal chains of production and distribution (Friedmann, 1988). Developed nations erect trade barriers to protect their domestic markets while simultaneously using export subsidies to sell food to developing nations. Developing nations, in turn, become import-dependent and reorganize their agricultural sectors based upon cheaper food imports, which in turn drives domestic smallholders into destitution.

During the communist period, Russia's agricultural sector was shielded from globalization, and food producers were protected from international competition. True, the Soviet Union entered the global food market to purchase grain and other agricultural commodities (OECD, 1991, pp. 181–198). But most food trade entailed intra-bloc trade vis-à-vis other communist nations and autarky vis-à-vis the non-communist West. Since 1992, however, Russia's economy has been liberalized and integrated into global markets, highlighted by entry into the World Trade Organization in 2012. Russia is now integrated into the third food regime as a food importer and exporter.⁴

Russia's entry into the global food regime is marked by three occurrences. First, Russia's integration into the global food regime is possible because of the emergence of agroholdings. Specifically, a relatively small group of agribusiness companies called agroholdings began to emerge in the early 2000s and now have enormous resources (Epshtein, Hahlbrock, & Wandel, 2013; Ryko, Khramova, Uzun, & Jolly, 2008; Wegren, Nikulin, & Trotsuk, 2018). Agroholdings are mega-sized, corporate farms. These farms are remarkable not only for their size—they are much bigger than traditional Soviet-era state and collective farms—but also for “new types of management, new technologies, the commercial orientation of the business and their aggressive market behaviour” (Serova, 2007, p. 19). Russian academician Petrikov contends that 23% of farms in Russia account for 93% of all profits (Petrikov,

⁴We acknowledge the debate whether a new food regime has emerged based on food sovereignty. Space constraints prevent an extended discussion, but this author's position on food sovereignty is closer to Bernstein (2014) and Agarwal (2014) than to Van der Ploeg (2008) and McMichael (2013). With regard to its application to Russia, I completely disagree with Visser, Mamonova, Spoor, and Nikulin (2015) that food sovereignty is a relevant concept for Russia's agricultural system.

2016). Russia's approximately 700 agroholdings represent an extreme concentration of economic power, and thus, to understand Russia's agricultural system and the place of smallholders, it is necessary to include agroholdings in the equation.⁵ The concentration of land and capital in the agricultural sector mirrors processes in other sectors of the Russian economy such as energy, banking, and finance.

Agroholdings' concentration of power is seen by the fact that the five largest agroholdings controlled 3.2 million ha of agricultural land in Russia in 2016: Prodimeks + Agrokul'tura—790,000 ha; Rusagro—670,000 ha; Miratorg—644,000 ha; Agrokompleks im. N. Tkacheva—640,000 ha; and Ak Bars—505,000 ha (Top-10 latifundistov, 2017). The concentration of land and other resources leads to concentration of production. The top 15 companies export 75% of Russian grain (Pavenskii, 2017). The top 20 companies produce 60% of the nation's pork (Kulistikova, 2017b). The top 20 companies produce 49% of animal feed (Kulistikova, 2017a). The top 25 companies produce 43% of the nation's meat (Kulistikova, 2017d).

Russia's large, powerful, corporate entities obtain financial investment from abroad and domestically. During 2012–2016, more than \$3 billion of foreign investment was made in Russian agriculture (Ganenko, 2017). Minister of Agriculture Alexander Tkachev indicated that during the same period, more than R1 trillion was invested by domestic investors in agriculture. These investments were made into and by agroholdings, resulting in a stratum of farms possessing modern, mechanized production equipment and the newest technologies. Agroholdings have political connections to regional and federal officials and benefit from by receiving the largest portion of state investment and subsidies. The federal government is committed to strengthening agroholdings because they enhance Russia's international status and prestige in the global food regime.

The second occurrence is marked by explicit statements that Russia is striving to be a global food superpower. Statements by policymakers to this effect began to appear as early as 2009 following what was then a record harvest in 2008. Former President Dmitry Medvedev expressed Russia's ambition to become a global food supplier (O razviti, 2009). As prime minister, Medvedev boasted that Russia has the ability to “feed half the world” (My sposobny, 2013). In October 2017, Minister Tkachev asserted “we may become a leading agrarian power,” referring to Russia's grain exports, its growing meat exports, and its quest to become a leading exporter of organic food (Kniazeva, 2017, p. 3). Grain is already an important commodity for export from Russia. In the 2015/2016 agricultural year, Russia was the number one wheat exporter in the world, surpassing the United States, Canada, and Australia. In the 2016/2017 agricultural year, Russia exported over 35 million tons of grain, a record volume for that country. During the 2017/2018 agricultural year, Russia regained the number one position with grain exports exceeding 50 million tons, including about 37 million tons of wheat. Going forward, Minister Tkachev has indicated goals for Russia to produce 140–150 million tons of grain and to export up to 50 million tons on a consistent basis (Agrofakt, 2016b). Because of their limited land holdings, smallholders produce less than 1% of Russia's grain, thus making virtually no contribution to grain supply.

To support their superpower aspirations, in November 2016, a federal programme called “The Export of Products of the Agroindustrial Complex” was approved by the upper house in the Parliament, and in December 2016, the government officially brought the programme into effect (Rossii, 2016). For 2017, the programme received R846 million rubles, with funding rising to R2.5 billion by 2020 (Kvedomosti.ru, 2017c). In July 2017, an analytical centre was opened to promote Russian food and food brands in foreign markets, providing logistical, legal, and consultative assistance to food exporting companies. The programme established a target for food exports to reach \$30 billion by 2021 (Kunle, 2017). Minister Tkachev indicated an ambition to increase food exports to \$50 billion by 2024, up from \$20 billion in 2017 (Kvedomosti.ru, 2018a). These measures are intended for commercial producers who export their surplus. Smallholders who consume their production do not participate in food exports.

The third occurrence has been the long-term absence of integration of smallholders into external markets. Russian analysts express the necessity of integrating smallholders into the international agricultural system and

⁵In 2014, there were 319 non-state agroholdings, of which only one was foreign owned, and 463 state agroholdings, of which 382 were owned by municipal governments and only nine by the federal government (Uzun & Shagaida, 2015, p. 175).

specifically to export markets with members of the Eurasian Economic Union—Russia's version of the European Union that includes a single market and free trade for many products (Tul'chev, Lukin, & Lukin, 2017).⁶ The reality for smallholders, however, is isolation from foreign markets. In this regard, Russia's smallholders are similar to smallholders in CEE and more broadly throughout the developing world (Fan, Brzeska, & Olofinbiyi, 2015; Burkitbayeva & Swinnen, 2018). There are steps that can be taken to integrate Russia's smallholders to the larger agricultural system and perhaps even to the global food regime (Koester, 2005). Regime preference, however, is clearly oriented towards supporting agrohholdings.

4 | THE TECHNOLOGY REVOLUTION IN AGRICULTURE

Smallholders are left behind by technological advances that are being introduced by agrohholdings and other large farms. During the Soviet period, there was a mechanization gap between state and collective farms and *lichnoe podсобnoe khoziaistvo*: the former utilizing mechanized machinery in many phases of production and the latter based on manual labour. During the 1990s, large farms in Russia demechanized during the economic collapse, and as a consequence, the mechanization gap narrowed. Starting in the 2000s, however, with the appearance of agrohholdings, a technology gap has emerged. It is on the back of agrohholdings and other large farms that Russian agriculture has experienced, in the words of former Minister of Agriculture V. Semenov, a “renaissance” (Kvedomosti.ru, 2017b). Agrohholdings already hold enormous advantages in land, labour, and capital. Agrohholdings receive the most state financial support. Agrohholdings facilitate the export food and give Russia prestige, and for that reason, they are the preferred producer in the system. The acquisition and use of technological advances give agrohholdings an even greater advantage in the capture of domestic and foreign markets.

The technological revolution in Russia mirrors a similar revolution occurring in global agriculture. Globally, new technologies are emerging in sensors and automation, as well as other directions (Zappa, 2014). On large farms, satellite sensors and drones can spot areas where pests or other problems exist, allowing farmers precise chemical application or pest removal, thereby reducing overall application of herbicides and pesticides (King, 2017). Variable swath control reduces inputs by calculating relative productivity in a field and applies seed, minerals, or fertilizers at variable rates accordingly. Agricultural robots substitute for manual labour and not only save money but are more efficient in harvesting, fruit picking, weeding, planting, and ploughing. Efforts are being made in developing nations to connect smallholders to technological innovations in agriculture (World Bank, 2017).

Currently, Russia's agricultural producers trail the West in the use of advanced technologies, but Russian policymakers and investors are committed to making the sector modern and globally competitive. Deputy Minister of Agriculture I. Kuzin noted that “Russia's agricultural sector has turned into a high-tech branch of the economy. Robotization and automation show that Russian agriculture has moved to a qualitatively new level of development” (Press-sluzhba, 2017). Kuzin's position is a bit optimistic as it is still early in Russia's technological revolution—an estimated 10% of Russia's 12,000+ large farms use advanced technology (Maksimova, 2017). But the prospects are considered to be bright. The Ministry of Agriculture estimates that by 2019, 30% of farms will be using the “internet of things.” During 2012–2016, more than \$685 million was invested in artificial intelligence and robotics in Russian agriculture, attracting an additional \$800 million in private investment (Forbes.ru, 2017).

As foreign and domestic investment flows into new technology, the gap between large corporate farms and smallholders continues to widen. A pilot project using robotics in cheese production was constructed in Moscow Oblast in 2017 and began production in mid-2018, producing 100 tons a day (Regnum, 2017). Experimental robots are also being used to pick apples at a rate of one apple per second and are able to move from orchard to orchard independently (Agrofakt, 2016a). In the next few years, there will be more drones used in agriculture than in any

⁶The Eurasian Economic Union was formed in 2010 with the creation of a customs union and single economic space. The formal union came into being in January 2015 with founding members Russia, Kazakhstan, and Belarus. Subsequently, Armenia and Kyrgyzstan joined in 2015, bringing membership to five states as of 2018.

other sector. Laser sensors are being introduced to calculate how much fertilizer or pesticide a given area of land needs so as to prevent over-application (Kvedomosti.ru, 2017a). In 2017, the Urals State Agricultural University announced the creation of a pilot-less tractor that will operate with artificial intelligence and be ready for use in agriculture within 3 years (Interfax, 2017). In August 2017, in Rostov Oblast, the first pilot-less grain combine entered into operation. The director of an agricultural machine making company in Rostov, Dmitry Inozemtsev, noted that the use of artificial intelligence and robotics is developing in many directions in agriculture, for example, controlling the speed and course of combines (V Rostove, 2017). It is estimated that the introduction of the “internet of things” in the agricultural sector will add R469 billion to the value of production by 2025 (Kulistikova, 2017c). In addition, Russia and China are working together in innovative technology to develop high yield seed and animal husbandry in the Russian Far East, cooperation that has already led to 85 patents (Kvedomosti.ru, 2017d). The critical point is that the introduction of new technology will make corporate farms more productive, more profitable, and economically stronger. Russia's smallholders clearly are not integrated into the technological revolution and are left behind.

One problem for Russia's smallholders is that the acquisition of high-tech agricultural equipment is very expensive, requiring either self-financing or access to significant credit. Because most smallholders do not have sufficient capital to buy new technology on their own, incentives are created for smallholders to pool their resources to buy farm equipment (Poluchateli, 2018). In terms of credit, federally subsidized credit for *lichnoe podsobnoe khoziaistvo* ended in 2007, leaving owners with only the option to mortgage their land as collateral, but banks are often reluctant to extend loans to household gardeners. A second problem is suitability—is high-tech equipment actually usable on land plots that average less than 1 ha? The reality is that most smallholders are unable to use advanced technologies and production techniques.

Further, the technology gap will grow because the government is committed to the transformation of the agricultural sector in order to improve Russia's standing in the global food regime. Towards this end, in August 2017, the federal government adopted a programme on the scientific-technological development of agriculture that will run 2017–2025, with R26 billion in federal funding (Postanovlenie, 2017). This scientific-technological programme is intended to support previous programmes on the development of science and technology in agriculture (2013–2020), the development of education (2013–2020), and the information society (2011–2020). Smallholders as a category are not targeted for resources in these programmes. Furthermore, the Ministry of Agriculture announced a programme called “Digitalization of agriculture” to be introduced in 2019. Large farms will receive subsidies to acquire robots to test the soil for moisture and fertilizer and to monitor production. Each robot is estimated to cost about R2.5 million—far beyond the means of the average smallholder—and will be able to cover 100,000–150,000 ha per season. These robots will be able to increase yield and reduce losses. At present, digital technology is used on only about 10% of arable land, but by 2026, that will increase to 50% under this programme (Kvedomosti.ru, 2018b). To support the dispersion of high-tech equipment into agricultural production processes, recruitment efforts are underway to attract 90,000 IT specialists who will work for large farms. Young specialists in particular are targeted, who are believed will want to work with robots and other high-tech equipment in agriculture. These initiatives are intended for large farms and not the smallholder sector.

5 | CONCLUSION

I have argued that Russia's smallholders confront path dependencies and institutional arrangements in the form of regional policies that limit production potential. Further, Russia's aspirations in the global food regime marginalize smallholders. Smallholders consume their household production and are isolated from markets and supply chains, thereby rendering them unable to contribute to Russia's status in the global food regime. Set in the context of other papers in this symposium, Russian smallholders have not had the success found in Central Asian states as described by Sedik and Lerman. Russia's smallholders are not as integrated into value chains as in Eastern Europe, described by

Swinnen and Burkitbayeva. Nor do smallholders have the political clout to protect their interests, the importance of which is shown by Falkowski in his paper on Poland.

Since 2004, Russia's agrarian policy has favoured the concentration of economic power in agroholdings, who have become dominant players in the agricultural system. Mamonova, for example, observes that in Russia, big capital has gained control over agricultural land, monopolizes the value chain for food products and inputs, and receives the majority of state subsidies. As a result, "this control grabbing limits diversification within rural communities based on access to productive resources. The majority of households are unable to accumulate land and capital for commercial farming" (Mamonova, 2016, pp. 22–23). Although it is unlikely that *lichnoe podsobnoe khoziaistvo* will become extinct, in the competition between big capital and small capital, big capital is likely to win (Bernstein, 2010).

My central argument is that Russia's technological transformation in agriculture is determining the future role of smallholders. Although big capital modernizes, smallholder production remains based on manual labour. Smallholders lack financial means to acquire new technologies. Most smallholders are unable to afford new technologies or adapt their use to their scale of farming. The upshot is that smallholders find it difficult to compete against producers who increase output and efficiency through advanced technology. Smallholders will be relegated to self-reproduction and isolation from broader macro-transformation, a cycle that ultimately reduces their economic significance. In short, the Russian case supports the argument that as big capital grows more powerful, smallholders become increasingly disadvantaged.

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