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Market survey of traditional rice varieties traded at Great Silk Road Bazaar in Osh, southern Kyrgyzstan

Master's thesis

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Supervisor:

Vladimír Verner

Author:

Petr Vopěnka

Declaration

I hereby declare that this thesis entitled **"Market survey of traditional rice varieties traded at Great Silk Road Bazaar in Osh, southern Kyrgyzstan"** is my own work and all the sources have been quoted and acknowledged by means of complete references.

In Prague, 22 April 2016

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Petr Vopěnka

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Abstract

Thesis documented the trade with traditional rice varieties at the Great Silk Road Bazaar in Osh city, representing regional market hub for southern Kyrgyzstan. A total number of 30 vendors participated in our survey. Interviewer-administrated semi-structured questionnaires were used in order to document traded volumes, stocks, prices and origin of documented rice varieties as well as demographic and socio-economic characteristics of vendors. Descriptive statistics such as percentages, means, and standard deviations were used to describe the sample on the various variables. Furthermore, Pearson correlation was applied to identify potential relations between main variables. Eight national varieties and three international varieties were identified during this research according to their market names. Results showed that the highest traded volume was from Uzgen region (33.02 %), followed by Jalal-Abad and Batken provinces (both 17.13 %) and Aravan region (17.10 %). Domestic rice varieties were sold for higher price and with higher trade volumes in comparison with imported ones, very probably because of strong tradition and culture. We identified high number or vendors selling rice without significant difference in retail prices that revealed aspects of perfect competition, which is typical for food markets and rural markets in developing countries. Consequently, we supposed that price was not decisive factor for consumers to buy certain amount of rice. Generally, vendors had limited storage capacity at the bazaar, and thus they had minimal stock of rice. All stalls were supplied via middleman two-three times per week. We identified positive correlation between daily traded volume and supply frequency per week (r=0.5859; p-value=0.001). It suggests that vendors with higher daily trade volume have to increase supply frequency instead of increase of a total stock due to limited storage capacity of the stalls. We documented annual price and demand fluctuations based on the vendors' opinion. Maximal value of price was identified from June to July and minimal value from September to October. Both peaks were influenced by harvest period in September. Than maximal demand was identified in July and September. The peak in July was caused by Ramadan which significantly pushed demand for rice up and the second peak was influenced by price which is at minimal value in September.

Key words: market survey, traditional rice varieties, vendors, Osh province, Kyrgyzstan.

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1   INTRODUCTION

Rice (*Oryza sativa* L.) is generally considered as annual grass which is grown worldwide. It is a nutritious grain crop which contains carbohydrates, proteins, lipids, minerals, etc. Rice represents major food crop in the world and is the most important crop according to the value of production (FAO, 2014). Rice is produced in a wide range of locations and under a variety of climatic conditions, from the wettest areas in the world to the driest deserts (OECD, 1999; McLean et al., 2013).

Figure 1 Rice, *Oryza sativa* L.

Source: Gnanamanickam (2002)

This study was carried out to document trade of traditional rice varieties traded at the Great Silk Road Bazaar in southern Kyrgyzstan. The bazaar is recognized as open-air

market which is located in Osh city, the second most populated city in Kyrgyzstan. Furthermore, the bazaar is considered as a market hub for the whole region.

Nowadays, rice is considered as one of the most important food crop worldwide and represents the most important crop according to value of production (FAO, 2014; Nasrin et al., 2015). Besides, rice has the highest contribution to human nutrition, especially in low and low-middle income countries in south-east Asia. World rice production increased more than two fold over last five decades due to genetic advances and agronomic improvements (Ando et al., 1997; Khush, 2005; Zeigler & Barclay, 2008; Godfray et al., 2010). Many authors have stated that the world food production would have to grow significantly to secure adequate food supplies for growing world population. The solution how to achieve this goal is to develop and disseminate improved varieties providing farmers with significantly higher yields and more resistant production under worse environmental conditions in comparison with traditional ones. (Khush, 2005; Godfray et al., 2010; McLean et al., 2013). Consequently, the majority of world rice production is created by production of improved varieties which are cultivated all around the world and traditional varieties are disappearing to the detriment of them. It negatively affects biodiversity, traditional knowledge, and cultural heritage.

In case of Kyrgyzstan, rice is not so important for food security such as in south-east Asian countries (Khush, 2005; Godfray et al., 2010; Nesbitt et al., 2011; Caccavale et al., 2013). This is typical for regions such as Central Asia, where rice has strong traditional and cultural importance. In these countries, including Kyrgyzstan, rice represents important part of the local culture, therefore, rice should not be perceived only as the staple crop destined for consumption. In the past, rice was commodity for Kyrgyz household with higher incomes and commonly used during special occasions such as weddings, funerals, etc. But in recent times, rice has established its place as a daily food commodity in Kyrgyz households across all regions and social groups (Zanca, 2003; Smanalieva et al., 2015).

Rice production in Kyrgyzstan is concentrated in the southwest of the country, at the end of the Ferghana Valley, which is considered as the most appropriate agricultural land in Kyrgyzstan with respect to soil fertility, water accessibility, and landscape profile in comparison with the rest of the country. Kyrgyz agriculture has undergone

changes after the disintegration of the Soviet Union which led to decollectivization and individualization of agricultural land. Particularly, agriculture in Kyrgyzstan stopped to be centrally planned by the Soviet Union which kept Kyrgyz agriculture focused on high-value crop instead of food crops which were imported from abroad. However, the collapse of international trade after the disintegration of the Soviet Union forced Kyrgyzstan to deal with the issue of food security at the national level. Consequently, Kyrgyz domestic rice production and consumption increased significantly over last two decades (Mathijs & Swinnen 1998; FAO, 2013).

2   LITERATURE REVIEW

2.1 Rice as a human diet: A dawn of the clash between traditional and improved varieties

More than half of world population depends on rice consumption and in many countries contribute to reach food security at national level, the issue which is globally discussed in conjunction with the permanent population growth (OECD, 1999; Dawe, 2001; Döös, 2002; Nguyen & Ferrero, 2006; FAO, 2009; Godfray et al., 2010; Wegner & Zwart, 2011; McLean et al., 2013). The world production of rice increased more than two-fold over last five decades, whereas the total arable land increased only by nine percent in the same period. That increase was achieved due to genetic advances and agronomic improvements that led to significant growth of rice yields worldwide (Ando et al., 1997; Godfray et al., 2010; McLean et al., 2013). Many authors have stated that the world food production would have to grow significantly to secure adequate food supplies for growing world population (Khush, 2005). Even in the case of rice, additional 40 % increase in production to feed five billions people depending on rice consumption in 2030 is expected (Khush, 2005). The solution how to achieve this goal is to develop and disseminate improved varieties providing farmers with significantly higher yields and more resistant production under worse environmental conditions in comparison with traditional ones.

Nevertheless, adoption of improved varieties at massive scale leads to replacing numerous traditional crop varieties. Higher food security was redeemed by serious genetic erosion, higher dependency of farmers on inputs providers, higher expenses on fertilizers (Lu, 1996; Qualset et al., 1997), decreasing biodiversity and disappearing of traditional knowledge and cultural heritage (Zhu et al., 2003; Giuliani et al., 2009; IRRI, 2012).

2.2 Economy of rice: From subsistence to trading and promising exporting article

Instead of nutritional importance, rice considered as one of the most important crops worldwide also for its economic potential, especially in low and lower-middle income countries (Dawe, 2001; Timmer & David, 2007; McLean et al., 2013). Global rice market constitutes monopolistic competition which is typically quite thin and is characterized by a small number of exporting countries trying to satisfy the demand of a large number of importing countries (McLean et al., 2013; John, 2014). Notwithstanding the global increase of rice production, it is commonly destined for self-consumption in the country where is produced. Actually only about seven percent of world production has being internationally traded (McLean et al., 2013; Rezitis et al., 2015). The narrowness of the world rice market have negative influence on stability of world rice price because each of the countries exporting rice can significantly affect the prices in the world market. Price instability, thus potential increase of rice prices, can cause serious problems for rice consumers in low and low-middle income countries, the majority of rice consumers particularly in developing countries. Timmer & David (2007) points out the importance of food price stability in context to the case of Indonesia in 2005, where sharp increase in rice prices pushed 4 million people below the poverty line (Dawe, 2001; Timmer & David, 2007; Seck et al., 2012; McLean et al., 2013; Kavallari et al., 2014).

In general, rice production leads to surpluses traded at local markets or it is even purposively produced as a unique exporting article. Particular local agricultural markets are places where improved varieties meet traditional varieties produced nearby.

2.3 Rice traded at local agricultural markets

Generally, agricultural markets have been recognized as places of connection between supply, represented by producers and vendors, and demand, represented by consumers. Markets also create demand for wide array of supporting services, which are closely connected to functioning of markets. Thus, markets do not generate income only for

producers and sellers, but also generate income for other players involved in a market-chain (Bye & Linares, 1983; Martin, 1992; Kaminski & Saumya, 1999; Cunningham, 2001; Marocchino, 2009). Socioeconomic role of markets in developing countries is indisputable as well.

Figure 2 A vendor sells domestic and imported rice varieties at Osh bazaar in Bishkek city, northern Kyrgyzstan
Source: Noriko Hayashi (2012)

These markets represent a significant source of employment and create employment opportunities particularly for women who otherwise could likely be unemployed. Furthermore, local markets provide a way to introduce products of domestic producers to potential domestic or foreign consumers at minimum costs (Kaminski & Saumya, 1999; IFAD, 2003; Dhur, 2008; Robinson, I., 2008). Moreover, markets should be also perceived as very important places for the daily life of people from nearby areas for meeting, exchanging or sharing their knowledge, ideas, habits and traditions related to their livelihood, which is very often linked to agricultural issues, natural resources use and food habits. Thus, they represent a very valuable source of information on traditional knowledge on local products utilisation among different cultural and/or

social groups (Bye and Linares, 1983; Martin, 1992; Alexiades & Sheldon, 1996; Cunningham, 2001; You-kai, 2004; Vlkova et al., 2015).

2.4 Rice in Kyrgyzstan: From field to spoon

However with a focus on Kyrgyzstan and its neighbouring countries in Central Asia, rice significance for food security is not as high as in south-east Asian countries such as China, Malaysia, Vietnam or Bangladesh (Godfray et al., 2010; Nesbitt et al., 2011; Caccavale et al., 2013) because the real value of rice for Kyrgyz is rooted in history and food culture. In the past, rice was the commodity rather for rich people and was used for special occasions such as weddings, funerals. Therefore, rice should not be perceived only as the staple food destined for consumption but as part of the local culture. Nowadays, rice occupies its place as a staple food for all Kyrgyz households and all dishes from rice are still prepared and served in accordance with old-established patterns and still maintains their traditional and cultural importance (Smanalieva et al., 2015). About 85 % of the agricultural land of Kyrgyzstan is used for the production of main crops such as wheat, maize, cotton, and rice (Abdulhamidov & Baanante, 2003). Agricultural land of Kyrgyzstan is characterized by significant regional differences in water resource availability and quality of soil (Aldaya et al., 2010). Rice is planted particularly in the south-western part of Kyrgyzstan, which is the area with the highest concentration of intensive rice agriculture because it is located at the end of the Ferghana Valley which is considered as the most appropriate agricultural area with respect to the landscape profile, soil fertility and water accessibility in comparison with dryer mountainous characteristics for the rest of the country. Actually, all national rice varieties are cultivated in this area (see Figure 2), mainly in the southern part of Jalal-Abad province (1), Uzgen region (2), Aravan region (3), and in the northern part of Batken province (4) (Dhur, 2008).

Figure 3 Rice field in Kyrgyzstan

Author: Vladimír Verner

Figure 4 Map of rice cultivation areas

In the past Kyrgyz production of rice was decelerated by the fact that Kyrgyz agriculture was centrally planned by the former Soviet Union till 1990 which kept Kyrgyz agriculture focused mainly on high-value production instead of production of staple crops which were imported from abroad. However, disintegration of the Soviet Union which led to the collapse of international trade forced Kyrgyzstan to deal with the issue of food security at national level. It resulted in a partial switch of crop patterns from high-value crops to staple crops such as wheat, rice, potatoes etc. in order to decrease dependency on imported rice. Similarly, it has become a priority for other post-Soviet Central Asian countries such as Uzbekistan, Turkmenistan, and Tajikistan (Aldaya et al., 2010). The independence of Kyrgyzstan led to the decollectivization and individualization of agricultural land which was previously owned by the state. Agricultural land was subdivided and allocated to individual farmers which acquired full property rights. Nowadays, farmers have decision making power at the farm level. As for instance, they can sell or rent their fields, or use land as collateral for credit. Consequently, they can liberally decide which crop they will cultivate. Akramov & Omuraliev (2009) claim that individual farmers are able to cultivate arable land more efficiently per unit in comparison with collective and state farms before the disintegration of the Soviet Union.

The change of agricultural orientation to production of food crops led to significant growth of agricultural land used for rice production in Kyrgyzstan. The annual growth of cultivated area with rice between 1993 and 1997 was 26.91 % on average and the total area cultivated with rice increased on 6,100 ha in 1997 compared with 1,900 ha in 1992. Thereafter, the total area slightly fluctuated without significant change compared with 6,289 ha in 2011. In the last years, there was an increase on 7,160 hectares in 2012 and recently data published by FAO showed an increase on 7,904 ha in 2013. (See Figure 4) (Abdulhamidov & Baanante, 2003; FAO, 2014)
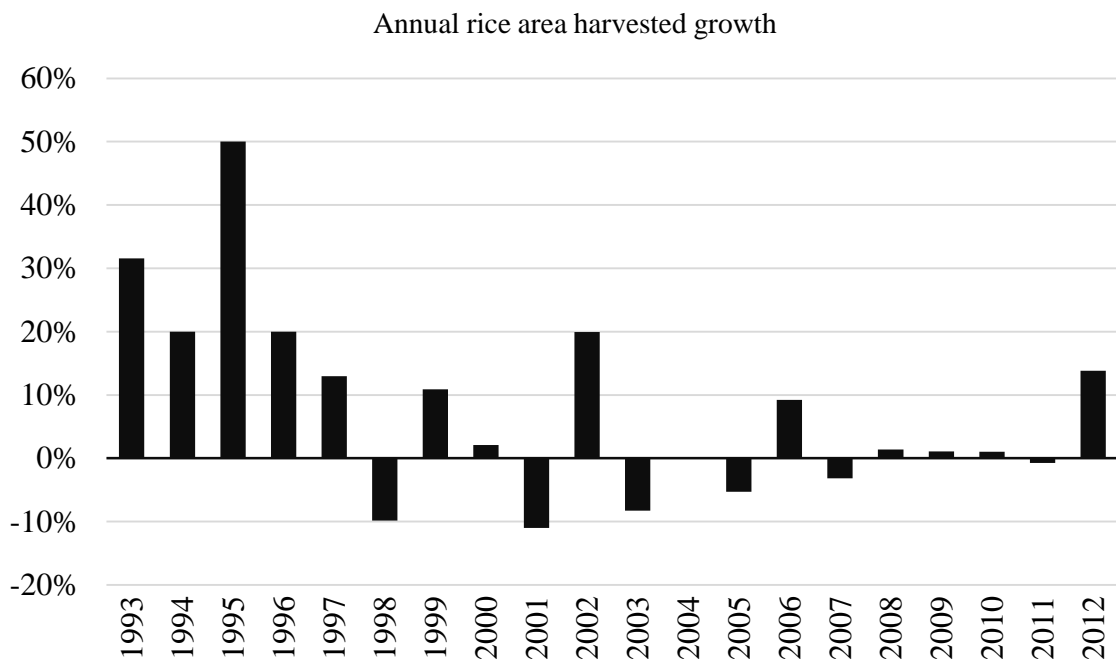
Annual rice area harvested growth

Figure 5 Annual growth of cultivated area with rice in Kyrgyzstan

It is suggested that above mentioned rice cultivated area growth had the most significant influence to fast growth of Kyrgyz rice production in last decades but production growth was to certain extend influenced also by development of farming system in Kyrgyzstan such as specialization, agronomic improvements etc. which positively influencing agricultural efficiency and thus an average yields of rice fields (Ando et al., 1997). Whereas Kyrgyz annual domestic rice production increased from 2,800 tonnes in 1992 to 20,811 tonnes in 2002, and finally to 27,220 tonnes in 2012. Kyrgyz rice production has increased approximately ten-fold from initial value in 1992 while the rice production of neighbouring countries went down. Such as Kazakhstan which rice production decreased by 26.27 % or by 77.08 % in case of Uzbekistan from initial volume in 1992 (FAO, 2013b). Nevertheless, despite the steep growth Kyrgyz production does not reach production levels its neighbours. According to the last official data published by FAO (2013b) for 2013 the Kyrgyz production get about 7.91 % of Kazakhstan production, 22.04 % of Uzbekistan production, or 27.78 % of Tajikistan production. It refers that Kyrgyzstan is not becoming rice producing power but rather it refers to increasing local importance of rice.
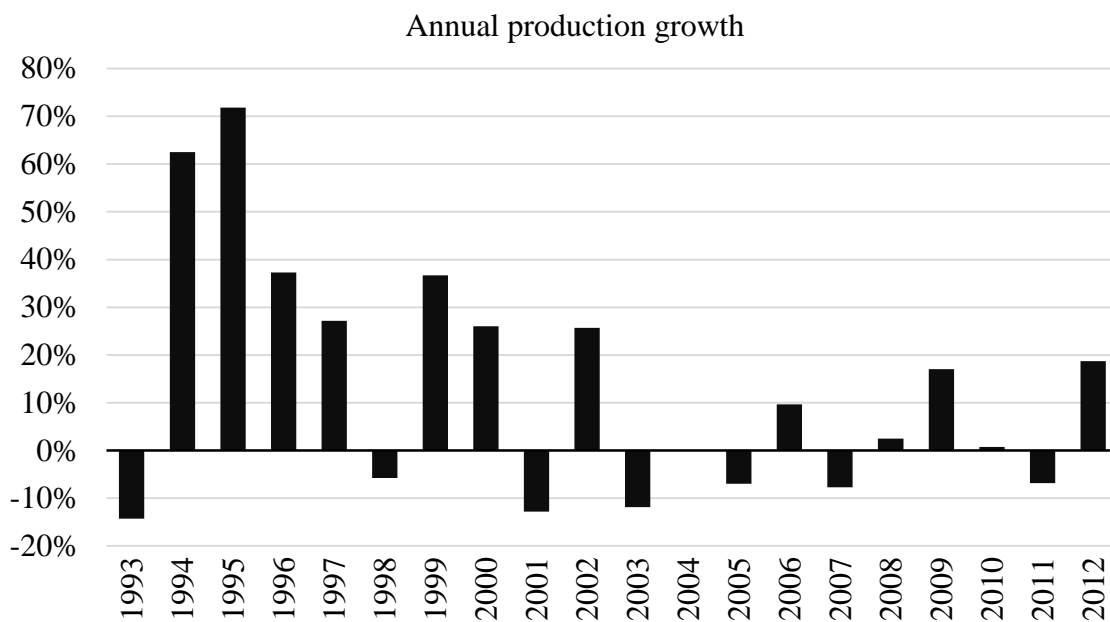
Figure 6 Rice production growth in period from 1992 till 2013 (FAO, 2013b)

Generally, self-sufficiency at the national level has become the hot issue in Kyrgyzstan especially after the disintegration of the former Soviet Union. Up to these days, Kyrgyz production was focused mainly on high-value crop production and basic crops were imported from abroad. Therefore, imported varieties represented approximately 70 % of a total rice supply in Kyrgyzstan in first years after gaining of independence (see Figure 4). In following decade dependency on imported rice had decreasing trend with peaks in 2001 and 2004 when imported rice represented only approximately 5 % from domestic supply. But sharp growth of domestic rice demand which Kyrgyzstan is not capable to satisfy only by domestic production, despite significant growth of Kyrgyz production in last two decades, pushed again Kyrgyzstan to dependency on import which represented 58.06 % on average in period from 2008 to 2012 (Figure 4, Figure 3) (FAO, 2013a; FAO 2013b). According to the latest data from FAO (2013c) from year 2011 the majority of imports came from Kazakhstan (56.71 %) and China (40.09 %), remaining 3.2 % represented imports from the Russian Federation (1.49%), the United States (1.39 %), India (0.24 %), Pakistan (0.14 %), Uzbekistan (0.02 %), Thailand (0.01 %), and Turkey (0.01 %) (FAO, 2013c).
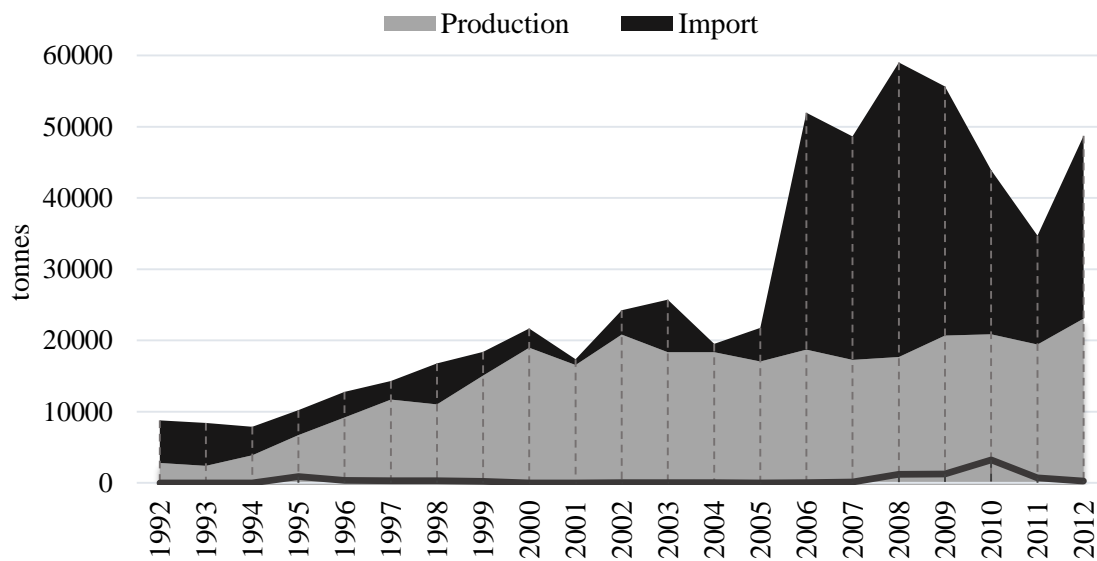
Figure 7 Total supply of rice in Kyrgyzstan in period from 1992 to 2011 (FAO, 2013a; FAO, 2013b)
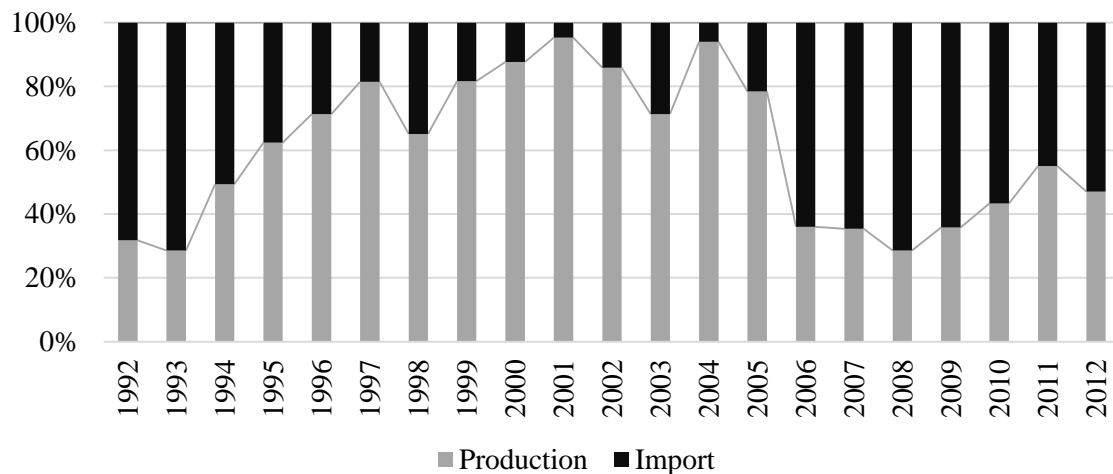
Figure 8 Total domestic supply: import and production ratio (FAO, 2013a; FAO, 2013b)

Important part of Kyrgyz rice production is traded at local bazaars. History of bazaars in Central Asia is very long and goes back to the times of the Silk Road. At those times, present area of Kyrgyzstan posed the main crossroad for the merchants streaming from the western Asia to the Middle East and their role remained important even during the middle ages and the era of Russian Empire. However, during communism, bazars were exploited as a tool for introducing production of the kolkhozes to the market in Soviet

times. The new flourish come after the disintegration of the Soviet Union and collapse of central planning economy in conjunction with the liberalization of agricultural markets and rehabilitation of traditional way of life (Akramov & Omuraliev, 2009; Kaminski & Saumya, 1999). Awaken traditions brought back dishes, which are typical for the region of Central Asia, including Kyrgyzstan. The main dish prepared from rice in Kyrgyzstan is *pilov.* The name *pilov* origins from Persian (<*pīlav)* or maybe even earlier and was probably derived from Turkic name for millet *pilaaka* (Timmer & David, 2010). *Pilov* has always been very important food for special occasions as circumcisions, weddings, memorial feasts and other large feasts (Nesbitt et al., 2010, Mack & Surina, 2005). Over time *pilov* also gained its place in family menus as a common dish which families eat once a week as a sign of the well-being within the family (Zanca, 2003; Nesbitt et al., 2010). All ethnics living in Kyrgyzstan are very hospitable and very frequently they invite unknown persons into their dwelling, regardless of guest's nationality, religion, political orientation etc. This act wage in the way that host sits with guests in place where host's family normally eat. The tablecloth called "*dastarkhan*" is spread in the middle expressing time and place to eat in a way of old-established custom which is very important from cultural point of view (Zanca, 2003; Mack & Surina, 2005). *Pilov* is usually main served course, among many kinds of food such as fruits, vegetables, candies, local bread and other food, which is all ordinarily brought by woman or children. Serving food, especially *pilov*, expresses the host's respect to the guest. Accordingly, *pilov* is perceived as the symbol of hospitality. During special events like weddings, *pilov* is served for almost three hundreds guests and it is prepared in huge cauldrons under the supervision of village chefs, whose are always men (Zanca, 2003). Over time, *pilov* was spread to different countries all around the world and is served in European countries, Russia etc. *Pilov* is originally prepared from carrots, onions, cottonseed oil, beef or mutton, salt, saffron or cayenne, and short-grained rice (Zanca, 2003), but ingredients may vary depending on season and region where *pilov* is prepared. Zanca (2003) argued that there is more than two hundreds variations of *pilov* within Uzbekistan, and Nesbitt et al. (2010) argued that there is even more than four hundreds variations and also point out that every ethnic group is proud to their own style of *pilov*, especially in case of festivals for which *pilov* is quite often prepared for large number of people.

3   OBJECTIVES

The aim of the study was to document and analyse trade with rice varieties at Great Silk Road Bazaar in Osh city, in southern Kyrgyzstan. The research documented which rice varieties were traded, what was their geographical origin, estimated their trade volume, stock and financial value. Consequently, social, and demographic characteristics of vendors were documented as well.

4   METHODOLOGY

4.1 Study site description

The Great Silk Road Bazar is located in the centre of Osh city, which history goes back at least 2,500 years. Osh is the second most populated city in Kyrgyzstan with a total urban population of 270,000 people, and is considered as a market hub for the whole region. The major ethnicity group is represented by Kyrgyz, followed by a minority of Uzbeks. The Great Silk Road Bazar is denoted as one of the biggest bazars of its kind. The bazar is spread out on almost 14 hectares of both banks of the Ak-Buura River which divides the bazar into eastern and western part. A total of 1,508 sellers offered their goods and services at the bazar. The spectrum of offered goods and services was quite wide starting from staple food, fruits and vegetables, meat, bakery products, clothes, chemists, to electronics or household goods.

Furthermore, scheme of the market was drawn directly at the Great Silk Road Bazar by the author, afterwards scheme was processed in Zoner Calisto graphical programme in order to acquire a precise and uncluttered scheme of the market. No scheme in paper version was available on the spot, nor GPS coordinates and satellite pictures cannot be used for purpose of draft of the scheme, because predominant majority of the market was covered by the roof which precluded possibility of utilization these data sources, except for size estimation of the total market area

EASTERN PART
OF THE BAZAR

4.88 Ha
462 vendors
67 rice vendors

Ak-Buura River
Ak-Buurinskaya street

Zainabetdinova street

WESTERN PART
OF THE BAZAR

8.80 Ha
1046 vendors
12 rice vendors

▲ Respondent
✖ Refused interview
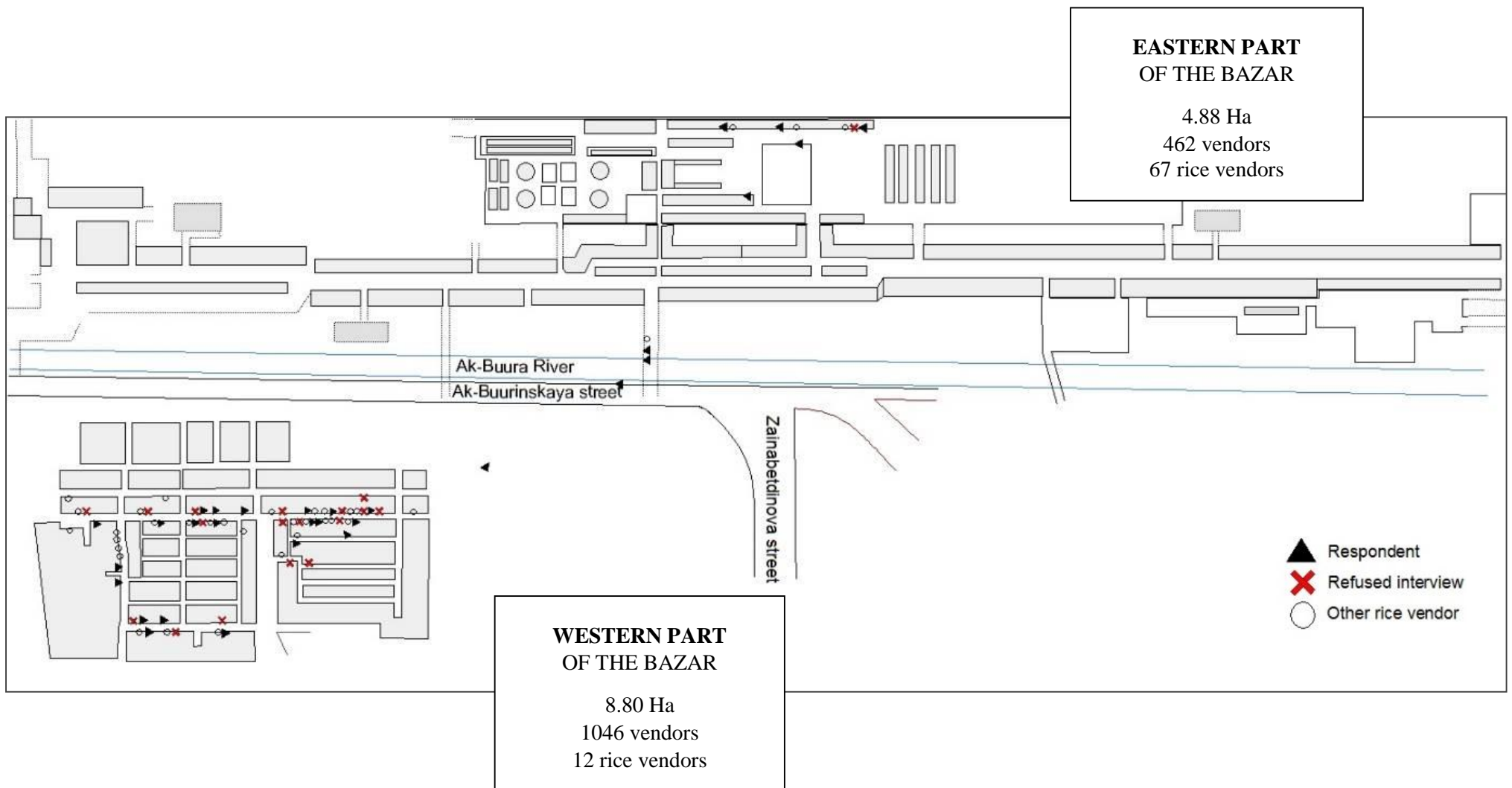◯ Other rice vendor

Figure 9 Great Silk Road Bazaar in Osh city, southern Kyrgyzstan

4.2 Research design and data collection

Data were gathered at the Great Silk Road Bazar in July 2014 via interviewer-administrated interviews and using semi-structured questionnaires. Questionnaire outline contained the information on sold varieties of rice, e.g. listing of sold varieties and their actual price, trade volume per day, stock, supplier and supply frequency, estimation of months with maximal and minimal price and demand, and socio-demographic characteristic of vendors, which means gender, age, place of residence, level of education, ethnicity and years of experience with selling rice (see Table 1).

We randomly addressed 48 vendors selling rice at the bazaar. Unfortunately, 18 of them (37.50 %) were not willing to share their information a knowledge with us. Finally, we carried out a total 30 interviews which were conducted in cooperation with a local translator who ensured interaction with vendors in Russian or Kyrgyz language. A duration of one interview was approximately 20 minutes.

Table 1 Questionnaire outline

Questionnaire outline		
Description	**Question used**	**Answer odds**
Vendors demographic	Gender of vendor	open-ended question
	Years of schooling	open-ended question
	Age	open-ended question
	Place of residence	open-ended question
	Ethnicity	open-ended question
	Years of selling rice	open-ended question
	Years of selling rice at the bazaar	open-ended question
	How often do you sell rice on the Osh bazaar?	every day / to 3 times per week / 1 time per week / less
	Do you sell on other market/place?	yes / no
	What gender buy rice more frequently?	male / female / equal

Questionnaire outline (continued)		
Description	**Question used**	**Answer odds**
Listing of sold varieties	Actual price	open-ended question
	Daily traded volume	open-ended question
	Stock in the store	open-ended question
	Stock out of the store	open-ended question
	Supplier	open-ended question
	Supply frequency per week	open-ended question
Market related questions	Number of middlemen operating at the bazaar	open-ended question
	Month with maximal price of rice	open-ended question
	Do you know why?	open-ended question
	Month with minimal price of rice	open-ended question
	Do you know why?	open-ended question
	Month with maximal demand of rice	open-ended question
	Do you know why?	open-ended question
	Month with minimal demand of rice	open-ended question
	Do you know why?	open-ended question

4.3 Data analysis

Descriptive statistics such as percentages, means, and standard deviations were used to describe the sample on the various variables. Descriptive statistics particularly contributed to description of estimated traded volumes per variety/region, prices, stocks, supplies frequency, and peaks of demand. Furthermore, Pearson correlation coefficients were calculated using SPSS statistical programme to document potential relation between main variables. Especially, we observed potential relations between daily traded volume and value of stock, then relation between daily traded volume and supply frequency per week, and relation between daily traded volume and price of individual variety. Furthermore, two-tailed Student t-tests for independent samples were used to test the significance of the differences in the means of traded volumes divided according to their national or international origin. The threshold for significance of statistical analyses was set at p-value = 0.05.

5   RESULTS

A total of 30 individual interviews was carried out and another 18 vendors, representing 37.5 % of addressed vendors, were not willing to cooperate and refused interview. The most frequent reason for refusing was concerns about lost income during interviewing. Nevertheless, any form of compensation was found as an unsuitable approach. Respondents were chosen randomly nevertheless from the desire to get data from a wide spectrum of vendors regarding to their location at the bazaar as well as marketed goods, though, there were not significant differences in marketed goods among vendors. The majority of vendors were selling rice together with many kinds of tea, oils and vegetables, followed by the second minority group of vendors selling only rice.

5.1 Characteristics of vendors

The majority of sellers were female (73.33 %). The most frequent ethnicity of vendors was Kyrgyz (83.33 %) followed by 16.67 % of Uzbeks which reflects ethnicity composition of the whole population in Osh. Average age of vendor was 35 years (±13.15). Most of the vendors had secondary education (60.0 %), followed by 26.7 % of vendors with tertiary education, and 13.3 % of vendors with primary education. According to the survey more than half (53.3 %) of the respondents had residence in Osh and the rest of respondents (46.7 %) had residence outside in average range 23.21 kilometres (±16.62) far from market.
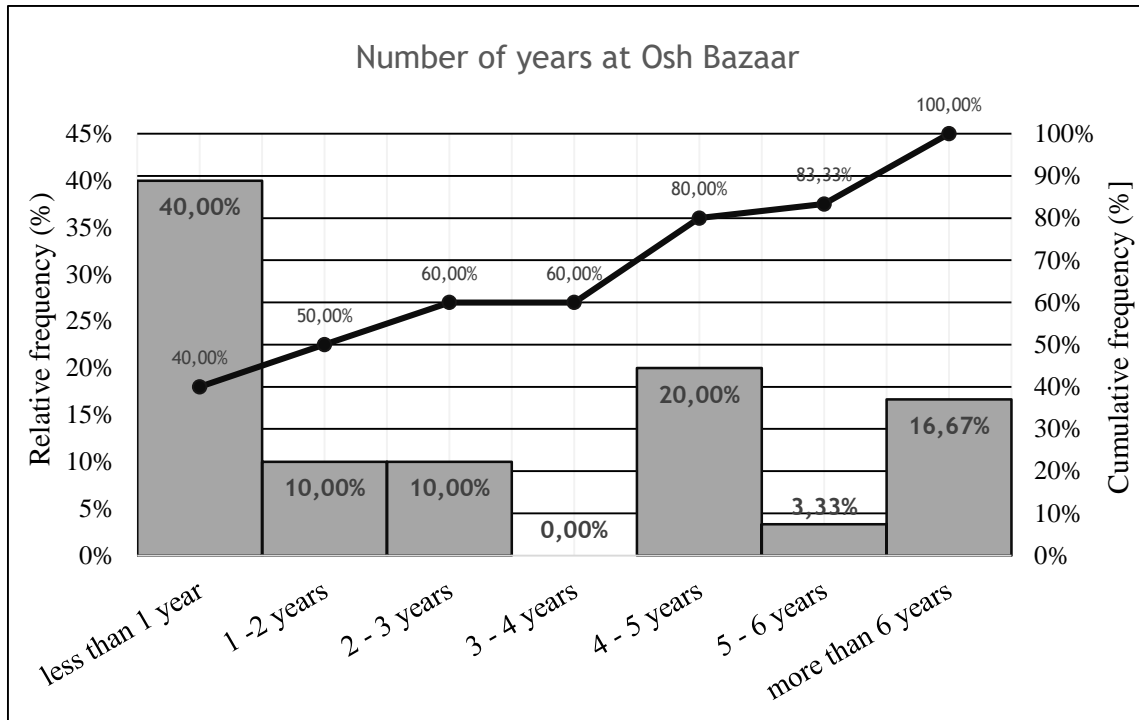
Figure 10 Histogram containing years of selling at the Great Silk Road Bazar

All stalls could be considered as permanent because vendors claimed regular selling of rice in their places throughout the year. Average time for how long vendors selling rice at the bazar was 4.83 years (±2.25) but a closer look at the histogram containing frequency distribution of vendors according to their number of years (see Figure 5) shows high portion of vendors selling three or less years with a cumulative percentage of 60 % of sellers. Mind also the gap in the group of vendors selling from three to four years which represents the time period approximately from July 2010 till July 2010. In this period, there was violence in Kyrgyzstan, especially in the southern part of the county. The result of the violence was the collapse of trade at the Great Silk Road Bazar because a large part was destroyed, vendors' stock were plundered and shops were burned. Consequently, many vendors did not return to their businesses after the violence. Then the Great Silk Road Bazar expanded and the new part on the opposite bank of Ak-Buura River was built during the recreating and the renewal of trade. In this new part of the bazar 462 (30.61 %) of a total shops at bazar were located during this research. All these aspects generated a greater opportunity to start businesses at the Great Silk Road Bazar exactly after the violence in 2010 which is represented by 60 % of respondents.

Figure 11 Typical rice vendor during the interview at the bazaar in Osh, southern Kyrgyzstan

5.2 Market survey

5.2.1 Geographical origin of rice varieties traded at the bazaar

Estimated trade volumes were tracked according to their geographical origin in order to estimate origin traded rice at the bazaar. We found out that the most volume came from Uzgen region (33.02 %), followed by Jalal-Abad province (17.13 %), Batken province (17.13 %), and Aravan region (17.10 %) with insignificant difference against preceding provinces (see Table 1) which represent the main rice – producing areas in Kyrgyzstan. The remaining volume (15.63 %) was ensured from abroad, namely three varieties which originated from Kazakhstan (5.92 %), Pakistan (3.51 %) and Russia (6.19 %).
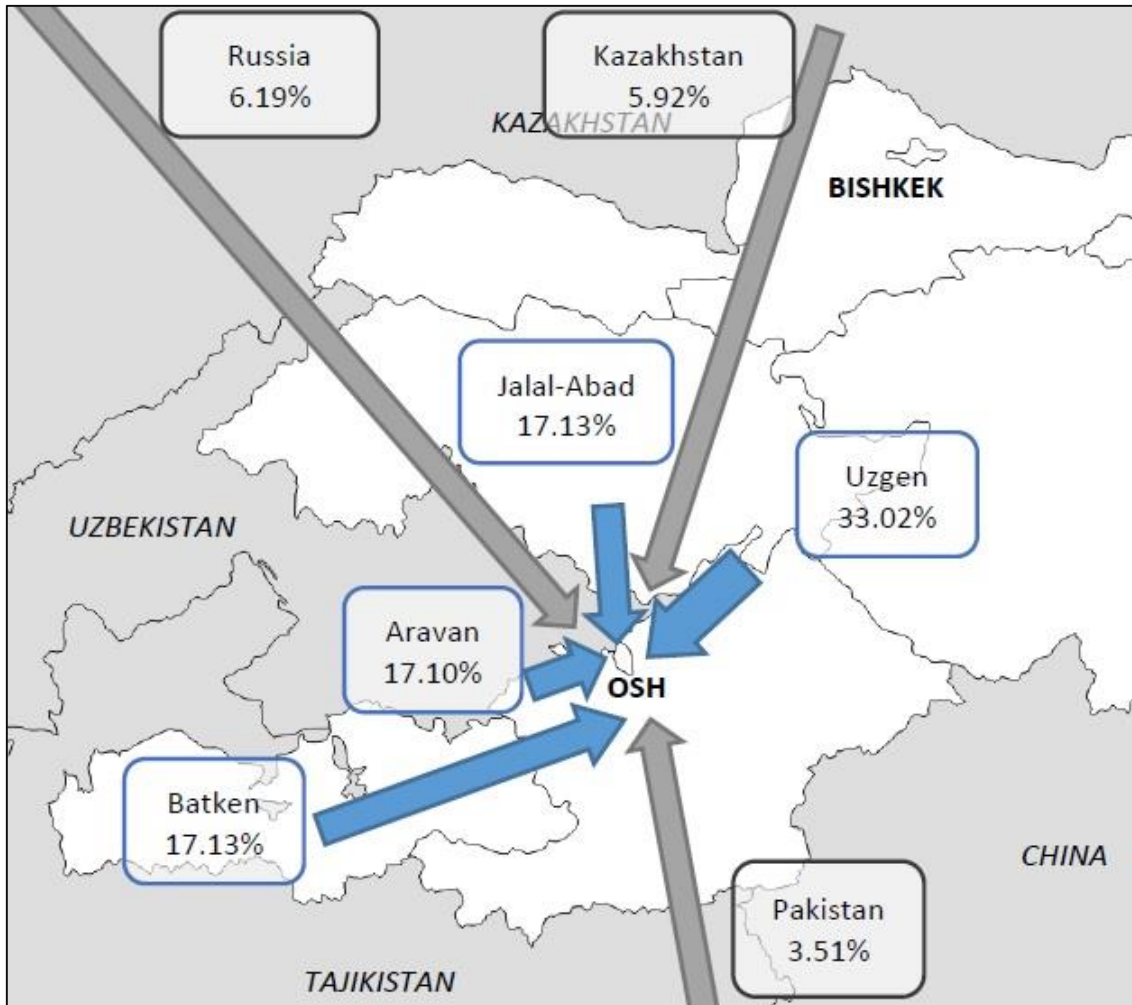
Figure 12 Geographical origin of traded rice at the Great Silk Road Bazaar in Osh city, southern Kyrgyzstan

Statistically significant difference ($t_{(114)}$=2.8, p=0.006) was observed between average traded volumes of national and imported rice varieties 14.55 (±16.59), and 8.60 (±9.01) respectively. An independent t-test was performed to test whether the national varieties and international varieties were associated with statistically significant different mean according their trade volumes.

5.2.2 Market survey

We identified a total 11 rice varieties according to used market names at the bazaar. Eight of them were represented by varieties from local production and three of them were originated from abroad.

The highest price was observed for traditional Uzgen varieties especially for variety Uzgen Uchuk (136.43 ±4.40) than for variety Uzgen Champion (132.29 ± 10.97) and for variety Uzgen Kakyr (130.28 ± 6.56). Followed by other local varieties, excluding varieties Akshak and Uzgen Cerza which represent low quality rice variety. Fourth most expensive was variety Batken (86.85 ±4.79) than variety Karakchi (79.22 ±6.39), and variety Aravan (72.95 ±3.25).

Imported rice varieties were lined up into the group of cheaper varieties marketed at the bazaar. Nominally, variety Pakust (71.92 ± 12.17) than variety Rossiysk (70.33 ±3.86), and variety Kazakh (67.11 ±2.60). At the last the cheapest were above mentioned varieties Akshak (47.17 ±14.36) and Uzgen Serza (42.50 ±10.70) (see Table 2).

Table 2 Average prices, traded volumes and stocks of rice varieties sold at the bazaar

Rice variety	Geographical origin	% of vendors selling var.	Daily sales (kg per day)	Price (KGS per kg)	Stock (kg)
Aravan	Local	73.33 %	15.82 (±18.43)	72.95 (±3.25)	22.32 (±14.70)
Batken	Local	76.67 %	15.15 (±86.85)	86.85 (±4.79)	32.39 (±18.47)
Karakchi	Local	76.67 %	13.72 (±79.22)	79.22 (±6.39)	21.52 (±16.45)
Akshak	Local	23.33 %	4.71 (±2.66)	47.14 (±14.36)	21.29 (±25.23)
Uzgen Serza	Local	20.00 %	8.67 (±9.94)	42.50 (±10.70)	28.00 (±25.69)
Uzgen Champion	Local	40.00 %	10.83 (±8.17)	132.29 (±10.97)	31.25 (±18.72)
Uzgen Kakyr	Local	60.00 %	23.31 (±21.64)	130.28 (±6.56)	46.44 (±41.73)
Uzgen Uchuk	Local	23.33 %	10.07 (±6.36)	136.43 (±4.40)	57.00 (±41.05)
Kazakh	International	30.00 %	13.39 (±9.54)	67.11 (±2.60)	27.56 (±12.16)
Pakust	International	43.33 %	5.50 (±8.61)	71.92 (±12.17)	13.23 (±12.37)
Rossiysk	International	50.00 %	8.40 (7.33)	70.33 (±3.86)	17.00 (±10.30)

Akshak	Aravan
Batken	Karakci
Uzgen Serza	Uzgen Champion
Uzgen Kakyr	Uzgen Uchuk

Figure 13 Domestic rice varieties identified according to their market names
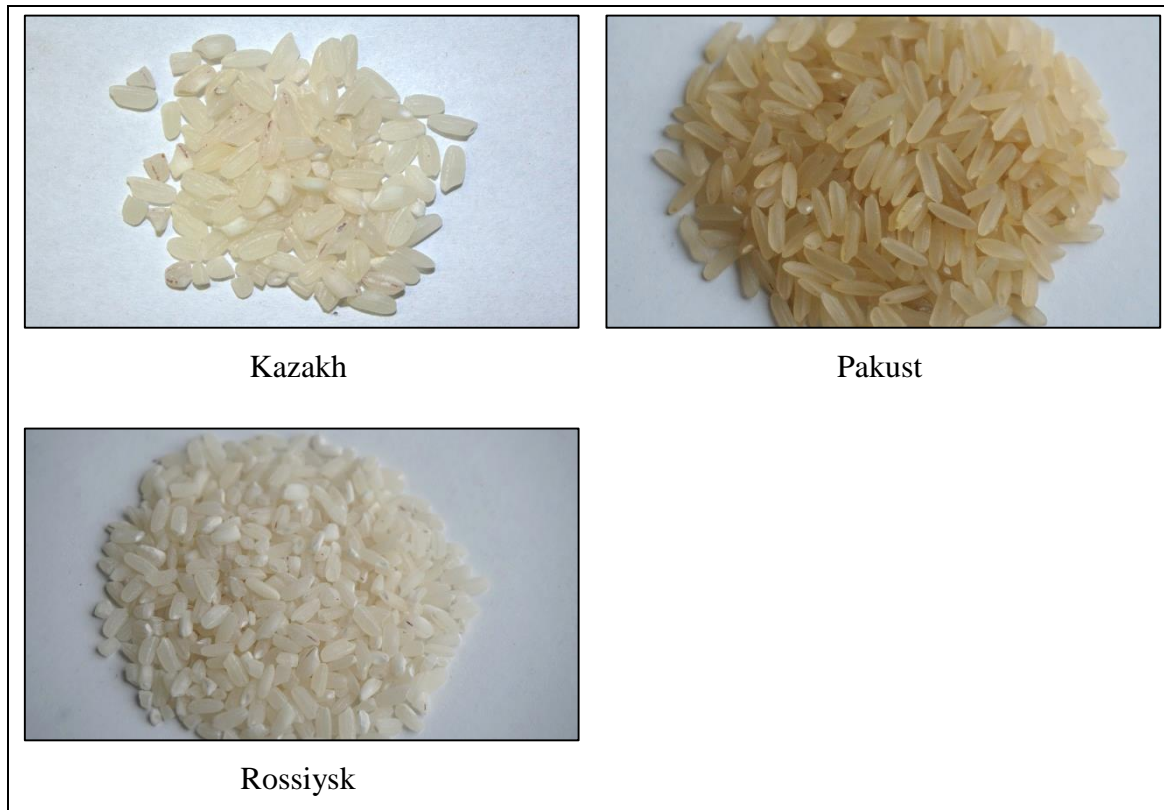
Figure 14 Imported rice varieties identified according to their market names

All vendors used services of middlemen who deliver rice supplies directly to individual vendor's shop at the bazar. They qualified middlemen's services as reliable and comfortable for them. On the other hand, they were not able to estimate a total number of middlemen working at bazaar but all estimations were around 25 and more middlemen supplying rice.

Maturity and functioning interrelationship between vendor and middleman validates that the majority of the vendors (93.33 %) had no stock in addition to stock easily visible in store.
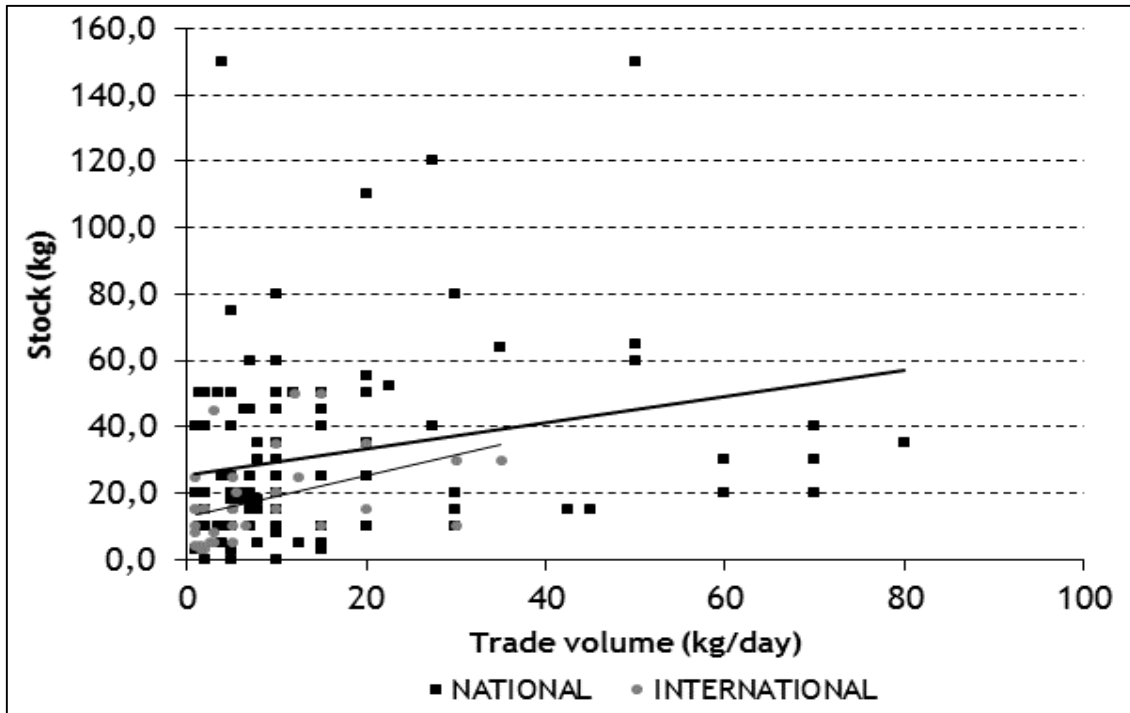
Figure 15 Correlation between trade volume and stock

Positive correlations between sold volume and stock were found for national varieties (ρ= 0.2412, p-value 0.009) as well as for international varieties (Pearson Correlation coefficient 0.4161; p-value 0.009) (see Figure 10). Generally, vendors replenish the stock 2.67 times per week (±1.35). An average supplying volume was estimated at 181.2 kilograms per supply. Further evaluation of stock data showed that vendors' actual stock volume were able to cover trade volumes for 4.14 days (±3.23). Furthermore, positive correlation was found between supplies frequency and trade volume (Figure 11), correlation coefficient is equal to 0.5859 (p-value 0.00053).
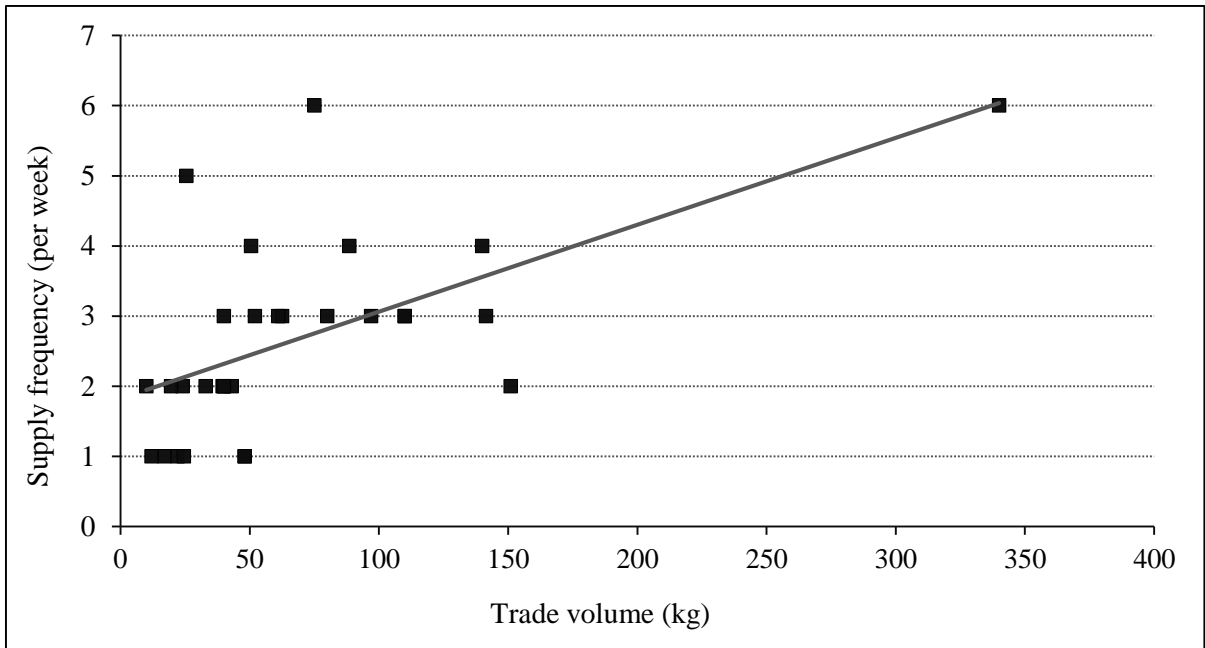
Figure 16 Correlation between trade volume and supplies frequency

5.2.3 Price and trade volumes peaks

Figure 9 shows price fluctuation of rice varieties traded at Osh Bazaar. Typically, during September (36.11 %) and October (42.37 %) prices comes down. The reverse peak, the maximal price, arise during June (41.34 %) and July (45.34 %) (see Figure 12).
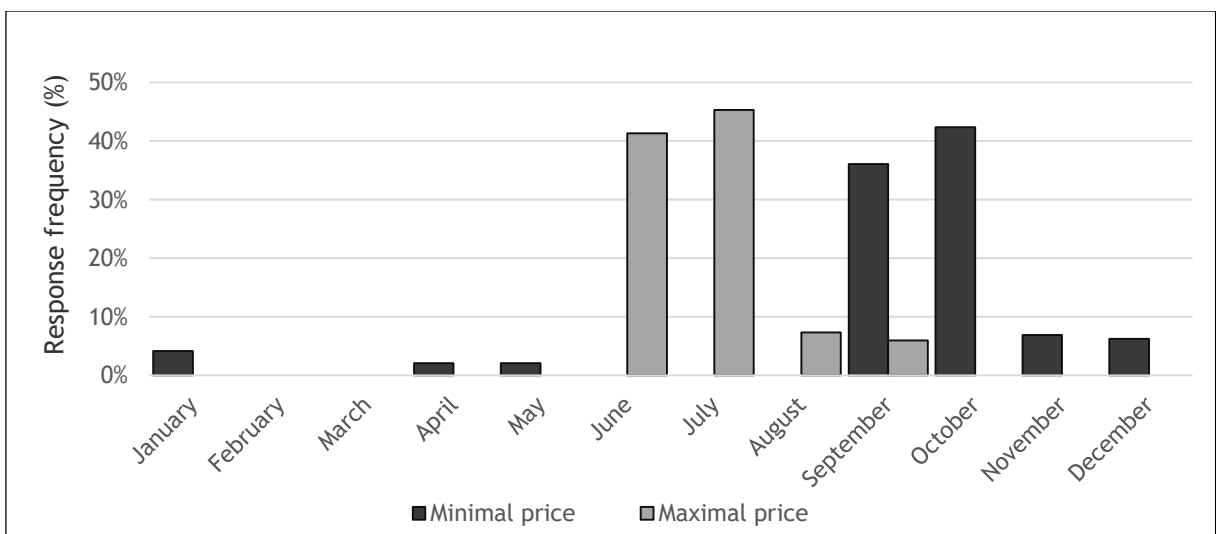

Figure 17 Histogram expressing price peaks

The maximal demand has two peaks, the first in July (50.12 %) and the second in September (25.67 %) (see Figure 13). Minimal demand from January to July 85.31 % (January to March 48.75 % and April to July 35.56 %).
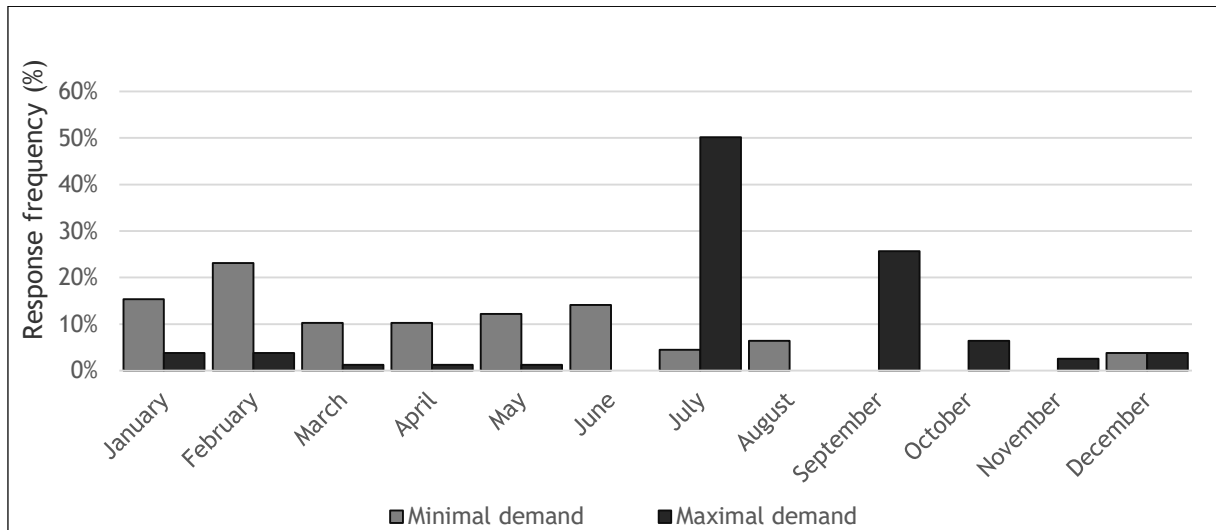

Figure 18 Histogram expressing demand peaks

5.2.4 Relation between price and traded volume

Pearson correlation coefficients were calculated to document potential relation between daily traded volume and value of stock for each variety. Particular correlation values are in the figures. Generally, correlation between these two variable was not approved.

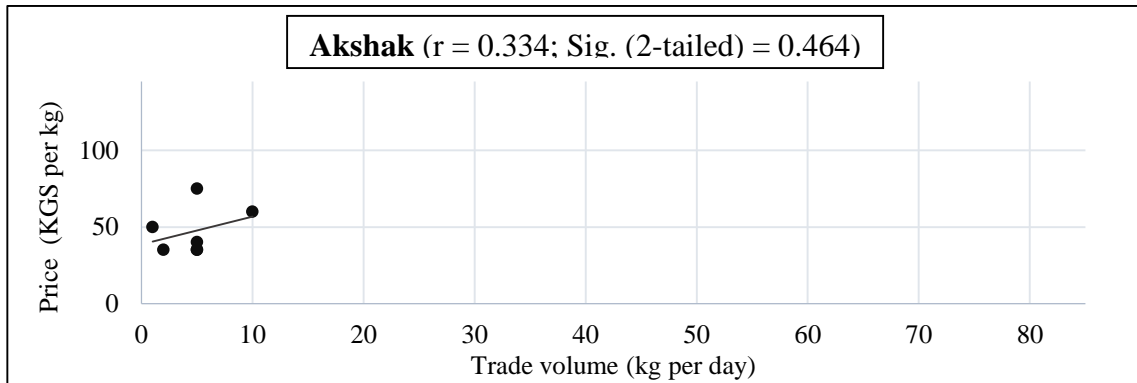**Figure 19** Akshak - relation between price and traded volume
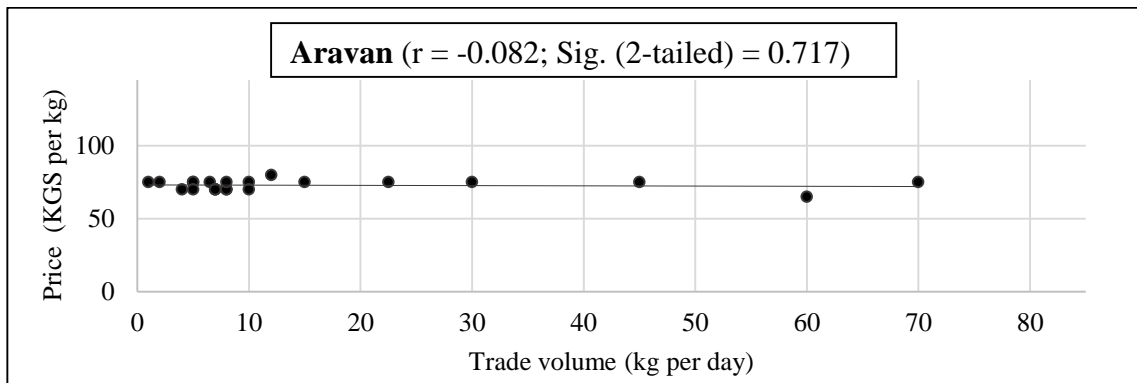
Figure 20 Aravan - relation between price and traded volume
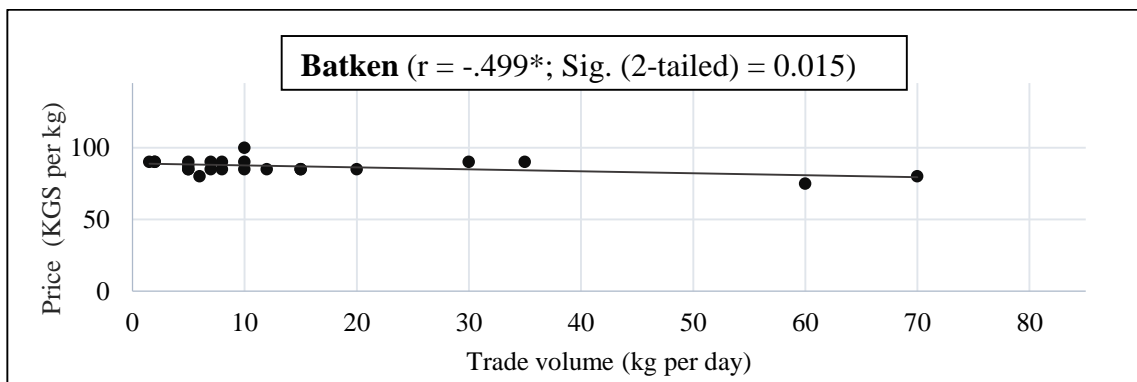
Figure 21 Batken - relation between price and traded volume

Figure 22 Karakchi - relation between price and traded volume

Figure 23 Uzgen Serza - relation between price and traded volume

Figure 24 Uzgen Champion - relation between price and traded volume

Figure 25 Uzgen Kakyr - relation between price and traded volume

Figure 26 Uzgen Uchuk - relation between price and traded volume

Figure 27 Pakust - relation between price and traded volume
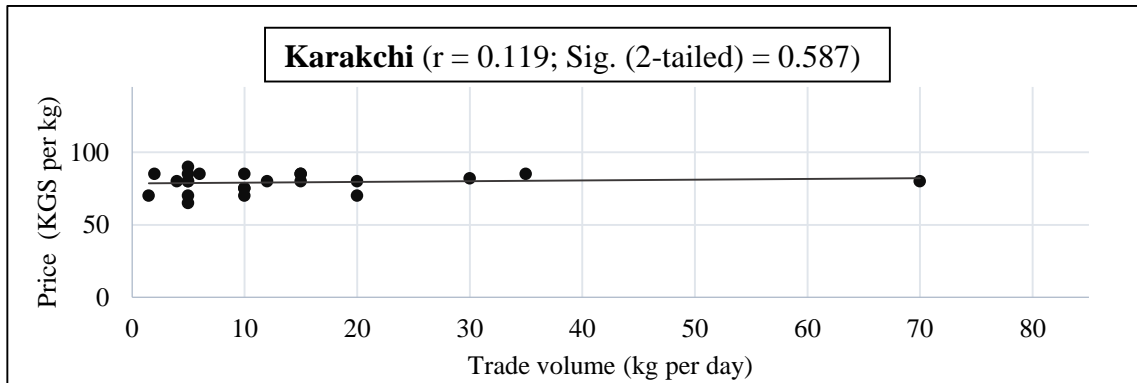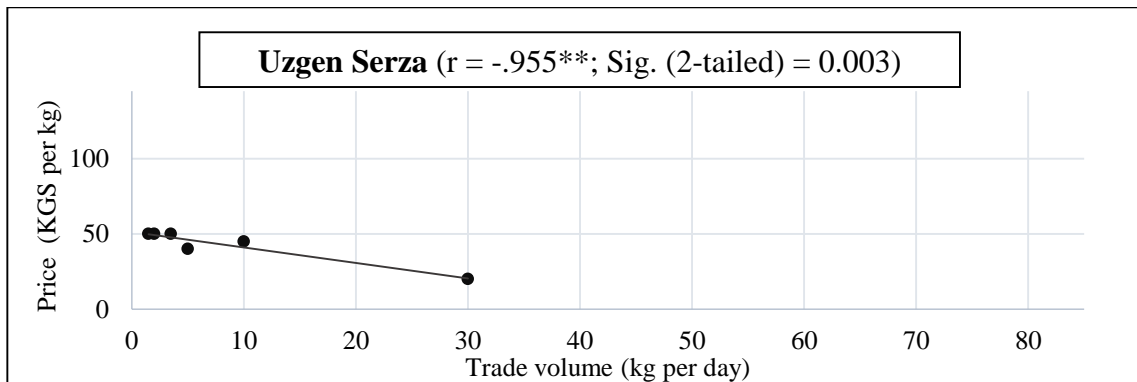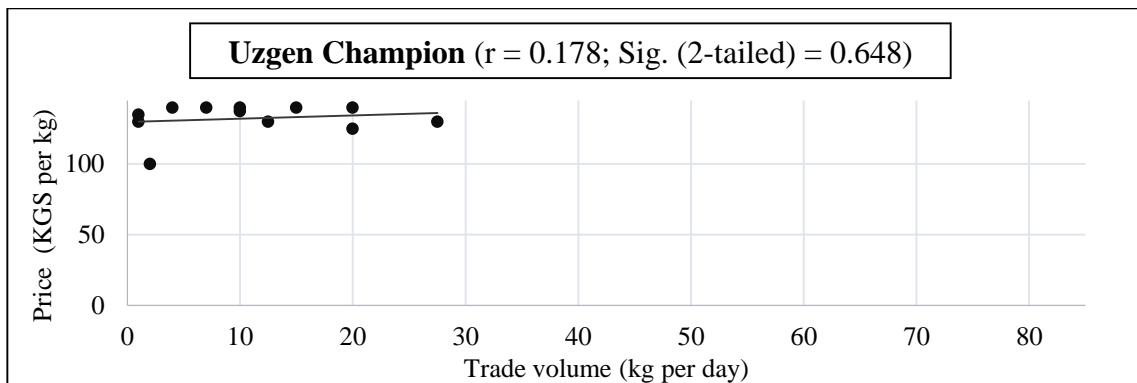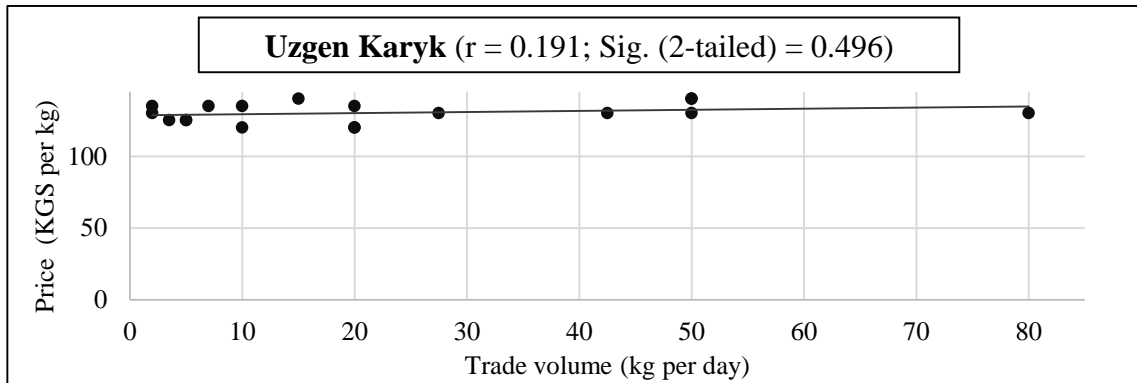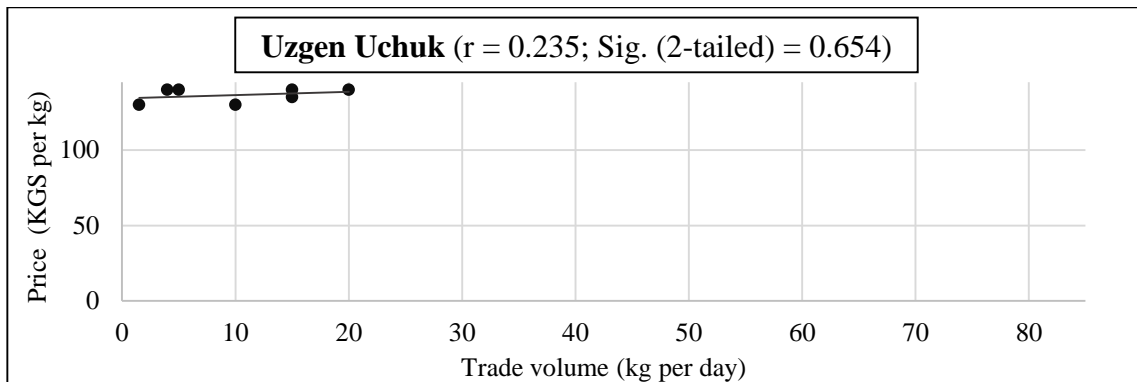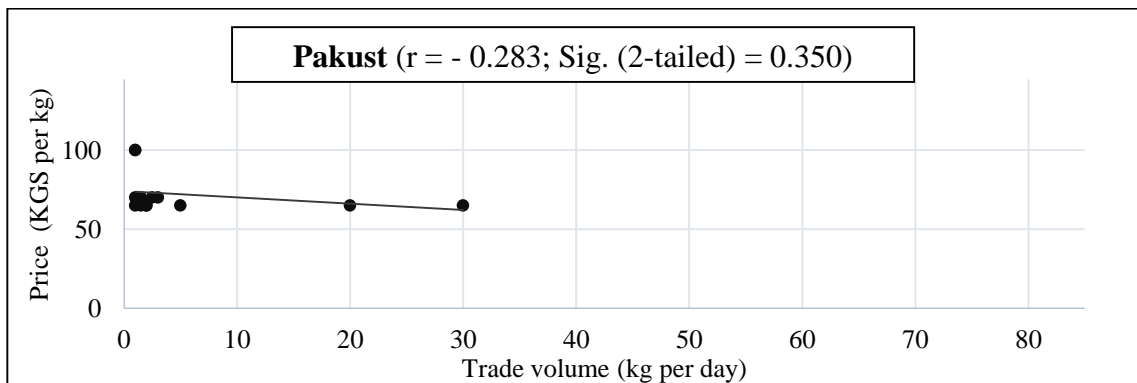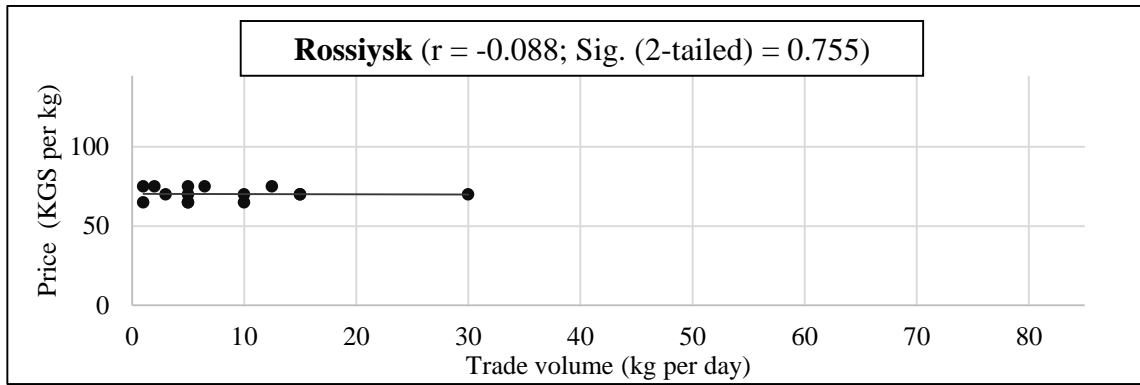
Figure 28 Rossiysk - relation between price and traded volume

6   DISCUSION

Social characteristics of vendors showed typical findings for rural markets and for post-soviet countries as well. The majority of rice-selling vendors were female. As Kaminski & Saumya (1999) state bazars create significant source of employment for women based on the fact that women represented approximately 75 % of vendors at surveyed bazars. Further, more than two-thirds of vendors were Kyrgyz which reflects ethnicity structure in targeted area. More than two-thirds of vendors gained secondary education or higher and the rest of respondents gained primary education. We believe that it is remain of the former Soviet Union education system. According to vendors' opinion the majority of buyers were female. This finding corresponds with the role of women in Kyrgyz household. They are responsible for household maintenance and ordinary cooking.

A total rice trade volume at the bazaar in July was estimated at 5 358 kilograms per day which is approximately 166 tonnes per month. Therefrom daily trade volume of local varieties represented 4 521 kilograms per day (84.37 %) and traded volume of imported varieties represented 837 kilograms per day (15.63 %). If we compare these numbers with the latest available data when local varieties represented 47.02 % of a total supply of Kyrgyzstan in 2012 or 41.94 % on average between years 2008 to 2012 (FAO, 2013a) we can state that sold volume at the bazaar was significantly more dependent on local varieties in comparison with the national level. Nevertheless, because the study was carried out during one month, in July, we should note that this finding cannot be unified for all months. Traded volumes vary from one month to another and calculation of a total traded volume for longer period would not reflect real value. On the basis of the results we can suppose that real values of traded volume for other months would be lower in comparison with estimated monthly trade volume in July because July was identified as the month with the highest rice demand within the year (see Figure 10). For estimation and description of traded volume for different months or for longer period, data would must be gathered in different periods of the year (Marocchino, 2009) Further, trade volumes of individual varieties were tracked according to their regional origin. The highest trade volume originated from Uzgen region where a total four

varieties were identified and their sum represented 33.02 percent of a total traded volume at the bazaar (84.37 %). Than almost the same volumes (approximately 17 %) originated from Aravan region, Batken region and Jalal-Abad region. A total trade volume of imported varieties was represented by imported rice from Kazakhstan (5.92 %) which is the main importer of rice to Kyrgyzstan. Than 6.19 % was imported from Russia and 3.51 % from Pakistan. These two countries belong to minority importer of rice to Kyrgyzstan based on the latest available data (FAO, 2013a; FAO, 2013b).

Evaluation of statistical characteristics showed dominance of local varieties of rice which represented eight of a total eleven varieties identified during the research. Furthermore, local varieties were more frequently offered among the vendors in comparison with imported varieties. As the most frequently offered varieties were identified Batken and Karakci which were offered by more than three-quarters of vendors, followed by Aravan (73 %), and Uzgen Kakyr (60 %). These varieties were also varieties with the highest daily trade volume. The highest daily trade volume was identified for Uzgen Kakyr with a trade volume 23.31 kilograms per day, followed by Aravan with 15.82 kilograms per day, than variety Batken with 15.15 kilograms per day, and variety Karakci with 13.72 kilograms per day. The fifth variety according to daily trade volume was imported variety Kazakh with 13.39 kilograms per day. All above mentioned local varieties which represented the most offered and the most sold varieties at the bazaar originated from the main rice-producing areas in Kyrgyzstan (see Figure 1). These areas are located close to Osh and therefore, they can be characterized by the efficient accessibility of transport to Osh. The author believes that this one of the main findings which can explain why the major part of demand is satisfied by the national production with significantly lower dependency on local varieties in comparison with the national level (see Figure 3). As a matter of interest, the role of difficultness of transport claims the fact that some of identified varieties are not marketed at the bazaars in Bishkek, the capital city of Kyrgyzstan.

Significantly higher prices were observed for Osh varieties which originated from Uzgen region. The highest prices were identified for variety Uzgen Uchuk with 136.43 KGS per, and Uzgen Kakyr with 130.28 KGS per kilogram (see Table 2). These varieties are perceived as high quality rice varieties with traditional post-harvest

processing which change their chemical properties and their colour as well. Value added during this traditional processing have influence on the final price of these varieties (Smanalieva et al., 2015). However, we should take into account cultural aspects causing that people tent to use local varieties. Their strong tradition gives an assumption that local varieties are preferred against imported varieties. It could account for the facts that daily trade volumes of above mentioned local varieties had higher trade volumes in comparison with others and simultaneously were offered by the majority of vendors (see Table 2). It proves consumer's desire to buy local varieties. During statistical evaluation of gathered data about stocks we observed relatively high fluctuation of stock within a short period of time. Generally, we can state that vendors had minimal stock which the majority of vendors stored directly at the bazaar only without external storage capacity. In some cases, value of actual stock for particular variety was lower than daily trade volume presented by a vendor during interview. It was caused by higher supply frequency. Practically, higher supply frequency can caused significant differences in particular vendors' stock volumes even within one day.

Moreover, we found out positive correlation between supplies frequency and a total traded volume per day which was more significant in comparison with correlation between a total stock volume and a total traded volume. We suppose that vendors with increasing traded volume per day increase supply frequency rather than an amount of rice at the stalls. It can be explained by limited storage capacity of the stalls which do not allow to store higher amount of stock directly at the bazaar. Nevertheless, minimal stock and absence of reserve stock force vendors to supply their shops closely before they run out of actual stock. That means that vendors rely on punctual supplies and in case of any complication or delay of supply can lead to stock scarcity and finally can results in sales threat. The study showed that all vendors supply using middlemen who deliver their supplies directly to the shop at the bazaar. Accordingly, it suggest an idea that services of middlemen are quite developed as well as linkage between vendors and middlemen. However, this idea was not directly approved during the research and cannot be supported by contemporary literature which have not dealt with this issue yet. It could be interesting issue for future research which could be aimed at other player in market-chain.

Price and demand fluctuation peaks from January to December were observed for the purpose to describe process of price and demand for rice at the bazaar and then try to estimate main factors which have influence on that price or demand change. The minimal price of rice was identified in September and October (see Figure 9). In these months come to decrease in price of rice at the bazaar as a consequence of the main rice harvest period in Kyrgyzstan. Main harvest period in Kyrgyzstan begins earlier in comparison with other rice producing countries, especially with countries from southern Asia, because of rapid change weather condition in following months such as in case of Uzbekistan (McLean et al., 2013). At this time, yield uncertainty of current harvest is eliminated and enough rice on national market increase supply from farmers, it leads to price drop based on the law of supply and demand. The similarity can be found in Hayami et al. (1999) study from Laguna Province in Philippines where the price reach its minimum in November due to later harvest time in comparison with Kyrgyzstan as well as Giuliani et al. (2009) state in case of their study in mountainous area in Turkey.

The maximal price of rice was identified in June and July (see Figure 9). We should point out that these months precede the main harvest period of rice in Kyrgyzstan as was mentioned above. Accordingly price in these moths is affected by some level of uncertainty relating to expected yields from following harvest. Stock from the last harvest become smaller and demand for rice reaches its maximum in these months (see Figure 10). The result of these facts is increasing of rice price on the basis of the basic economic theory. Regarding the demand fluctuation, the maximal demand peaks were identified in July and September (see Figure 10). The peak in July is caused by cultural issues because rice demand increases as the result of Ramadan which is under way in this month. Ramadan represents one of the five pillars of Islam which is based on fasting principle. Notwithstanding this, Ramadan have positive influence on local rice demand especially because of its religious importance for Muslims, the majority of Kyrgyz population. Rice becomes more frequently used in Kyrgyz households especially in form of *pilov* which is the most important dish for special occasions in Kyrgyzstan. It leads to increase in rice demand for the duration of Ramadan. The second peak of maximal demand was identified in September (see Figure 10). This peak is caused by minimal price of rice in post-harvest period as was mentioned before during the explanation of minimal prices of rice. Based on the fact that consumers are

willing to buy more rice at a lower price. Interpretation of minimal demand is difficult because no significant ascendency of any month was found because the estimations of vendors are spread from December till August (see Figure 10) without any significant statistical variance and no relevant vendor's explanation of minimal demand was given during interviews. For this reason we can not specify any peak with high level of probability.

Analysis of retail prices revealed aspects of perfect competition which is typical for food markets and rural markets in developing countries. During the research we identified that high number of vendors selling very similar product, rice in our case, without significant difference between them. It results in the situation that each individual vendor has only limited power to influence price at the market. Practically, both sites of the trade, vendors and consumers as well, are in position of price-takers and has to accept retail price from his competitors. Consequently, we observed minimal differences in prices of rice varieties among the vendors (Hubbard et al., 2013; Krugman and Wells, 2012). Based on this findings we can state that retail price is not decisive factor influencing trade volume. Our expectation that retail prices and trade volumes will be negatively correlated was not approved (see Figures 19 – 28). Thus, we can suppose that differences in trade volumes among the vendors are influenced by other factors which cause that particular vendor sell more than another. Our estimations of these influencing factors are potential difference in quality of offered rice, vendors' relation with consumers, or their location at the bazaar. However, it is only our estimation because we can not specify these factors on the basis of our research. For better specification of these factors, we recommend a survey with focus on consumer behaviour and preferences. Potentially this survey could specify which factors have the highest power to consumer's final decision on the question which rice variety to buy and where. Moreover it could help to understand the role and importance of particular rice varieties for local households. For instance, if they buy particular rice variety for particular dish preparation or if they buy rice regularly from particular vendor. Furthermore, we recommend a study focused on rice producers and suppliers. This study would be necessary to understand the whole market-chain which would document the role, importance, power of particular players in that market-chain.

6.1 Limitations of the research

As other studies either our study was not without limitations of the research as well. During the research we found out that vendors did not maintain any notes about their sales, prices, or stock in past. Therefore, vendors had to think back on every single question. Moreover, the fact that interviews were carried out during common running of the bazaar can result in vendors' inconvenience to devote sufficient time to answer all our questions in details may cause some minor biases. On the basis of the results we assume that the majority of vendors could have a lack of experience and knowledge about rice trade and market functioning in longer period of time. The key finding for this statement was that half of vendors had experience with selling at the market shorter than two years with average 0.78 (0.70) year of selling at the bazaar.

7   CONCLUSION

According to our best knowledge, our study provides the first insight to rice trade at the Great Silk Road Bazaar in Osh city, especially which varieties were traded, their geographical origin and prices. The study furthermore documented which local varieties are more preferred or sold for higher price. Based on our results, we suppose that consumers tend to use local traditional varieties because of their cultural and traditional importance for Kyrgyz households. Despite the fact that southern Kyrgyzstan has ethnically mixed population, trade with rice is dominated by Kyrgyz as majority of vendors were Kyrgyz women. Average age of vendors was 35 years and more than half of them had secondary education. Approximately half of vendors had residence in Osh city, while others were base in average 23.2 km far from the bazaar.

We identified a total eleven rice varieties according to their market names and each vendor offered approximately five of them. Domestic varieties represented eight of them and three of them were imported from abroad. Analysis of estimated trade volumes showed that domestic rice varieties represented the majority of sold rice at the bazaar, whereas the most trade volume originated from Uzgen region whose rice varieties are interesting by traditional post-harvest processing. Almost the same trade volumes originated from Aravan region, Batken region, and Jalal-Abad region. The highest trade volume was identified for Uzgen Kakyr, followed by Aravan, and Batken.

The most frequently offered varieties among the vendors were Batken, Karakchi, Aravan, and Uzgen Kakyr. Further, the most expensive variety was Uzgen Uchuk, followed by Uzgen Champion and Uzgen Kakyr. Vendors' stocks of rice were very probably influenced by limited storage capacity of the stalls at the bazaar. The highest average stocks were observed for Uzgen Uchuk, Uzgen Kakyr, and Batken.

We identified typical aspects of perfect competition. Consequently, analysis of relations between price and daily trade volume for individual varieties showed that vendors and consumers are practically in position of price-takers, thus they have no power to influence price at the market. On the basis of this result, we suppose that price is not

decisive factor influencing trade volume. Further, vendors determined June and July as the months with the highest price of rice, and vice versa September and October as the months with the lowest price. They also determined July and September as the months with the highest rice demand.

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