A Comparison of Agricultural Higher Education in Russia and the United States

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ABSTRACT

As the internationalization of universities has grown in importance, there is an increasing number of cooperative programs between U.S. universities and those in other countries. To have the most effective programs, it is important to have an understanding of the differences between the respective higher education systems. With the disintegration of the former Soviet Union there has been an increasing interest in collaborating with higher education institutions in Russia and other countries of the newly independent states. A comparison of U.S. agricultural higher education and that of Russia shows substantial differences in operation and educational philosophy. Since the higher education systems of the newly independent states were modeled after the Russian system, these comparisons provide a basic understanding of the agricultural higher education system in all of the newly independent states. The objectives of this paper are to (i) compare the structure of agricultural higher education in the USA and Russia, (ii) highlight the differences in the two systems, and (iii) identify aspects of each system that could strengthen each other. Although changes have occurred in the Russian system, additional changes might include: permit individual universities to set their own student/faculty ratios, determine student enrollment, charge tuition to all students, and grant them freedom to develop their own curricula.

Inefficiencies in Russian agriculture have been a major factor in many of the changes in leadership of the former Soviet Union; such inefficiencies are postulated to have played a major role in the collapse of Soviet socialism. Reed (unpublished, 1996) points out that many of the differences between western and Russian agriculture are due to the different evolutions of the two cultures. Science and education have been a major factor in the development of U.S. agriculture. Huffman and Evenson (1993) state that:

Investments in public sector research, extension, and school programs have been a primary source of U.S. agricultural productivity change, i.e., increased output per unit of input.

They present evidence and quote other work that shows that the development of new technology, its transfer to the user, the decentralization of decision making, and the increased educational level of the farmer have all had a profound effect on the increased productivity of U.S. agriculture.

Since technology is a major driving force in the success of a modern agricultural market economy, it is instructive to understand the higher education system of Russia and how it compares with that of the USA. The only other article we found discussing Russian or Soviet agriculture higher education was that of Dalrymple (1960), which deals mostly with student numbers with only a short discussion of the higher education organization.

The objectives of this manuscript are to: (i) compare the structure of agricultural higher education in the USA and Russia, (ii) highlight the differences in the two systems, and (iii) identify aspects of each system that could strengthen the other if adopted.

THE U.S. EDUCATIONAL SYSTEM

The U.S. educational system is based on 12 yr of elementary and secondary education. This is most often made up of 5 yr of elementary education, 3 yr of middle school, and 4 yr of high school. Upon graduation from high school, graduates can enter the work force, attend a 2-yr (junior college) college, or attend a 4-yr college or university. With proper course selection, a student can transfer from the junior college to a university and obtain credit for most, if not all, of the courses taken at the college. Figure 1 shows the general progression in U.S. education. This is the general pattern for all education in the USA. In the case of agriculture, some high schools will have vocational agriculture programs where students can take some agriculture courses. These do not constitute a specialty.

Junior colleges, also called community colleges, are usually based locally. Junior colleges generally have lower tuition than universities and students are typically commuter students, as few junior colleges have residences. In the USA, there are 1113 community colleges. Of these, 972 are public and 141 are independent or private (M.H. Neufville, personal communication, 1999). Many of these community colleges do not offer agricultural programs but most, if not all, will offer courses that will meet the general education requirements for agricultural degrees at 4-yr institutions. Thus, many students will begin at a community college, take 1 or 2 yr of general education requirements, and then transfer to a 4-yr college or university.

A university Bachelor of Science degree requires about 130 semester credit hours (1-credit-hour is usually 1 h of lecture or 3 h of laboratory). In general, a student who completes 16 or more credit-hours per semester can graduate in eight semesters or 4 yr, assuming they attend university for two semesters per year. Most university curricula have three types of requirements: general education university courses that

Abbreviations: MOAF, Ministry of Agriculture and Food; RAAS, Russian Academy of Agricultural Sciences; EMA, educational methodological association.
help provide the student with a broad range of understanding in arts, humanities, and sciences; major (technical) course requirements; and electives. The number of electives will vary by major, but most majors do provide the student with enough electives that they can develop a degree program that meets their special interests or needs.

There are some 131 U.S. universities that offer 4-yr agriculture degrees. None of these offer only agricultural degrees. Seventy-four of these are land-grant universities and 57 are non–land-grant state universities (M.H. Neufville, personal communication, 1999). All of the land-grant universities offer graduate degrees and many of the non–land-grant universities offer at least a Master of Science graduate degree. The 74 are called land-grant because the federal government provided an initial grant of land or a special allocation of funds to be used to establish the university, or in some cases, a college of agriculture. The original land-grant act was passed in 1872. Each state has at least one land-grant university.

All of the 4-yr agriculture institutions are public; that is, they receive some direct support from government. Most of the support is received from state government and tuition. There is very little direct federal government support for academic or education programs. Some universities do receive substantial federal support, but that is largely on a competitive basis and is mostly for support of research, not education. For example, the budget sources for agricultural academic programs in many land-grant universities will be approximately 40% state funds, 40% tuition, and 20% other. The other will be from companies, foundations, and other branches of government (T. Fretz, personal communication, 1999).

Agricultural academic programs are offered by departments that are part of a college of agriculture, which, in turn, is part of a comprehensive university that is generally state supported. Their programs and curricula are determined and developed locally. They are not set or determined by the federal government, but there may be some federal grants for program development. The faculty of each university is responsible for the course offering and degree program content. In a few cases, there are professional organizations that set national requirements, i.e., engineering. A university determines its offerings. Many states have coordinating boards that have oversight of program offerings and try to increase efficiency and reduce duplication of programs. A board of trustees that is responsible for setting university policy and provides oversight will govern most universities. Some uni-

Fig. 1. Scheme of progression in the U.S. education system.

Fig. 2. Typical university and college of agriculture administrative structure at a U.S. land-grant university.
versities have individual boards and some boards govern several universities. How board members are selected varies, but they are usually appointed by the state governor and confirmed by the state senate or are elected. The typical administrative structure for a land-grant university is shown in Fig. 2. Many land-grant universities have 10 or more colleges and their names and specialties depend on the university. Figure 2 shows only a few of the typical colleges.

All of the land-grant colleges of agriculture have three major responsibilities and are the only colleges with these responsibilities: academic programs, agricultural research, and extension. All colleges on a campus have academic programs (i.e., educate students) and many will conduct research. The uniqueness of colleges of agriculture lies in their research and extension programs. Research programs focus on agriculture problems of importance to the state and region. Most colleges of agriculture will also have basic research programs that relate to the more important issues in the state or nation. The extension function is to transfer knowledge to the users so they can have a viable and profitable agricultural business. The users were traditionally the farmers, but now extension serves a much broader group. With these three areas of activity, colleges of agriculture have a different relationship with the state than other colleges, in that the college has a clientele group other than students. In addition, the faculty of colleges of agriculture usually hold split appointments; that is, they will have responsibility for at least two of the three functions, such as a 25% teaching and 75% research appointment or other combinations. This provides a direct link between research and teaching, research and extension, and so on. This greatly strengthens the transfer of knowledge to students, of problems to scientists, and solutions to users.

There is a difference in the research programs of a college of agriculture vs. other colleges—the research of other colleges is faculty initiated and of interest to the faculty member, whereas most of the agriculture research is issue driven. In the USA, the only agriculture extension system is through the colleges of agriculture. Thus, in the USA, colleges of agriculture are responsible for all three functions—education, research, and extension. In many countries, these responsibilities will be split between three different sectors; education at universities, research by the federal government, and extension by the state or provincial government. The U.S. system fosters much greater interaction and efficiency.

The U.S. Department of Agriculture (USDA) does have a large and very good research program in the Agriculture Research Service (ARS). It is responsible for research to support other agencies of USDA and for research on national issues. In most cases where appropriate, the ARS and university programs are well coordinated. It is common to have ARS scientists located in university facilities or university researchers in ARS facilities, which fosters cooperation and efficiency.

The programs of U.S. colleges of agriculture are need driven, are determined by the individual states, and as a result change as issues and needs change.

**THE RUSSIAN AGRICULTURAL EDUCATIONAL SYSTEM**

In contrast to the American system, the Russian agricultural education and training system has been and still remains highly structured. Under the Soviet system, agricultural education was to serve the specialized needs of the agro-industrial complex. It was, and still is, to a certain degree centrally planned, operated, and funded. The programs focused on three main areas: crop production, livestock production, and the associated agricultural mechanization. Since the breakup of the Soviet Union, the education system has initiated revision of curricula, emphasized agricultural economics and marketing, and begun to make other appropriate changes. But as with any well-entrenched system, significant change takes time.

**GENERAL EDUCATION IN RUSSIA**

In Russia, general education begins at age seven with a primary education. The first cycle, the so-called incomplete general education was for 8 yr, but is being extended to 9 yr. Upon completion of their primary education, students can continue in general education for another 3 (or 2) years, or go to a vocational path that is offered in one of two ways (Fig. 3). For 3 yr they can attend vocational schools, which qualify them as specialized workers, or they can attend a tekhnikum (junior college) for 2 yr, which then provides them the opportunity for higher education. Instead of the vocational route, they can go to the tekhnikum for 4 yr and from there enter the work force or attend a higher education institution. Students who complete 11 yr of general education have three alternatives: (i) attend an institution of higher education, (ii) attend a vocational school and from there enter the work force, or (iii) attend a junior college and from there higher education (Fig. 3).

Agricultural education, training, and research are the responsibility of three different ministries in the Russian Federation: the Ministry of Agriculture and Food, the Ministry of Education, and the Ministry of Science and Technology Policy. Figure 4 shows the general structure of their system.

The Ministry of Education is responsible for the vocational education system, which has schools throughout the country. In the main agricultural areas, there are schools in most of the counties (rayons). The Ministry of Agriculture and Food (MOAF) and local authorities do exert some influence on the curricula, equipment, and funding of the agriculture components. Figure 5 shows the general structure of the education system beyond the general level and lists the number of different institutions. The Ministry of Education and the MOAF do have common programs for the training of vocational teachers.

During the 1980s, about 45% of the graduates of elementary agricultural vocational education obtained additional training at the vocational schools. The other 55% received additional training at the state and collective farms.

**SECONDARY PROFESSIONAL EDUCATION IN THE RUSSIAN AGRO-INDUSTRIAL COMPLEX**

The main function of the secondary professional education system of Russia’s agro-industrial complex is to prepare midlevel specialists. The MOAF has 286 secondary education institutions that are located in 71 out of 81 oblasts (similar to a state or province) of the Russian Federation, i.e., in all regions with developed agriculture. These institutions employ 12 300 faculty and enroll 270 000 students, including 98 000 part-time students, which are 36.3% of all enrolled students.
Fig. 3. Scheme showing the progression in the education system of the Russian Federation.
Fig. 4. Structure of the Russian agricultural science and education system.
Fig. 5. Structure of the Department of Personnel Policy and Education of the Russian Ministry of Agriculture and Food.
Specialists are trained in 39 majors, with 232 institutions specializing in agricultural (agronomists, livestock specialists, veterinary assistants, mechanics, and others), 19 institutions in construction, 16 in food processing, 12 in meat and milk, and 7 in hydro-melioration (irrigation and drainage) and land management. A deputy head for higher education, MOAF, for middle level education is responsible for the programs at the tekhnikums and colleges (Y. Lachuga, personal communication, 1999).

All agricultural education institutions have farms. The average size of these farms is 3000 ha, which is sufficient to provide for student practical training and produce agricultural commodities.

Of the 286 secondary institutions, 193 have tekhnikum status, which provide training for midlevel specialists of the base level. The other 93 have college status, which provide three levels of training. At the first stage of study, colleges prepare entry-level workers. At the second stage, they provide training for midlevel specialists at the base level (similar to tekhnikums), and at the third stage they provide training for midlevel specialists at the advanced level who are eligible to enter higher education institutions with a reduced term of study. As of September 1997, all tekhnikums and colleges train students according to the new government educational standards that take into account the requirements of a market economy (Y. Lachuga, personal communication, 1999).

RUSSIAN AGRICULTURAL HIGHER EDUCATION

A deputy minister of agriculture and food is responsible for the higher education programs in agriculture, which is composed of academies, universities, and institutes. Under the Soviet Union system, academies were the most prestigious of the higher education organizations; before 1990 there were two in the former Soviet Union—Timiryazev Academy and the Veterinary Academy, both in Moscow. Universities were of a somewhat lower status, but both offered graduate programs and had scientists who were doctors of science and members of the Russian Academy of Agricultural Sciences (RAAS). But the universities would have fewer programs and scientists with doctor of science degrees or who were members of RAAS. Academies would also have a wider array of course offerings. Institutes had fewer programs and fewer staff who had candidate and doctor of science degrees. Currently, there seems to be a change in the way academies, universities, and institutes are perceived; universities may be receiving increased recognition (P. Sorokin, personal communication, 1999).

In Russia, the candidate of science degree is comparable to the U.S. doctor of philosophy (Ph.D.) degree. The doctor of science degree is awarded after the scientist has been active for a number of years and prepares a dissertation based on their research, which is then judged by a committee of peers, and the candidate is passed or failed into the degree. The closest in the USA would be a fellowship in one’s professional society. All of these higher education institutions have the right to issue government approved diplomas to their graduates if the institutions possess state accreditation. All three have programs that conduct research and provide training in areas of science, engineering, and agricultural cultural practices. Training of students in the institutions of the MOAF is conducted in 9 areas and 68 specialties.

Currently (1998–1999), the Russian system of higher agricultural education has 37 academies, 18 universities, 4 institutes, 1 high school, 9 branch or satellite campuses, 11 research institutes, 60 research departments, and more than 2000 departments. There were 2 academies, 8 universities, and 60 institutes in 1993 (Y. Lachuga, personal communication, 1999).

Over the last several years, most institutes were renamed to academies and universities. Acquisition of the more prestigious name was motivated by hopes of a substantial increase in financial support from the government. At the moment, all of higher education is in a condition of severe financial stress as are other government agencies.

Change is indicated by the following reorganizations.

1. In 1994, combining the Omsk State Veterinary Institute and the Institute of Continuing Education with the Omsk State Agrarian University resulted in a reorganized Omsk State Agrarian University.

2. In 1996, the Novgorod State Agricultural Academy left the MOAF and became a division of Novgorod State University.

3. Saratov State Agrarian University was formed in 1997 by joining three Saratov agricultural higher education institutions: Saratov State Academy of Veterinary Medicine and Biotechnology, Saratov State Agro-Engineering University, and Saratov State Agriculture University (Y. Lachuga, personal communication, 1999).

Some believe that Russia has too many higher education institutions, including agricultural institutions, and it would be appropriate to combine some of them. At the same time, there is discussion in the regions on restructuring and some steps are being taken to expand local financial support. In addition, there is an opinion in the federal government that all higher educational institutions should belong to the Ministry of General and Professional Education. The MOAF resists this change, arguing that it would be difficult to account for the specific problems of agriculture, and to organize quality practical training for the students. Organization of such training is based on connections with local agricultural authorities and enterprises.

Many countries discuss whether or not there are too many institutions of higher education. There are 557 state and about 250 nongovernmental academies, universities, and institutes in the Russian Federation, with more than 3 million students. Russian law states that the state budget will provide funds for training in higher educational institutions for no less than 170 students for each 10 000 people. There are currently approximately 280 000 students enrolled in agricultural higher education institutions. However, the education level of the labor resources in agriculture is much lower than in other branches of the national economy. In rural areas, only 47 persons for every 1000 have higher education compared with 136 in the cities (Y. Lachuga, personal communication, 1999).

Traditionally, higher agricultural education is completed within 5 yr. Students are admitted to an institution on a competitive basis, after passing admission exams. The number and form of the exams are chosen by the institution from a list of general educational disciplines, approved by the Ministry of
General and Professional Education. Russian language exams are mandatory for all students.

The higher education curriculum is defined by state (national) educational standards for each specialty. The study of humanities, socio-economic sciences, natural sciences, general professional sciences, and special disciplines is stipulated in the standards. Each institution develops its curriculum on the basis of the standards. It is necessary to emphasize that schools have the right to independently introduce about 25% of the course work into the curriculum to take into consideration specific conditions and needs of the region. Higher education institutions develop the educational programs for each course after considering provisional programs recommended by the appropriate educational methodological associations (EMA) of colleges. Such EMAs are government–public organizations, which assist the state education agencies by providing methodological support for the educational process. For example, the EMA on agro-engineering education develops documents on methodology of education for specialists in mechanization, electrification, and automation of agricultural production and processing and others. Thus, institutions have substantial independence in determining their curriculum. Due to the development of market systems in Russia, institutions now emphasize economic sciences and include marketing, management, and other disciplines related to business in their curriculum. Strong economic preparation of the students helps them find employment after graduation. The educational institutions are only beginning to learn how to take responsibility for the preparation of their own curriculum.

The department of staff policy and education of MOAF actively assists in the introduction of new programs. Since 1993, designated institutions have introduced a multilevel education structure. This multilevel system stipulates preparation of students with bachelors and masters degrees in programs similar to those in the USA.

Russian institutions are involved in active revision, adoption and change of the curriculum. There has been a number of seminars, meetings, and workshops held in Russia and in the USA. They were conducted with participation and support of American universities, USDA, Agency for International Development, and other organizations. Other western countries carry out similar activities.

Higher education in Russia remains free-of-charge for most students. Tuition is charged to the students who have passed admission exams, but have not accumulated enough points to be admitted to positions financed by the government. The number of positions financed by the state is determined by the MOAF in cooperation with the Ministry of Education. The structure of admitted and graduating students has changed for the period from 1985 to 1996 (Y. Lachuga, personal communication, 1999). There has been an appreciable increase in the number of students graduating with economic specialties, and less significant increases in the number of students in the area of land management. There has been a decrease in the number of engineering students. The educational system has not yet fully become part of a market system, as the MOAF controls the number of students supported by the federal budget. The MOAF also sets student/faculty ratios (currently approximately 8:1). As a result of the quotas and ratios, individual institutions have little ability or incentive to be innovative and make adjustments to meet changing needs. However, colleges have an opportunity to admit tuition paying students and to train them in majors that are in increased demand.

Agricultural institutes employ more than 20 000 faculty, 55% of which have candidate of science or doctor of science degrees. Members of the Russian Academy of Agricultural Sciences also work in agricultural colleges.

CONTINUING EDUCATION

The major responsibility for continuing and professional education falls to the unit of Personnel Policy and Professional Education and Consulting, MOAF. At the current time the network of continuing professional education includes 5 academies and 4 branches, 43 institutes, 15 schools of management, 7 learning centers, and a research institute (Y. Lachuga, personal communication, 1999). The main functions of these educational institutions are retraining of administrators and preparation of their successors—managers, farmers, entrepreneurs, training crisis managers, and improving qualifications of other specialists. Students in these programs are taught marketing, pricing, taxation, business loans, banking, and auditing.

These institutes are mainly organizers of programs, they have small staffs and contract with the staff of institutions of higher education and the Russian Academy of Agricultural Sciences to teach the courses. These institutions are demand driven and do earn a significant portion of their income from fees for workshops and seminars. There is a requirement that the managers of the joint stock companies earn continuing education credits. If they do not, they can be terminated and if they do, they can earn increased salaries. The joint stock companies are the organizations that have developed after the state and cooperative farms issued stock certificates. In most cases, they are still operated in much the same manner as the previous operations, although some are beginning to adjust to a market economy.

Most of the continuing education institutions do have an advisory committee that provides guidance on the curriculum and courses that should be offered. The offerings are supposed to be revised annually. There have been assistance programs supported by several different countries and some good business and market economy courses and material have been developed. These institutions are also providing training for various businesses outside of agriculture such as banks. Each year these institutions educate approximately 145 000 people.

EXTENSION EDUCATION—TECHNOLOGY TRANSFER

Russia has no extension service as known in the USA or other western countries. Under the old system there was a well-developed system for working with the managers of the state and collective farms to pass information to the manager. But it was a chain-of-command system so the plans, goals, procedures, and expectations were issued from Moscow. As a result, there was no demand for information so individuals could make informed decisions. The emerging market system is beginning to place demands on organizations such as the MOAF. It will take some time for MOAF and other organization to adjust to these new expectations.
Table 1. A summary of the total agriculture higher education system under the MOAF (MOAF, 1997).

<table>
<thead>
<tr>
<th>Issue</th>
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<th>Russia</th>
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</tr>
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<td>Senior project</td>
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Table 2. A comparison of agricultural higher education in the USA and Russia.

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Various efforts are being made to meet this need. The teknikums (junior colleges), continuing education, and to a lesser degree the institutions of higher education have all begun efforts to provide extension type services. In addition, the World Bank has included funding for extension in one of its loans. All of these efforts are struggling. This is due to the lack of resources, a relatively small number of private farmers (the demand is still small) and the change from a top down to an individual decision making system, which takes time to begin to function.

Table 1 summarizes Russian higher education within the MOAF. It is a large multifaceted system.

**RESEARCH**

Russia has a diverse system for conducting agricultural research; the applied aspects are the responsibility of the MOAF and the basic the responsibilities of the Russian Academy of Agricultural Sciences. As shown in Fig. 4, these are the responsibilities of different ministries. A detailed description of the Russian agricultural research system can be found in the paper by Mudahar et al. (1998).

The higher education institutions also have a research function. Many of the more than 11,000 faculty with candidate or doctor of science degrees do conduct basic or applied research supported from the institution budget or by contracts. Most, if not all, of the institutions have experimental farms, often large in area. In addition, the universities employ 1858 scientists from the research institutes. With the difficult budget situation, many of the funds for research are no longer available. There are currently about 4000 graduate students studying at Russian agricultural higher education institutions. This is an increase of 50% during the last 5 yr.

**COMPARISON OF THE TWO SYSTEMS**

Table 2 presents a comparison of many aspects of the two systems and shows clearly that the two systems are very different and that the differences are due to a centrally planned system vs. a decentralized system (the first 7 of the 11 listed issues). In Russia, most of the issues were determined, and still are set, by the Russian Ministry of Agriculture and Food. In the USA, the role of the federal government in agricultural higher education is close to zero, with the control at the campus level but usually with state oversight. As a result, the U.S. system has greater diversity, innovation, and is more adaptable to local needs and problems.

When someone graduates with a Bachelor of Science degree in the USA and a 5-yr degree from the Russian system, the training appears to be comparable in the theoretical areas. The difference is in the application. The Russian students have had very little practical training. This is at least partially due to the differences in the systems links to research and extension. These links are very strong in the U.S. land-grant system, but since Russia does not have an extension system there are no links to extension. Because a large part of Russian agricultural research is located in the Russian Academy of Agricultural Sciences, the links to research are weak. There are some in the USA who believe that as the farm population decreases and there are fewer students with farm backgrounds, these linkages will grow weaker in the USA.

The Russian requirement of senior projects is an excellent teaching method. Some believe the U.S. system would be strengthened if a similar requirement were adopted in the USA.

Most people believe that the U.S. system has helped create one of the most productive agricultures in the world. This has been well-documented (Huffman and Evenson, 1993). A large part of the success has been credited to the U.S. science and education system and its decentralization. This would suggest that the Russian system might be strengthened with greater decentralization and that the USA should be very cautious about having more direct federal involvement in agricultural higher education. If the Russian system were to move more toward decentralization many steps and issues will need to be resolved, as there are many individual policies that would have to be addressed. In addition, it would take time to develop the local capability to deal with all of the details that decentralization would entail.

**SUMMARY**

The higher education system of Russia, unlike that of the USA, is still highly centralized, but is slowly adopting more of a market economy curriculum. Before the individual institutions can become innovative and responsive to needs they will need to be given more latitude to adjust and respond to the local and regional situations.
Individual institutions will need to be given more freedom to solve local problems and to develop programs suited to their situation. For this to happen a system of incentives will need to be developed rather than the disincentives that are currently in place. The disincentives include: student/faculty ratios set by the MOAF, MOAF allocation of funds based on the number of students and faculty, curricula being mostly determined by MOAF, and the lack of ability to assess tuition for all students. In the USA, all of these are determined by the institution. One important development that still needs to occur is for local authorities to begin to provide funding for the local higher education institutions.

Although the Russian higher education system has many issues that need to be addressed, they are providing the education and training needed to prepare students for working in a market-driven society where significant changes have and are occurring. To make the changes envisioned and needed, well-articulated cooperative programs with other countries should be helpful in assisting the Russian system adapt and change.

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