Wheat industry compared and contrasted between Russia and the USA

M V Shavanov¹,³ and I I Shigapov²

¹ Agrotechnological institute, the Chechen State University, Sheripova 32 Street, Grozny, 364907, Russia
² Technological Institute – branch of Federal State Budgetary Educational Institution of Higher Education «Ulyanovsk State Agricultural University», Kuibyshev 310 street, Dimitrovgrad, 433510, Russia

³ Email: Musa_Vahaevich@mail.ru

Abstract. Wheat is the most widely produced and consumed cereal crop globally. It belongs to the large family of monocotyledonous flowering plants that is called staple crop as it is grown in great quantities and provide more food energy globally than many other type of crops. This paper is focused on the wheat industry of two countries that are in the top 5 producers globally. Competitive strength in growing wheat of Russia and the USA are discussed in this article. Russia and the USA not only produce enough wheat every year for local consumption but also supply a substantial share of world wheat trade. The massive area, favourable environmental and soil conditions, improved high-yielding varieties makes the USA and Russia two of the leading countries in producing wheat worldwide. Socio-cultural perspective is one of the most important factor influencing marketing decisions and strategic goals of countries entering foreign markets. Consequently, social and cultural factors are compared and contrasted, which are of high importance to success in business of Russia and the USA.

1. Introduction

Wheat is a cereal grain of monocotyledonous plants belonging to the Poaceae (previously Gramineae) family [20]. While crops are in general are necessary nowadays to quell famine of the increasing population, Gramineae are an abundant and large family of monocotyledonous flowering plants, which is the most economically important family as the majority of the biomass produced in agriculture comes especially from monocotyledonous. Wheat, however, is the largest crop among cereals and the most widely grown commercial crop in the world amounting over 200 million hectares (table 1) [13; 14]. It is the most important food source globally for humans providing more nourishment than any other food source. This is because of its good source of protein, carbohydrates, minerals, vitamins and fats. It is the second most important food crop in the developing world after rice and the most globally traded one [7].

Table 1. Top crop area and production in the world [13; 14].

| Commodity   | Production (tonnes) | Area (hectares) |
|-------------|---------------------|-----------------|
| Sugar cane  | 1.907.024.730       | 1               |
| Wheat       | 214.291.888         | 1               |
Wheat has tremendously been diversified through mutation and hybridization, which resulted in the adaptation of the crop to different parts of the world by developing various genetic traits suited to a particular environment condition and agricultural practices. These are higher-yielding, heat and frost tolerant, insect and abiotic stress-resistant varieties [23]. Besides, wheat grain is easy to store and convert the grain into flour for making bread, pasta, noodles and other food product, which makes it a major diet component. The success of mainly wheat being used to produce food products also depends on a unique viscoelastic property of wheat gluten [18]. Consequently, it can be said that wheat is more competitive over other crops. It is most successful between the latitude of 30°C and 60 N and 270 and 40o S. However, there is also a potential for wheat to be grown beyond these limits, for example, in higher latitude areas near the equator. The optimum growing temperature is about 25°C, with minimum and maximum growth temperatures of 3°C to 4°C and 30°C to 32°C, respectively. However, wheat is also grown in some tropical countries where heat exceeds 32°C [23]. This is because wheat is adapted to a broad range of conditions, ranging from xerohytic to littoral. Most of the land area (three-fourths) where wheat is grown receives an average of between 375 and 875 mm of precipitation every year. In spite of this, wheat can be grown in most areas with precipitation ranging from 250 to 1750 mm. Optimal production requires an adequate moisture throughout the growing season, but an abundant availability of precipitation can cause yield losses driven by disease and root problems. Wheat cultivars of the widely differing pedigree are grown under varied conditions of soil and climate and show wide trait variations. Although wheat is being harvested in almost any given month globally. For example, in the Northern hemisphere harvest occurs between April and September, while in the Southern Hemisphere between October and January [7].

Wheat is classified into spring and winter with the latter being dominant globally. Winter wheat is sown in autumn and enters dormancy over the winter soon after developing into young plants. Such practice allows taking advantage of using autumn moisture, which eliminates the problems of limited spring and early summer moisture, along with effectively using early spring sunshine, warmth and rainfall. In cases when winter wheat is not able to endure the winter cold, spring wheat is planted. These regions usually have enough spring and summer moisture for spring wheat to be ready for harvest in the late summer. Winter wheat is usually prevalent in countries with mild winters. For instance, South Asia, North Africa, the Middle East and low-latitude countries [7]. Wheat is also used as a rotational crop to break disease cycles with other crops. In addition, it is used as a cover crop to protect and improve soil quality.

2. Relative competitive strengths of Russia and USA in growing wheat

Nowadays wheat is grown in most parts of the world. It is generally agreed that it was one of the first cereal grains to be cultivated. Cultivated forms of wheat were selected by farmers from wild populations based on their superior yield and other characteristics. Owing to its adaptability potential to a wide range of temperate environments, the spread of wheat across the world occurred. Being spread into Europe, Asia, Africa and America the crop became embodied into the culture. This could explain the religious significance of bread nowadays in various religions such as Judaism, Christianity and Islam [18]. It is special in several ways: its world trade is greater than for all crops combined; commercial production of starch and gluten; the raised bread loaf is possible because the wheat kernel contains gluten, an elastic form of protein that traps minute bubbles of carbon dioxide when fermentation occurs in the leavened
dough, causing the dough to rise. It is the best of the cereal foods and provides more nourishment for humans than any other food source [19]. It is a vital source of carbohydrate in Russia and the USA as well as in a majority of countries. These factors in combination with its other qualities, as mentioned earlier, and its unique viscoelastic property of gluten makes it a more successful crop compared to other temperate crops.

Today, Russia and the USA are the 3rd and 4th biggest countries respectively in producing wheat worldwide with the former’s production amounting to 72.1 million and the latter producing 51.3 million in 2018 (Figure 1). However, the annual average production of USA from 1992 to 2018 is higher, totalling to 59 million, while the Russian average for the same period only equals to 48.5 million (Figure 2). Figure 3 shows that during the 12 years from 1992 to 2014 USA had been producing more yield every single year, except the year 2002, 2009 and 2011 when Russia slightly outproduced the USA. However, from 2012 wheat production in Russia had been massively increasing, displacing the USA in 2014 to become the 3rd largest country in producing wheat [12].

![Figure 1. Top wheat producers in the world in 2018.](image1)

![Figure 2. Top wheat producers in average between 1992 and 2018.](image2)
2.1 Russian federation

In Russia, most rainfed agricultural activities are located between 40 and 60 degrees N latitude, which is the successful latitude for growing wheat. Annual precipitation ranges are 500 – 700 and 350 – 500 mm in the European and Asian parts, which according to the ratio of precipitation can be classified as excessively wet or wet. In the western part of Russia, the mean summer and winter temperature range between 20 – 24°C and -2 to -10°C respectively. The most agriculturally valuable major soil grouping – Chernozems – occupy about 94,000,000 hectares in Russia, which is only 6% of the land area. In addition, 160 million hectares (10% of the land) is occupied by the other four major soil groupings that are also favourable for agriculture. These are Fluvisols, Greetzems, Phaeozems and Kastanozems. These fertile soils and favourable climatic conditions cause this area to be suitable for growing spring and winter cereals along with other crops such as fodder crops, fruits and industrial crops (sunflower and sugar beet) [4]. Spring wheat is normally sown in mid-March through April when the soil conditions become optimal and harvested in the late summer. Despite that total area planned to grains in Russia is relatively stable, there has been a clear redistribution of area planted to the major grains. For example, winter wheat has become more widespread than spring wheat for the last decade. Until 2009, the majority of the wheat area was taken up by the spring crop, while now nearly 60% is under the winter crop. Also, winter wheat accounts for 91% of all winter crops, crowding out winter rye. Mild winters and climatic changes making winter-planted wheat more productive. It also believed that farmers are willing to grow a crop that brings more income, therefore choosing to plant higher-yielding winter crop, which has led to this expansion of winter wheat share in the total wheat production in the country [11; 1]. Furthermore, over the past two decades, Russia has managed to move from a net importer of wheat to a net exporter, displacing the EU to become the largest exporter in the 2016-17 marketing season. Wheat exports from Russia as a percentage of the global total have doubled since the 2013-14 (July-June). Higher wheat output and quality, as well as low production costs, have helped propel Russia to the top position among wheat exporters. There is intense competition for market share in the 2020/21 global trade arena due to abundant exporter supplies. Argentina, Australia, Canada, Ukraine, USA, Russia are the largest exporters of wheat, among which Russia and USA are the world’s leading exporters with 33.5 and 26.5 million tonnes respectively [11]. Roughly 70% of Russia’s wheat is classified as food-grade or milling quality wheat and 30% as feed-grade [10].
2.2 United states of america

Wheat stands 3rd among the field crops in the USA in value, production and planted area. Despite the regional climate difference across the country, wheat grows in a diverse range of climates and soils, thus growing in nearly every part of the country. Wheat distinct varieties and its classification into winter and spring allow it to be grown over different seasons in different regions of USA, with winter wheat yielding very well in the more humid and warmer sections of the country. This, however, may result in a broad variety of production cost, which, in turn, impacts on competitiveness of the crop over others.

There are optimal growing conditions in the USA for wheat and considering its importance in a human diet to grow wheat it is economically viable. This crop has many qualities which allow it to compete with other crops. Except all the features mentioned earlier, it is, for example, mainly grown for 3 reasons in Western Washington: as a secondary cash crop, as a rotation crop and as a cover crop [17]. Wheat is also an excellent source of feed for livestock, especially in years when weather conditions adversely influence on harvests and significant quantities of the grain quantities deteriorate in quality, which as a result becomes unsuitable for human consumption. In addition, such low-quality grain is often used by industry for alcohol production, to make adhesives and paper additives. Wheat is also grown intentionally for feed purposes in the USA.

Three main varieties are sown in the USA, which are winter wheat, spring wheat and durum. Winter wheat production constitutes 70-80 percent of total U.S. production, or 1,100 million (about 30 million tonnes) to more than 1,800 million bushels (49 million tonnes) [6]. According to Prechter and Currie a bushel of wheat is a unit of volume equal to 60 pounds of wheat [8]. In the Northern Plains winter wheat plantings are limited due to winters are harsh, and spring or durum varieties are favoured. Spring wheat composes about one-quarter of total U.S. wheat production, or 400 million (10.8 million tonnes) to over 600 million bushels (16.3 million tonnes). Durum wheat only accounts for about 75 million bushels (2 million tonnes), which equals to 3-5 percent of total U.S. wheat production. It is much smaller in production compared to other two varieties of wheat. From figure 1 it can be seen that in 2018 the USA produced about 51.3 million tonnes of total wheat, positioning itself as the 4th largest country in wheat production globally. The three varieties of wheat mentioned earlier can be further disaggregated into five major classes, which are hard red spring (HRS), hard red winter (HRW), soft red winter (SRW), white wheat (both winter and spring), and durum. Each class is grown for different purposes, and production tends to be regional-specific. For example, HRW and HRS account for the most production, about 40% and 20% respectively. HRW is mainly grown for bread flour in the Great Plains (northern Texas through Montana) while HRS is valued for its high protein levels and mostly grown in the northern Great Plains states (North Dakota, Montana, Minnesota and South Dakota. The rest 40% of the total production is accounted for SRW, white wheat and durum. The latter, however, is the least grown wheat class (about 3-5%), which is primarily used in pasta production [6]. Most durum is grown in the northern Great Plains, primarily in North Dakota and Montana.

The USA is one of the leading exporters of wheat to other countries around the globe albeit it produces only about 7% of the world’s wheat. It is the 2nd largest country in exporting wheat, flour and wheat products in terms of export volume, after Russia, and has been stable at this position over the last several years. During the 2018/19 about 27 million tonnes of wheat was exported by the USA while the output of wheat worldwide in the same marketing year was 179.5 million tonnes. [6].

3. Wheat prospects in the future

With a predicted world population of 9 billion in 2050, the global demand for wheat is expected to increase by 60% with an annual yield rise of at least 1.6% [14]. Hoisington predict a much larger number of future population by 2050, which is nearly 12 billion [16]. Alexandratos and Bruinsma propose their projections to be slightly higher of 10 billion [1]. The world will experience a substantial increase in the number of inhabitants whether it will be 9, 10 or 12 billion. At the same time, the means of production such as natural resources are dwindling along with changes in climate that most likely detrimentally affect the production. Consequently, it is a global issue of food security with a common need for all countries to contribute into addressing today’s most pressing challenges such as increasing wheat
consumption, climate change and depletion of natural resources [14]. Considerable improvements have been made for this crop from genomics to agronomy up to this point, but still, the yield growth is believed to be continued as it is considered to be the major route to meeting future global demand for food, fuel and feed [13]. Improved farming practices, irrigation, improved varieties and modern inputs are the practices from which the world agriculture’s production is derived until now. The future world agriculture’s production is expected to be derived for the same practices. It is also suggested that the potential for different approaches to further increase the production of wheat, its quality and sustainability worldwide need to be identified [14].

Wheat annual yield gains would have to rise by 87% -110% to meet an increasing global demand driven by growing population. Yield increases is predicted to be gained on, essentially, the same land area with less water, nutrients, fossil fuel and labour. While it is predicted a persistent increase in average wheat yield globally, it is believed that due to climate change, crop failures and shortage of natural resources there will be a continuous drop for the next 30 years [25; 26]. The annual potential yield for wheat progress at present is about 0.5% and the yield gap is 40%, which implies that farm yield currently can be increased up to 40%. Such a gap between attainable yield (AY) and farm yield (FY) exist due to various limitations ranging from infrastructure to institutions. Farm gate cost and prices, farmer skills and attitudes to diverse technical restrictions also can contribute to a reduction of FY thereby increasing the existing yield gap. Consequently, there is a prospect for improving the FY by diminishing the current gap yield. Here are the following ways to do so:

- Improving the efficiency of utilisation of solar radiation, which, in turn, may result in greater biomass production [13].
- Converting unarable land into arable using soil management practices [25].
- Breeding is one of the practices that will be of utmost importance in the 10 to 40 years in meeting the future increasing demand for wheat. Altering plants genetically for higher yield is a very promising approach in meeting global food demand [16; 25].
- Yield improvement is the main prospect in the world. Many type of research most likely to be taking place in the future trying to find various ways to increase wheat yield. In one of the researches carried out by Bassu, higher and better quality yield is tried to be achieved by introducing triticale high yielding traits into the wheat model. The study inferred that triticale traits may result in better adaptability of wheat to the current and future climate change scenarios. Also, the study shows a positive result for the low and high yielding environments such as Mediterranean-type environments of Western Australia wheat-belt and Italy [3].
- Harvest index and grain weight are another 2 prospects for deriving more yield from. In some countries though such as China, harvest index and grain weight reached their theoretical maximum and the future improvement in wheat yield are rather seen in biomass production and grain number [24].

4. Compare and contrast the cultural factors which are of importance to success in business in Russia and USA
People are an integrated part of a business, therefore their culture is a fundamental aspect of a business that impacts on the bottom-line results. Having enough cultural sensitivity in business may affect how well corporate goals can be achieved. It helps the businessmen to understand the multiculturalism of an organisation. These are established beliefs, values, traditions, attitudes, behaviours, laws, practices and languages of a group of people working at a company or the society within a country the business is conducted [21; 9]. Every culture differs from others by the specific solutions it chooses to certain problems, thus exploring a particular culture will also help to understand what particular aspects of management mean in various cultures [22]. The differences between the cultures exist not only internationally but also within a country. For example, there are as many differences between the cultures of the west coast and east coast America as there are between different nations. National culture can comprise a so-called subculture, which in turn, contains particular values and beliefs. Texan and
New Yorker can be exemplified because people from states see themselves very different from each other [21]. Russia is also a multicultural country with various ethnic groups existing within a state. However, as opposed to the USA, the Russian ethnic group comprise 80% of the population making it thereby less culturally diverse than the USA [5]. One can exemplify the businesses such as McDonald’s and Coca-Cola which are becoming common to the world market, and highlight the fact that variables such as product, technology and market are much more of a determinant than culture is. However, the adequate question to ask here is not what these variables are but what they mean to the people in each culture. For example, although many people in both USA and Russia enjoy eating McDonald’s, in Moscow McDonald’s is perceived as a show of status while in New York it is fast food for a fast buck. Consequently, culture ignorance may result in failure for a company. A great example can be seen in American’s business Wal-Mart’s failure in Germany due to the culture being ignored along with the structural business elements such as pricing and severely restrictive zoning [22].

There are seven cultural dimensions identified in the literature that account for nearly the entire range of the behaviour one can encounter [21; 9; 22]. These dimensions are the following:

### 4.1. Hierarchy and egalitarianism

This cultural factor is the one that defines how individuals view authority and power. In the hierarchical system workers shows formality and respect to authority. People in authority can be seen as leaders providing guidance for employees. This cultural factor is important to know for a businessman in order not to make the same mistake as Wal-Mart made in Germany. American egalitarian approach of constant smiles to German hierarchical customers was perceived as intrusive and presumptuous. On the hierarchy/egalitarianism scale of 25 scores with the highest indicating hierarchy, America falls into 10-13 points, while Russia scores 14-17. It means that the authority of a business may want to interact more formally with Russian customers compared to American ones [21].

### 4.2. Group focus

This cultural factor describes the issues of individualism versus collectivism, implying that in different countries people define themselves as a part of a group or by individual responsibility. Russian culture scores considerably lower on individualism than do USA, 14-17 and 5-9 respectively where the lowest indicates individualism [21]. In the individualistic society distinctiveness and uniqueness is encouraged and rewarded, while in the group societies the group values, identity and achievements are prioritised. Individualistic cultures teach people individuality, optimism and self-reliance, therefore they are most likely to prefer to work and spend time alone and focus on their individual roles when working in a team. Collectivistic cultures, however, teach certain skills and virtues that are necessary to participate in a group. Also, it teaches that the best way to succeed is through group efforts. As a result, learning is often seen as an adaptation process for youngers, because they need to learn to be a member of a group [15; 21].

### 4.3. Relationships

This factor highlights the importance of building extensive connections and developing trust and how central relationships are as a prerequisite to working with someone. The USA is one of the most transactional countries with Russia following up along with other European countries. In these countries, especially in the USA, there is no need to establish relationships with colleagues before they do business. People are just keen to do the business and, in fact, during the work, people bond to each other quite easily as having a common task to do. However, it may not mean anything outside the work environment. Russia, same as the USA lean towards transactional culture, although not as much. Consequently, it is vital to be aware of how people, that do business together, perceive the relationships between them [21; 9].

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4.4 Communications styles
The way a society communicate provides remarkable insights into the way it thinks and the way it conducts business. The USA scores 10-13 point on the scale while Russia a bit more, 14-17, with the lowest score implying a country being direct in communication. People from the direct cultures usually express an explicit brief verbal message and even express disagreement openly without being considered impolite. In indirect communication cultures, however, such a way to convey a message may be considered disrespectful. It is extremely important to understand this factor, because the polite way conveying message in the USA may not be perceived in the same level of politeness in Russia [21; 9].

4.5 Time orientation
It emphasizes the fact that cultural perception of time differs across the countries. It is a degree to which people differ in managing their time, schedules, adhering to agenda and deadlines. USA value time so highly that it scores the highest score of 22-25 on the scale. Time is money in this culture and for individual task devoted a particular amount of time. Russia stands in the middle on the scale scoring between 14 and 17. In this country, people place less emphasis on meeting and schedules and perceive relationships more important than keeping up with time [21; 22].

4.6 Change tolerance
This dimension gives the idea of whether people of a particular culture accept change as an opportunity or threat to be avoided. Also, it indicates whether people feel comfortable when changes occur in the workplace. The USA is in the middle on the scale falling into 14-17 scores while Russia is slightly lower on the scale scoring 10-13, with a low and high score indicating change-averse tolerant respectively. Low scoring countries see a problem in a change and thus, feel more safe and comfortable within a constant environment. In contrast, cultures that are change tolerant perceive change as a necessity for success, therefore feeling more comfort in an environment with a constant change. In this case, the USA is more change tolerant than Russia [21; 22].

4.7 Motivation – work-life balance
The last dimension measures whether people are driven by personal achievements, self-fulfilment and status at work or they valued personal time and activates more. USA culture is the highest scoring 22-25 along with China and Japan, implying that people of these cultures are motivated by achievements and status. Russia, in comparison, scores considerably less, 14-17. It means that Russian culture prioritises personal life overwork more than USA [21].

5. Conclusion
Wheat is one of the most important staple food crops of global food and nutritional security. The demand for wheat has been increasing substantially with the increasing human population pressure. Ease of grain storage, its agronomic adaptability, unique viscoelastic properties and the simplicity of altering grain into flour for making edible and palatable foods make wheat a major diet component in majority of countries. Russia and the USA are in the top 4 countries in producing wheat in 2018 and the world’s leading exporters. The massive area, improved high-yielding varieties, favourable environmental and soil conditions, fertilizers, pesticides along with wheat being diversified makes USA and Russia difficult to over compete by other countries. During the 26 years period from 1992 to 2018 Russia produced an average 48.5 million tons of wheat on average area of 24 million ha at average productivity level of 1.8 t/ha, while the USA produced an average 59 million tons on average area of 22 million ha at an average yield level of 2.9 t/ha. These two countries substantially contribute into world wheat production but for the constantly growing population there is an increasing demand to grow more, therefore there is a need to move the U.S. and Russian wheat industry forward in a stronger direction. Also, one must remember that cultural factors of the USA and Russia discussed above have been conceptualised based on generalisation. Thus, it is not fair representation of all people of these countries because individuals are different, and stereotypes can be misleading.
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