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Hassanzoy, Najibullah
Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University | Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University

Amekawa, Yuichiro
Faculty of Agriculture, Kyushu University | Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University

Isoda, Hiroshi
Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University

Ito, Shoichi
Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University

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# The Characteristics of Rice Markets and Trade in Afghanistan: A Survey of The Major Commercial Rice Markets

**Najibullah HASSANZOY[1]*, Yuichiro AMEKAWA[2], Hiroshi ISODA and Shoichi ITO**

Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics,
Faculty of Agriculture, Kyushu University, Fukuoka, 812–8581, Japan
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This paper explores the characteristics and working of Afghan rice markets, including rice imports from the overseas suppliers using primary data collected through a survey of the major provincial rice markets. Descriptive statistics, compound annual growth rates, Herfindahl–Hirschman Index and a double–log linear model are employed in the data analysis. The results underline several notable features of the rice markets in the country. Kabul rice market is leading the remaining markets in the majority of selected indicators. The surplus and deficit markets of local rice appear to be segregated as the availability and trade of local rice is largely concentrated in the markets closer to major rice producing provinces. As compared to imported rice, local rice may be price competitive but not quality competitive. Moreover, the domestic value chain of paddy–rice is very short at present. Moderate to strong market concentration along with the influence of big traders may exist in the major provincial rice markets. The demand of traders for rice imports may be explained by their cumulative experiences in the rice business, purchasing power of imported rice and transfer costs, among others.

**Key words**: Afghanistan, Rice value chain, Rice markets concentration, Structure of rice markets, Traders' rice import demand

## INTRODUCTION

Rice is the second major staple foodgrain after wheat in Afghanistan, which accounts for around 8% of the daily calorie intake (2,100 Kcal) with the per capita annual consumption of about 17 kg averaged over 2003/04–2013/14. On average, during 2000/01–2014/15, paddy rice comprises almost 11% of the total cereals production, indicating its importance as the second major cereal crop in the country (Figure 1). Kunduz, Baghlan, Takhar, Nangarhar and Laghman (Figure 2) are the top five rice producing provinces in the country, which together account for approximately 81% of the total domestic rice production during 2011/12–2015/16. The average total milled rice consumed in the country during 2001/02–2013/14 is about 0.5 million tonnes of which 73% is produced domestically while the remaining is imported largely from Pakistan. However, due to predominant subsistence rice production, the low quality of local rice varieties, tiny marketable surplus of local rice and paucity of modern rice processing mills, the country suffers from persistent deficits in rice production and appears far from attaining self–sufficiency in the near future (Hassanzoy *et al*., 2017).

Hassanzoy *et al*. (2015, 2016a, 2017) investigated spatial market integration and dynamics of price transmission among high and low quality rice markets in Afghanistan. Similar studies have also been conducted

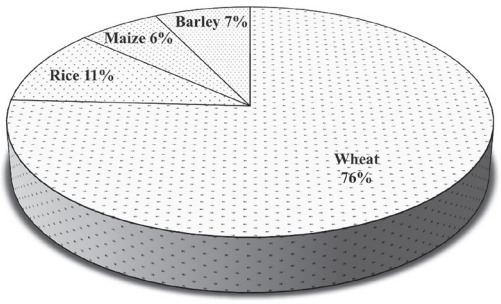


**Fig. 1.** The share of major cereals in total cereals production during 2000/01 to 2014/15.
*Source:* Own presentation using data from FAOSTAT2016 online database

for wheat and wheat–flour markets in the country (e.g., Chabot and Dorosh, 2007; Halimi *et al*., 2015; Hassanzoy *et al*., 2016$_{b, c}$). These studies are mainly based on price data, and examine spatial price linkages and functioning of markets. Without enough information on the context within which the markets under study operate, only price–based studies may not be as revealing as possible. This challenge may be more acute when dealing with Afghan rice markets, which did not receive due research attention. A knowledge of the characteristics and working of domestic rice markets and trade would help researchers to accurately interpret empirical findings derived from the existing price data alone. It may also assist policy makers in improving the institutional and physical conditions of the rice markets in the country. Furthermore, the government of Afghanistan is working on the national rice promotion strategy (NRPS) with the goal of increasing domestic rice production to one million tonne by 2021, and improving the quality and competitiveness of local rice against imported ones for the

[1] Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Graduate School of Bioresource and Bioenvironmental Sciences, *Kyushu University*, Fukuoka, 812–8581, Japan
[2] Faculty of Agriculture, *Kyushu University*, Fukuoka, 812–8581, Japan
* Corresponding author (E–mail: hassanzoyn@gmail.com)

purpose of import substitution (MAIL, 2016). The successful implementation of NRPS may not be possible without a hands–on understanding of the actual mechanisms of rice markets and trade in the country. Despite all that, there have been no empirical studies that examine the characteristics of rice markets and trade in the country. With this background in mind, this study investigates the characteristics and working of Afghan rice markets and identifies the determinants of traders' rice import demand using a double–log linear model.

## DATA AND METHODS

This study is based on the primary data obtained from a survey conducted in the five major commercial markets of Afghanistan, namely, Kabul, Jalalabad, Kandahar, Hirat and Balkh between April 23rd and June 20th, 2016. Other relevant secondary (cross–sectional and time series) data are also used to complement the analysis (Appendix 1). The sampled population includes rice wholesalers or traders in the five major provincial (commercial) markets who import rice from Pakistan or India and sell it to other wholesalers, retailers and consumers in domestic markets. A pre–tested semi–structured questionnaire was used and 54 of the wholesalers (13 in Kabul, 11 in Kandahar, 10 in Jalalabad, 8 in Hirat and 12 in Balkh), excluding the dropouts, were interviewed using the face–to–face interview method. The major commercial rice markets surveyed for this research are portrayed in Figure 2.

The characteristics of rice markets are analyzed using descriptive statistics such as averages, totals and proportions as well as compound annual growth rates. Besides, Herfindahl–Hirschman Index (HHI), independently developed by Herfindahl (1950) and Hirschman (1945), is also used to measures the level of concentration in the rice markets as follows:

$$HHI = \sum_{i=1}^{n} S_i^2 \tag{1}$$

where, $S_i^2$ is the squared market shares of rice wholesalers (i=1, 2, …, n). HHI may vary between 0 and 1. In accordance with Naldi and Flamini (2014), HHI $< 0.01$ denotes negligible competition, HHI between 0.01 and 0.15 conveys absence of market concentration, HHI between 0.15 and 0.25 indicates moderate market concentration and HHI $> 0.25$ signifies strong market concentration. The HHI is estimated for individual markets as well as for all of the markets combined. Since an exhaustive list of rice traders and their market shares is not readily available at the national level, the HHI is estimated from the small sample data collected. This may provide only a rough estimate of the degree of concentration in the selected rice markets, however.

An objective of this research is to estimate the determinants of traders' demand for rice imports in the country. Table 1 summarizes the details of variables used in the estimation of traders' import demand function, which is estimated as a double–log linear model below:

$$lnD = \alpha_0 + \sum_{i=1}^{6} \delta_i \, lnx_i + u \tag{2}$$

where, $lnD$ is logarithm of the annual quantities of imports, $\alpha_0$ is the constant term, $\delta_i$ is a vector of the parameters being estimated, $lnx_i$ is a vector of explana-

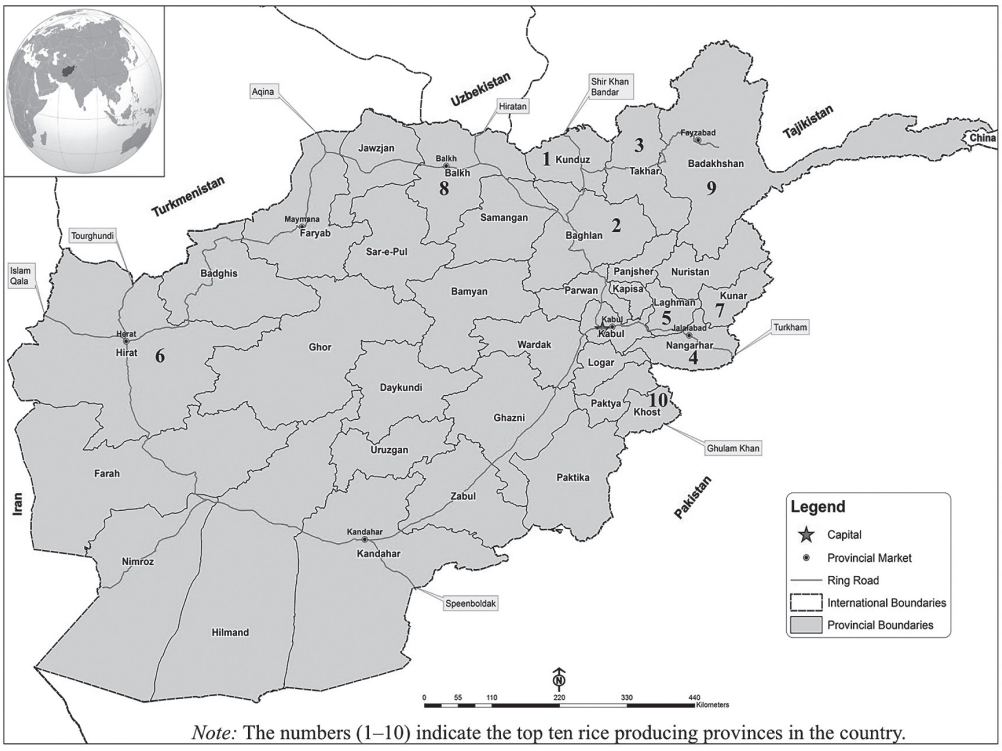


**Fig. 2.** The major provincial rice markets surveyed and the top ten rice producing provinces in the country.
*Source:* Own work

**Table 1.** Description of the explanatory variables used in estimation of Equation (2)

| Sr. No. | Independent Variables | Research Hypotheses | Expected Signs | Notations |
|---|---|---|---|---|
| 1 | Experience in rice business (years) | Business experience may have positive effects on the annual quantity of rice imported. | + | $X_1$ |
| 2 | Imported rice purchased in single transaction (tonnes) | The purchasing power is expected to have positive effects on rice imports. | + | $X_2$ |
| 3 | Purchase of local rice (Yes=1, No=0) | If a trader purchases local rice, his purchase of imported rice may decrease. | – | $X_3$ |
| 4 | Trade restrictions (Yes=1, No=0) | Trade restrictions have negative effect on the quantity of rice imports. | – | $X_4$ |
| 5 | Monthly prices of HQR (Afs/kg) | Rice prices may have negative effect on the traders' rice import demand. | – | $X_5$ |
| 6 | Transaction costs (Afs/tonne) | Transaction costs are expected to have negative effects on rice imports. | – | $X_6$ |

*Source:* Own compilation
*Notes:* Dependent variable (D) is the quantity of rice imported per year; HQR: High Quality Rice; Afs: Afghanis

tory variables in logarithm and $u$ is the error term. The ordinary least squares (OLS) method with robust standard error is used to estimate Equation (2). Variance inflation factor, regression specification error test (RESET) and other post–estimation tests are applied to check whether the estimated model is a best fit without major econometric problems.

The results of this study are constrained by the following limitations faced in the data collection process. Business people may not provide accurate figures on monthly sales, annual imports, frequency of imports, storage capacity and other similar indicators. More so in the context of Afghanistan where concerns about government tax accountability, a sense of insecurity associated with information disclosure, various illegalities nested in the rice trading and poor realization of the importance of academic research make it difficult for traders to maintain integrity in their information provision. Moreover, either traders may not have accurate records of their business transactions or they may not be willing to provide specific information from their records for the aforementioned reasons.

## RESULTS AND DISCUSSION

### General features of the rice markets and trade

It should be noted that the present study mainly explains the features of rice markets at the wholesale level of rice value chain including imports from abroad. Some of the observed characteristics of rice markets are measured quantitatively while others are analyzed qualitatively. Table 2 summarizes the average values of selected quantitative indicators describing certain aspects of the provincial rice markets. On average, each trader imported approximately 1,159 tonnes of rice, mainly from Pakistan. The volume of annual rice imports per trader is the largest in Kabul (1,827 tonnes) whereas it is the lowest in Kandahar (245 tonnes). In addition, the annual frequency of rice imports varies from about 3 times in Kandahar to around 26 times in Balkh. The purchasing power of traders, i.e., the amount of imported rice that a trader can purchase in a single transaction, is the largest in Kabul (350 tonnes) whereas it is the smallest in Balkh (74 tonnes) with an overall average value of about 152 tonnes.

The traders maintain and use small stocks of rice for ensuring a stable supply of rice in their markets of operation. The respondents denied any attempt of using storage for speculating activities. On average, the potential storage capacity (not actual stock) of each trader varies from about 95 tonnes in Hirat to 451 tonnes in Kabul with an overall mean storage capacity of around 197 tonnes. An average trader may sell about 76 tonnes of rice per month. The Individual traders in Kabul have the largest volume of monthly sales (188 tonnes) while others in Kandahar have the lowest monthly sales of rice (29 tonnes). Furthermore, transaction costs determine the profitability of spatial arbitrage. The transaction costs incurred by individual traders include transportation cost, import tax, and other official and unofficial fees. On average, the transaction costs of importing one tonne of rice from Pakistan to a trader's shop is about 6,585 Afghanis (Table 2).[3] It should be noted that the rice traders have contracts with the private transportation companies. The transportation companies, paid in lump sum by traders, assume the full cost of transportation including import tariff. This type of contract arrangement is a source of corruption in the customs as the transportation companies can easily circumvent payment requirements for the full import tax to the government. Some of the traders interviewed expressed discomfort about the existence of this kind of illegal practices. However, some of them mentioned that if we pay the total import tax, the higher cost may reduce the profitability of our business, which is the main incentive of people involved in this business.[4]

[3] Although Kandahar is the closest market to Pakistan, the transaction costs are reported very high for this market (Table 2).
[4] Indeed, the traders may compensate a potential increase in transfer costs by increasing the rice prices. The increase in rice prices and the inelastic nature of demand for rice may depreciate the welfare of rice consumers. In this case, if at all, consumers could be far more severely affected by an increase in transfer costs.

The rice prices demonstrate seasonal patterns such that they are relatively lower during the harvesting season in Pakistan, i.e., between September and December, than the remaining months of the year. Local rice in Afghanistan is also harvested between September and November. Since the marketable surplus of local rice is meager, its harvesting season may not have major effects on the rice prices. The survey results in Table 2 indicate that the average price of high and low quality imported, and local rice is about 63 Afghanis (Afs)/kg, 42 Afs/kg and 45 Afs/kg, respectively. An eyeballing of the prices of rice in the individual markets revealed that the local rice price is lower than high and low quality imported rice prices in Jalalabad and Kabul whereas it is higher than the low quality imported rice price in Balkh. Our analysis based on data from the National Risk and Vulnerability Assessment (NRVA) 2007/08 also showed that the district–level prices of local and imported rice are such that the local rice price (44 Afs/kg) is lower than that of imported rice (63 Afs/kg), i.e., import parity price. Although the price of local rice is relatively lower than imported rice, its demand is very weak, presumably due to the poor quality of local rice. That is, as compared to imported rice, local rice may be price competitive but not quality competitive.

The pattern of changes in high and low quality rice prices, during January 2007 to October 2016, is presented in Figures 3 and 4. The Figures provide a better outlook of the behavior of rice prices in the major (Kabul, Kandahar, Jalalabad, Hirat and Balkh) and rural (Maimana, Faizabad and Nilli) provincial markets of high and low quality rice in the country. It is evident from the Figures that the high and low quality rice prices may move together, among themselves, in the long–run but

**Table 2.** Average values of selected indicators describing important aspects of the major provincial rice markets in Afghanistan

| Variables | Averages for the Individual Provincial Rice Markets | | | | | Grand Average |
|---|---|---|---|---|---|---|
| | Kabul | Jalalabad | Kandahar | Hirat | Balkh | |
| Business Experience (years) | 8.27 | 14.89 | 17.50 | 9.75 | 26.08 | 15.82 |
| Quantity of Imports (tonnes/year) | 1827.21 | 995.80 | 244.55 | 1635.00 | 1148.17 | 1159.10 |
| Frequency of Imports Per Year | 17.5 | 16.30 | 3.36 | 21.75 | 36.00 | 19.17 |
| Imported Rice Purchased in Single Transaction (tonnes) | 349.58 | 136.40 | 84.55 | 82.25 | 74.00 | 151.60 |
| Storage Capacity (tonnes) | 450.48 | 198.00 | 124.09 | 95.00 | 97.08 | 196.64 |
| Monthly Rice Sales (tonnes) | 188.15 | 55.40 | 29.18 | 78.75 | 41.21 | 76.10 |
| Price of High Quality Rice (Afs/kg) | 66.01 | 63.40 | 64.73 | 58.43 | 60.29 | 62.83 |
| Price of Low Quality Rice (Afs/kg) | 34.80 | 57.25 | NA | 31.00 | 36.5 | 41.68 |
| Price of Local Rice (Afs/kg) | 29.30 | 27.00 | NA | NA | 50.78 | 45.22 |
| Transaction Costs (Afs/tonne) | 6625.07 | 6520.10 | 9404.10 | 1781.25 | 7450.50 | 6584.59 |

*Source:* Own survey results
*Note:* NA and Afs stand for Not Available and Afghanis, respectively

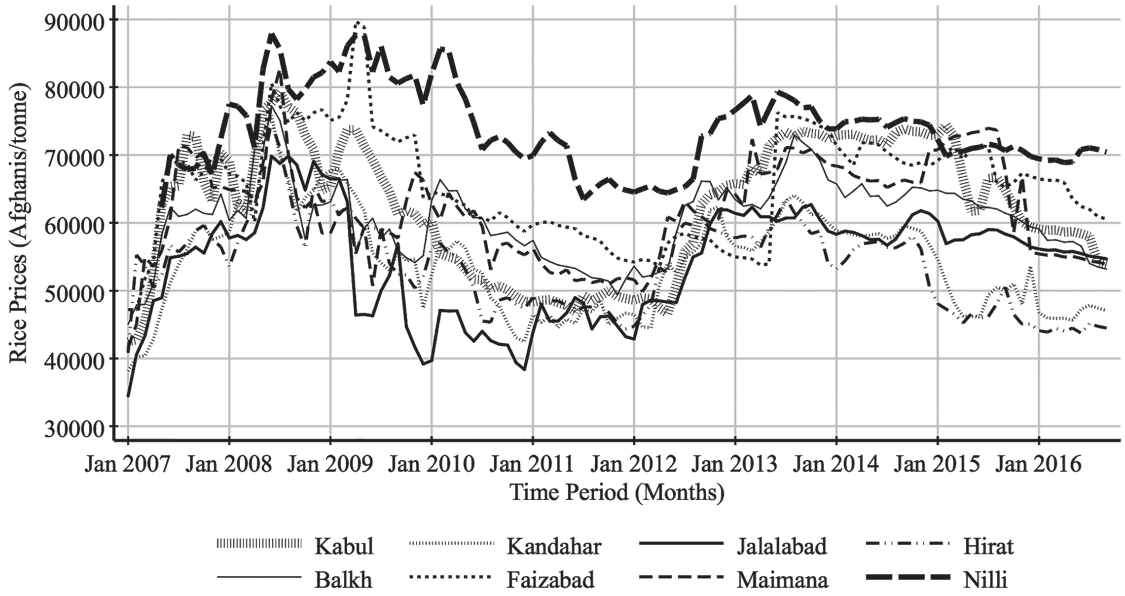


**Fig. 3.** Pattern of changes in high quality rice prices (real) in the provincial rice markets during January 2007 to October 2016.
*Source:* Own presentation using data from market price bulletins of the World Food Program, Afghanistan

their behavior vary across the years as denoted by the vertical lines. Likewise, the level and volatility of rice prices are different across the markets. They are relatively higher in the rural provincial markets of Nilli and Faizabad. As mentioned in the preceding paragraph, overall, the rice prices normally decline during the last quarter of the year (September–December), which demonstrate their seasonal behavior.

Table 3 reports the percentage values of key selected features of the major provincial rice markets in the country. Majority of the wholesalers in Kabul (67%), Hirat (63%) and Balkh (91%) are largely specialized, i.e., they only purchase and sell rice. There may be a positive correlation between the size of business and degree of specialization in the rice markets. As regards the purchase of local rice, only about 75%, 40% and 17% of the wholesalers in Balkh, Jalalabad and Kabul reported that they purchase and sell local rice, respectively. In contrast, no wholesaler in Kandahar and Hirat is reported to be engaged in the local rice business. Balkh and Jalalabad are the two markets surrounded by the major rice producing regions (Figure 2). These two markets are geographically more closely located to Kabul, the capital market, than Hirat and Kandahar rice markets. Hence, local rice is purchased and sold predominantly in the markets near the major rice producing regions. This may also indicate a lower probability of integration between the surplus and deficit regions, which may be a major challenge before achieving self–sufficiency in rice production.

The common reasons given by the respondents for not purchasing the local rice are as follows: (1) local rice is inferior in quality to imported rice; (2) consumers do not prefer local rice (72% of the traders reported that local rice is less preferred to imported rice by consumers) and its demand is very weak due to poor quality; (3) local rice is poorly processed with inadequate cleaning; (4) local rice has poor cooking quality and it cannot be used at festivals and ceremonies such as weddings by restaurants and households, which is a major and growing segment of demand for rice in the country; (5) the supply of local rice is not stable due to droughts and traditional production system (around 52% of the wholesalers said that the availability of local rice is sufficient in the market throughout the year, especially in Balkh); and (6) an alleged claim by some traders that the prices of local rice is high, which is not supported by the existing price data except in Balkh as mentioned above. The preceding issues should be addressed in the national rice promotion strategy of Afghanistan.

Majority of the traders (67%) reported that the demand for rice has decreased in the recent years, which is attributed to a drastic decline in income and rising unemployment rate. Hassanzoy *et al*. (2015, 2016a) conjecture that a price shock may increase the demand for low quality rice more than high quality rice due to the substitution effects. About 68% of the traders confirmed that the demand for low quality rice increases during a dramatic surge in rice prices as in addition to the consumers of low quality rice, some of the consumers of medium and high quality rice may also shift to low quality rice consumption. Similarly, wheat and rice may be close substitutes for each other as around 83%, 75% and 63% of the wholesalers in Kabul, Balkh and Hirat markets, respectively, observed that consumers substitute wheat and rice for each other under a substantial increase in the prices of one of them. These substitution relations are used as coping strategy by consumers during dramatic price shocks, which shall be considered by policy makers.

A vast majority of the rice traders (73%) reported that the supplier country (Pakistan) does not impose any restrictions on rice exports to Afghanistan. The increasing political tensions between Afghanistan and

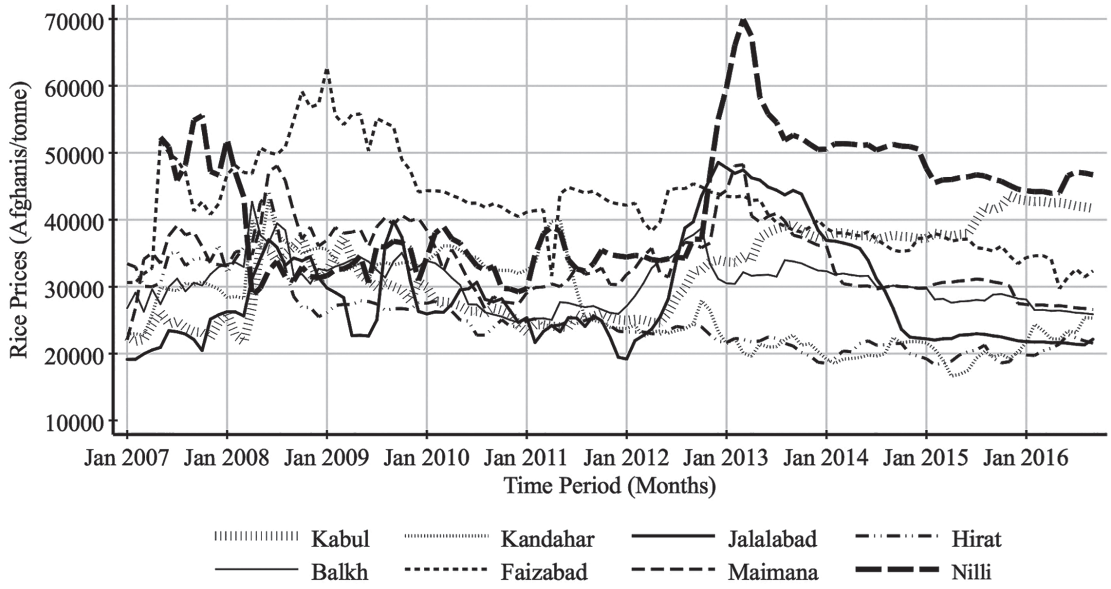


**Fig. 4.** Pattern of changes in low quality rice prices (real) in the provincial rice markets during January 2007 to October 2016.
*Source:* Own presentation using data from market price bulletins of the World Food Program, Afghanistan

Pakistan have affected bilateral trade between the two countries, however. As reported by 92% of the traders, Afghan government does not exercise any notable trade policy measures when the domestic prices of rice increase dramatically. The only trade policy may be changing the rate of import tariff on rice.[5] In addition, a large share of the traders (96%) expressed a sense of contentment in the quality of imported rice even though the quality of imported rice, as indicated by 65% of the traders, is not controlled at the borderers.[6] As other businesses in the country, rice trade is said to be negatively affected by insecurity as indicated by 90% of the respondents.

**Storage capacity and total volume of imports and sales of rice**

The storage capacity, quantity of imports and volume of sales of rice are estimated from the sample data and the results are reported in Table 4. It is evident from the Table that about 59,773 tonnes of rice is imported to the five major provincial markets each year of which around 46,572 tonnes, including local rice, is sold annually. The remaining quantity may be left as carry over stock given the total storage capacity of approximately 9,975 tonnes. Roughly speaking, if the full storage capacity is exhausted, the markets would be capable to supply rice for about two months and a half under a severe shortage in the markets. It seems that due to the stable supply of imported rice, the traders' storage capacity is very low with little chances of speculation. However, traders import and store large volumes of rice during the harvest season of rice in Pakistan when the prices tend to be very low. It should be noted that Kabul is the largest market in terms of annual imports (about 34% of total annual imports), sales (around 49% of total monthly or annual sales) and storage capacity (47% of the total storage capacity).

Although no strategic reserve of rice is maintained by Afghan government at present, the forthcoming national rice promotion strategy considers a stockpile of 70 to 75 thousand tonnes of milled rice, i.e., about 10% of the projected national requirements of milled rice by 2021 (700 to 750 thousand tonnes). The purpose of maintaining the rice stock is twofold: (1) to meet the

**Table 3.** Percentage values of selected indicators describing important aspects of the major provincial rice markets in Afghanistan

| Variables | Percentages for the Individual Provincial Rice Markets | | | | | Overall Percentage |
|---|---|---|---|---|---|---|
| | Kabul | Jalalabad | Kandahar | Hirat | Balkh | |
| Traders Trading: Only Rice, (Rice and Others) | 66.67 (33.33) | 40.00 (60.00) | 36.36 (63.63) | 62.50 (37.50) | 91.67 (8.33) | 60.38 (39.62) |
| Availability of Imported Rice: Sufficient, (Insufficient) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) |
| Purchase of Local Rice: Yes, (No) | 16.67 (83.33) | 40.00 (60.00) | 0.000 (100.0) | 0.000 (100.0) | 75.00 (25.00) | 28.30 (71.70) |
| Availability of Local Rice: Sufficient, (Insufficient) | 80.00 (20.00) | 40.00 (60.00) | 0.000 (100.0) | NA | 100.0 (0.000) | 51.61 (48.39) |
| Influence of Large Traders: Yes, (No) | 70.00 (30.00) | 20.00 (80.00) | 90.00 (10.00) | 50.00 (50.00) | 50.00 (50.00) | 56.25 (43.75) |
| Trade Restrictions by Suppliers: Yes, (No) | 0.000 (100.0) | 10.00 (90.00) | 36.36 (63.64) | 62.50 (37.50) | 33.33 (66.67) | 26.92 (73.08) |
| Substitution of Rice and Wheat: Yes, (No) | 83.33 (16.67) | 33.33 (66.67) | 9.09 (90.91) | 62.50 (37.50) | 75.00 (25.00) | 53.85 (46.15) |
| Change in Demand for Rice: Increased, (decreased), [not changed] | 36.36 (45.45) [18.18] | 10.00 (90.00) [0.000] | 27.27 (72.73) [0.000] | 25.00 (75.00) [0.000] | 25.00 (58.33) [16.67] | 25.00 (67.31) [7.69] |
| Type of Rice Purchased under a Price Spike: HQR, (LQR), [LR], {None} | 25.00 (75.00) [0.000] {0.000} | 0.000 (50.00) [0.000] {50.00} | 27.27 (54.55) [0.000] {18.18} | 12.50 (87.50) [0.000] {0.000} | 8.33 (75.00) [8.33] {8.33} | 15.09 (67.92) [1.89] {15.09} |
| Consumer Prefer Local Rice Over Imported: Yes, (No) | 8.33 (91.67) | 50.00 (50.00) | 54.55 (45.45) | 0.000 (100.0) | 54.55 (45.45) | 35.29 (64.71) |
| Traders Satisfied with the Quality of Imported Rice: Yes, (No) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) | 100.0 (0.000) | 83.33 (16.67) | 96.23 (3.77) |
| Presence of the Trade Policy Measures: Yes, (No) | 0.000 (100.0) | 0.000 (100.0) | 10.00 (90.00) | 14.29 (85.71) | 16.67 (83.33) | 8.16 (91.84) |
| Quality Control of Imported Rice at Borders: Yes, (No) | 66.67 (33.33) | 20.00 (80.00) | 0.000 (100.0) | 12.50 (87.50) | 66.67 (33.33) | 35.42 (64.58) |
| Insecurity Negatively Affected Trade: Yes, (No) | 90.00 (10.00) | 100.0 (0.000) | 90.00 (10.00) | 75.00 (25.00) | 91.67 (8.33) | 90.00 (10.00) |

*Source:* Own survey results

*Notes:* Figures in brackets are percentages showing the response; NA: Not Available; LQR: Low Quality Rice; HQR: High Quality Rice; LR: Local Rice

[5] The import tariff on rice ranges from about 2.5% to 5% in the country.

[6] The quality of imported rice should be controlled at the borders as evidence of exporting synthetic, uncleaned and fake brands of rice is observed in some countries.

**Table 4.** Estimates of total quantity of rice imports, total quantity of rice sales and total storage capacity for the major rice markets in Afghanistan

| Markets | Total Quantity of Imports (tonnes/year) | Total Quantity Sales | | Total Storage Capacity (tonnes) |
|---|---|---|---|---|
| | | tonnes/month | tonnes/year | |
| Kabul | 20266.50 (33.91) | 1881.53 (48.48) | 22578.36 (48.48) | 4705.30 (47.17) |
| Jalalabad | 9958.00 (16.66) | 554.00 (14.27) | 6648 (14.27) | 1980.00 (19.85) |
| Kandahar | 2690.00 (4.50) | 321.00 (8.27) | 3852 (8.27) | 1365.00 (13.68) |
| Hirat | 13080.00 (21.88) | 630.00 (16.23) | 7560 (16.23) | 760.00 (7.62) |
| Balkh | 13778.00 (23.05) | 494.50 (12.74) | 5934 (12.74) | 1165.00 (11.68) |
| Grand Total | 59772.50 | 3881.03 | 46572.36 | 9975.30 |

*Source:* Own survey results
*Notes:* Figures in brackets are percentages of the grand total

needs of national army, public universities' hostels and public hospitals as well as (2) to use it as a buffer stock for price stabilization (MAIL, 2016). A long–term strategy for the development of rice sector should also consider the demand of industries that use rice as raw materials. This has been ignored in the country's proposed national rice promotion strategy.

**The degree of concentration in the rice markets**

Market concentration here means that a limited number of wholesalers or traders assume a larger share of the total rice sales in the markets. This dominance of a small number of sellers discourages competition and hence hinder efficient functioning of the market. The Herfindahl–Hirschman Index (HHI) is one of the widely–used measures of market concentration. Table 5 summarizes the point estimates of HHI for the five major provincial rice markets in the country. The results for individual rice markets show that Kabul, Kandahar and Hirat rice markets are strongly concentrated. Meanwhile, Jalalabad and Balkh rice markets are moderately concentrated, although the latter is close to strong concentration by the HHI definition. Similarly, about 90%, 70%, 50%, 50% and 20% of traders in Kandahar, Kabul, Hirat, Balkh and Jalalabad rice markets, respectively, reported that a small number of big traders do influence the rice markets in the country (Table 3). These results seem to attest to the existence of significant market concentration in the major provincial rice markets. Hassanzoy *et al*. (2017) also reported evidence of short– and long–run imperfections among the domestic markets of high and low quality rice, which may also include the existence of market power.

The rice traders and wholesalers have official associations in each of the major provincial market. These associations not only represents rice traders in the private sector matters but may also influence the market supply and commodity prices. These associations are also influenced by large traders. This may also contribute to market concentration and prevent efficient functioning of rice markets in the country. More deep analysis may be needed to investigate the working of traders' associations and their influence on competition and price determination.

**Determinants of the traders' rice import demand**

Estimating the trader's rice import demand function may be useful in understanding the factors that may affect the demand of traders for rice imports. Table 6 summarizes the results of traders' import demand function estimated in the current study. The explanatory variables included in the model explain about 32% of variations in the traders' import demand for rice. All of the variables included in the model have the expected signs as described in Table 1. Among the independent variables, trading experiences, purchasing power and

**Table 5.** Market concentration in the major provincial rice markets of Afghanistan

| Markets | HHI | The Pre–Defined Intervals for HHI | Interpretation |
|---|---|---|---|
| Kabul | 0.31 | HHI > 0.25 | Strong market concentration |
| Jalalabad | 0.20 | 0.15 < HHI < 0.25 | Moderate market concentration |
| Kandahar | 0.41 | HHI > 0.25 | Strong market concentration |
| Hirat | 0.28 | HHI > 0.25 | Strong market concentration |
| Balkh | 0.24 | 0.15 < HHI < 0.25 | Moderate market concentration |
| All Markets | 0.09 | 0.01 < HHI < 0.15 | Absence of market concentration |

*Source:* Own estimation from the survey data
*Note:* HHI stands for Herfindahl–Hirschman Index

transaction costs are statistically significant at the conventional levels. That is, a 1% increase in trading experience may increase traders' demand for rice imports by as much as 0.53%. This is understandable because the scale of their business, i.e., the volume of imports and sales, tends to expand over years as they gain more skills and knowledge through their practical business experiences. Similarly, the quantity of imported rice purchased in a single transaction, i.e., purchasing power, has positive effects on the traders' rice import demand. Such that, a 1% increase in purchasing power may lead to an increase of 0.35% in the traders' rice imports. As expected, transaction costs may negatively affect the traders' rice import demand. That is, a 1% increase in transaction costs may cause the rice import demand of traders to decline by about 0.59%. Factors such as purchasing power of traders, procurement of local rice by traders, trade restrictive measures, rice prices and transaction costs may be manipulated by policy makers to improve the working of rice markets and trade in the country.

**The structure of rice market and trade**

The survey of rice wholesalers/traders may not provide a comprehensive picture of the structure of rice markets and trade in Afghanistan unless it is combined with the available secondary data. Table 7 summarizes the pattern of changes in supply of and demand for milled rice in the country. On average, during 2001/02–2013/14, the country annually consumes about 493 thousand tonnes of milled rice of which 359 thousand tonnes (73%) is produced domestically and the remaining 134 thousand (27%) is imported. The demand for milled rice increased from 467 thousand tonnes in triennium ending (TE) 2003/04 to 481 thousand tonnes in TE 2013/14. The supply of milled rice also increased from about 467 thousand tonnes to 482 thousand tonnes during the same period. Kunduz, Baghlan, Takhar, Nangarhar and Laghman (Figure 2) are the top five rice producing provinces, which account for about 81% of the average total rice production during 2011/12–2015/16. The major determinants of increase in demand for milled rice in the country may be population growth and increase in per capita income whereas those for supply may be increase in domestic production and the recent upsurge in rice imports.[7]

It is worth noting that about 67% of the traders reported that the demand for rice has decreased in the recent years, most notably since the year 2014/15.[8] During 2001/02–2013/14, the total rice consumption

**Table 6.** Estimation results of the traders' rice import demand function

| Explanatory Variables | Notations | Coefficients ($\delta_i$) | Robust Standard Error | P–Value |
|---|---|---|---|---|
| Trading Experience | $X_1$ | 0.531* | 0.209 | 0.015 |
| Purchasing Power | $X_2$ | 0.352** | 0.119 | 0.005 |
| Purchase of Local Rice | $X_3$ | –0.372 | 0.406 | 0.364 |
| Trade Restrictions | $X_4$ | –0.562 | 0.427 | 0.195 |
| Rice Price | $X_5$ | –1.103 | 1.746 | 0.531 |
| Transaction costs | $X_6$ | –0.588** | 0.187 | 0.003 |
| Constant | $\alpha_0$ | 13.312* | 6.688 | 0.053 |

*Source:* Own estimations using the survey data
*Notes:* ** and * denote 1% and 5% levels of significance; number of observation = 53; $R^2$ = 32%; the joint hypothesis test is highly significant; RESET test failed to reject the null hypothesis of no omitted variables; Variance Inflation Factor (VIF) = 1.13; AIC = 177.35; BIC = 191.14

**Table 7.** Pattern of changes in supply of and demand for milled rice in Afghanistan during 2001/02–2013/14

| Triennium Ending (TE) | Production ('000 tonnes) | Imports ('000 tonnes) | Supply ('000 tonnes) | Utilization ('000 tonnes) | SSR (%) | ICR (%) |
|---|---|---|---|---|---|---|
| 2003/04 | 236.33 | 231.00 | 467.33 | 467.00 | 50.61 | 49.46 |
| 2007/08 | 350.33 | 167.67 | 518.00 | 518.67 | 67.54 | 32.33 |
| 2010/11 | 428.67 | 64.33 | 493.00 | 493.67 | 86.83 | 13.03 |
| 2013/14 | 374.67 | 107.33 | 482.00 | 481.00 | 77.89 | 22.31 |
| Average | 358.73 | 134.39 | 493.12 | 493.30 | 72.62 | 27.34 |

*Source:* Own presentation using data from FAOSTAT2016 online database
*Notes:* SSR and ICR denote Self–Sufficiency Ratio and Import Consumption Ratio, respectively

[7] The domestic production and imports of rice appear to be negatively correlated (coefficient of correlation = –0.86 [p–value = 0.0001] during 2000/01 to 2013/14). Although the availability of local rice is scarce in the markets across the country, this correlation suggests the importance of local rice in the national rice consumption.

[8] The major events that negatively affected the Afghan economy in post 2014 are said to include the drastic reduction of foreign troops, controversial election, increasing rates of unemployment, massive migration of youths, increasing instability and capital flight.

dropped marginally and the rate of decline is statistically not significant whereas the per capita rice consumption experienced a significant decline of –2.91% per year (Figure 5). The pattern of rice consumption per week is estimated from the National Risk and Vulnerability Assessment (NRVA) 2011/12 household data at the district level. The results are reported in Table 8, which show that about 61% of Afghan households did not consume high quality rice during a weak nor did around 24% of the households consume low quality rice in a week. In other words, approximately 39% and 76% of the households consumed high and low quality rice 1–7 times in a week, respectively. This suggests that a vast majority of households consume low quality rice in the country. On average, each household consumes about 3 kg of high and 4 kg of low quality rice per week. The rice consumed is largely purchased from the market place, i.e., about 98% of high and 93% of low quality rice is sourced from the market. Only about 1% of high and 3% of low quality rice consumed is produced by the households themselves. That is, local rice constitutes a tiny portion of the total rice consumed by the households in the country.

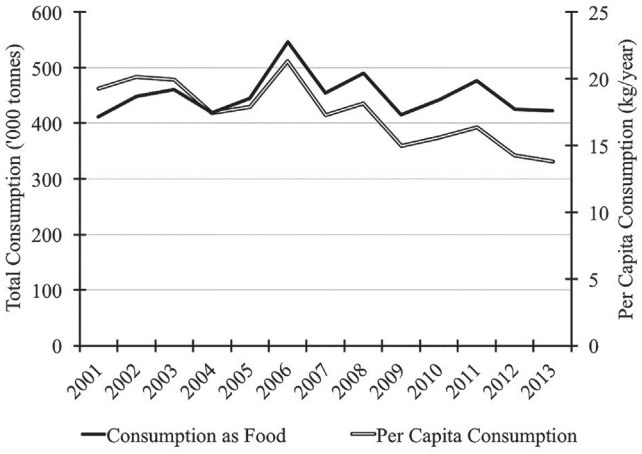


**Fig. 5.** Trends in total and per capita rice consumption during 2001/02 to 2013/14.
*Source:* Own presentation using data from FAOSTAT2016 online database

The self–sufficiency ratio (SSR) of rice has increased from about 51% to 78% between TE 2003/04 and 2013/14. Due to the subsistence rice production, low quality of local rice varieties, tiny marketable surplus of local rice and paucity of modern rice processing mills, the country suffers from persistent deficit in rice production and appears far from self–sufficiency. The import to consumption ratio (ICR) of rice decreased from about 49% to 22% over the same period (Table 7). On average, during 2013/14–2015/16, the country imports 218 thousand tonnes of rice per year (26% high quality and 74% low quality) from various countries with a total value of about US$ 70 million, i.e., an amount equal to 1.4% of the country's agricultural GDP. Pakistan is the only major supplier of rice to the country that accounts for 94% (205 thousand tonnes) of total annual rice imports to the country (22% high quality and 78% low quality) with a value of approximately US$ 60 million during the same period. However, our survey of the rice markets demonstrates that almost all of the rice imports are from Pakistan with occasional imports from India, i.e., only one trader in Jalalabad rice market reported that he imports rice mainly from India. The name of certain rice brands sold in domestic markets can be misleading. For instance, Indian Sela rice is indeed an Indian rice variety grown and produced in Pakistan. Consumers may consider it to be produced and imported from India, however.

Pakistan is the fifth largest exporter of rice in the world that accounts for about 9% (2.85 million tonnes) of the total rice exports in the world (38.25 million tonnes) during 2000/01–2013/14. More than 88% of the total rice output in Pakistan is produced in its Punjab and Sindh provinces. Basmati rice is mainly produced in Punjab whereas IRRI (white long grain rice) is grown in both Punjab and Sindh. Rice trade in the country is executed by the private sector with little or no government intervention since the disbandment of the state–run Rice Export Corporation of Pakistan in the year 2000 (USDA, 2015).

The inflows of imported and domestic rice to the major provincial markets, the linkages among the provincial rice markets and the distribution of rice supplies

**Table 8.** Weekly rice consumption and sources of rice supply in Afghanistan

| Frequency of Rice Consumption During a Week | | | Sources of Rice Consumption | | |
|---|---|---|---|---|---|
| Frequency | HQR (%) | LQR (%) | Sources | HQR (%) | LQR (%) |
| 0 | 61.33 | 24.33 | Purchased | 98.11 | 93.13 |
| 1 | 16.11 | 15.67 | Own production | 0.79 | 2.70 |
| 2 | 12.24 | 24.47 | Bartered/payment in kind | 0.06 | 0.02 |
| 3 | 5.87 | 17.38 | Borrowed/ taken in credit | 0.76 | 3.74 |
| 4 | 2.36 | 9.27 | Received as gift | 0.11 | 0.12 |
| 5 | 0.87 | 3.88 | Food aid | 0.14 | 0.23 |
| 6 | 0.28 | 1.25 | Others | 0.02 | 0.06 |
| 7 | 0.94 | 3.75 | Consumption (kg/week) | 2.99 | 3.56 |

*Source:* Own calculations from the National Risk and Vulnerability Assessment (NRVA) 2011/12 database
*Notes:* HQR: high quality rice; LQR: low quality rice

throughout the country are portrayed in Figure 6. The domestic supply of rice is comprised of domestic production and imports. Afghan traders import rice largely from the rice mills in Punjab and Sindh provinces of Pakistan. The imported rice enters into the country through Torkham (in Nangarhar province), Ghulam Khan (in Khost province) and Speen Boldak (in Kandahar province) border customs, which is transferred to the major provincial markets, i.e., Kabul, Jalalabad, Kandahar, Hirat and Balkh (Figure 2). The imported rice is then sold to the surrounding provinces and on occasions to distant provinces as well. Local rice also follows the similar path but their distribution tends to be concentrated in the nearby markets, i.e., closer to major rice producing provinces. The Figure also indicates that bidirectional trade flows exist between some of the major rice markets. Trade reversal among the provincial rice markets could occur as well.

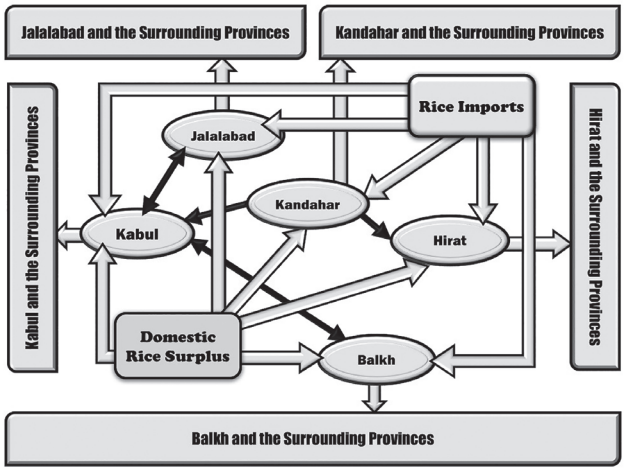


**Fig. 6.** The flows of imported and local rice to the major rice markets in the country.
*Source:* Own survey

## The rice value chain

The rice value chain in Afghanistan is relatively short at present. Paddy is processed into milled rice largely through traditional methods and it is mainly consumed as cooked food such as *Qabuli Pallaw*.[9] The demand for rice is expected to increase in conjunction with population growth, income growth and the development of industries that are using rice as raw material. A schematic presentation of the rice value chain is displayed in Figure 7. To begin with, the local paddy rice is processed into milled rice using conventional processing techniques. A large proportion of the milled rice is then consumed by the farmers' households. The remaining milled rice is often sold by farmers to the nearest provincial markets, which is then sold to consumers. A tiny amount of local rice may also be sold in the village and district markets.[10] Representatives of rice wholesalers in the provincial markets also directly purchase milled rice from the farmers. There are three commercial rice processing mills in the country, two in Nangarhar and one in Kunduz province. They purchase paddy rice from farmers and process it into milled rice, which is then supplied to provincial rice markets, rural retailers and directly to consumers. These rice mills are not working at their full capacity, however. As regards the imported rice, Afghan rice traders purchase milled rice from rice mills in Punjab or Sindh of Pakistan, which is then transported to the major provincial markets. The imported rice is subsequently sold to other wholesalers, rural and urban retailers (in the province of major provincial market and other surrounding provinces) or directly to consumers.

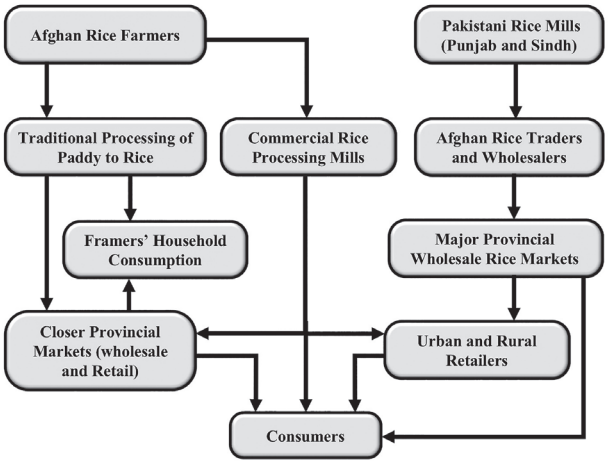


**Fig. 7.** A schematic presentation of the rice value chain in Afghanistan.
*Source:* Own survey and information

## The types of local and imported rice available in the markets

The types of local and imported rice available in the major provincial markets are classified into high and low quality rice by the respondents on the basis of their share of broken rice kernels and cooking quality. However, there are no well–defined criteria for classifying local and imported rice to specific categories by quality in the country, which require separate studies. Generally, the high–quality rice has long kernels and lower share of broken rice with good cooking quality, e.g., Palawe. The low–quality rice, conversely, is largely broken with poor cooking quality, e.g., Sholayee. Table 9 presents the types of local and imported rice available in the major provincial markets at the time of the survey. Among the local rice varieties, only Baghlani rice is identified as high quality whereas Look, Behsoodi, Sorkha, Sha Lawangee, Zarati Watani, Bara and Sela–e–Zarati

[9] Qabuli Pallaw is a popular Afghan dish made of rice, carrots and raisins.
[10] The information of rice value chain from farmers to consumers is based on our field research and a short–survey of farmers in two villages of Laghman province. Additional efforts may be needed to map the rice value chain between farmers and consumers as well as between rice mills and consumers.

rice are regarded as low quality.[11] As regards imported rice, there are as many brands of rice as the number of traders/wholesalers in the markets but the types of imported rice branded are not so many. Indian Sela, Pakistani Sela, Super–5 and Broken Sela are reported as high quality imported rice whereas Chocha Sela/Super–1, Batt Sela, Parmal, Sapedak, Kernal Sela, Thailandi and Ere–9 are regarded as low quality imported rice.

**Table 9.** The types of local and imported rice available in the provincial markets

| Local Rice | Quality | Imported Rice | Quality |
|---|---|---|---|
| Baghlani | High Quality | Indian Sela | High Quality |
| Look | Low Quality | Pakistani Sela | High Quality |
| Behsoodi | Low Quality | Chocha Sela/Super–1 | Low Quality |
| Sha Lawangee | Low Quality | Batt Sela | Low Quality |
| Zarati Watani | Low Quality | Super–5 | High Quality |
| Bara | Low Quality | Parmal/Sholayee | Low Quality |
| Sela–e–Zarati | Low Quality | Broken Sela | High Quality |
| Sorkha | Low Quality | Sapedak | Low Quality |
| | | Kernal Sela | Low Quality |
| | | Thailandi | Low Quality |
| | | Ere Nine | Low Quality |

*Source:* Own survey results

**The problems and challenges in the rice trade and marketing**

The following problems and challenges were reported during the survey: (1) the full import tax is not paid by the transportation companies, contracted by traders to transport their rice consignments, due to corruption in customs; (2) the declining demand for rice in the last few years; (3) unofficial rice trade and illegal fees taken along the way to destinations; (4) higher fees of obtaining import license and new brand registration; (5) transactions with deferred payment, which have a higher chance of default; (6) counterfeit activities and selling fake products; (7) higher transportation costs and problems in transportation; (8) no government support policies and insecurity along the highway; (9) political problems between Pakistan and Afghanistan negatively affect trade; (10) increase in government taxes, and fares of shops and warehouses; (11) depreciation of Afghanis against US dollar and price volatility; and (12) no standard storage system and the loss of rice in storage. Some of these listed issues and challenges should be targeted in the forthcoming national rice promotion strategy of Afghanistan. They may be addressed effectively through a public–private–partnership (PPP) approach.

## SUMMARY AND CONCLUSIONS

This paper has examined several important issues and aspects of domestic rice markets and trade in Afghanistan at the wholesale level of rice value chain including imports from abroad. The analysis is based upon primary data collected from the five major provincial rice markets through the authors' field survey as well as other relevant secondary (cross–sectional and time series) data. Descriptive statistics, Herfindahl–Hirschman Index and a double–log linear model are used in the process of data analysis.

Among the five major provincial rice markets studied, Kabul rice market, as the largest commercial center in the country, is leading the remaining four markets in majority of the selected indicators analyzed. Meanwhile, the local rice is largely available and purchased by the wholesalers/traders in the markets surrounded by major rice producing provinces, i.e., Balkh and Jalalabad rice markets, whereas it is scarce or non–available in the rice deficit markets of Kabul, Kandahar and Hirat. This indicates that the surplus and deficit markets of local rice may not be integrated, which is an obstacle to achieving self–sufficiency in rice production. Moreover, due to the tiny marketable surplus of local rice, their harvesting season may not have substantial effect on domestic rice prices. Although the local rice prices are lower than import parity prices, its demand is very weak due to poor product quality. This suggests that local rice may be price competitive but not quality competitive as compared to imported rice. Thus, there is a need for improving the quality of local rice varieties and reducing their cost of production so that they can be more competitive against imported ones.

The presence of moderate to strong concentration in the five major rice markets along with the influence of large traders is observed. This may hinder the efficient functioning of rice markets in the country. In addition, the rice value chain is very short, which may be extended by the establishment of relevant industries. Encouraging the imports of paddy rice while restricting the imports of milled rice can, with some key conditions met, stimulate the development of rice milling industry and extend its value chain in the country. The traders' storage capacity is very small and public reserves of rice do not exist at present. A long–term strategy for the development of rice sector in Afghanistan should entail a serious consideration of the industrial demand for rice along with maintaining a modest amount of buffer stock of rice. Moreover, the demand of traders for rice imports is determined by, *inter alia*, their cumulative business experiences, purchasing power of imported rice and the amounts of transfer costs incurred.

The high and low quality rice as well as rice and wheat appear to be close substitutes for each other in the context of Afghanistan. These substitution relationships are used as coping strategy by consumers under a

[11] The local rice varieties are of *Indica* and *Japonica* types. However, all of the local rice varieties cultivated across the country have not been classified into these two types yet.

substantial increase in the rice or wheat prices. In addition, the majority of Afghan households are found to consume low rather than high quality rice. This is most likely due to their low levels of income. This implies that the abnormalities in low quality rice market shall be controlled for mitigating their impact on the poor households. The rice consumed by households is mainly purchased from the local or regional markets, a large bulk of which is imported from Pakistan. Although the supply of imported rice is sufficient in the major provincial markets, diversifying the sources of imports may contribute to the stability of domestic rice market.

## AUTHORS CONTRIBUTIONS

Najibullah HASSANZOY is the principal investigator of this study who has designed the study, conducted the survey, performed the data analysis and interpretation and written the draft of this manuscript.

Yuichiro AMEKAWA supervised the study and reviewed the manuscript.

Hiroshi ISODA provided comments and supervised this research.

Shoichi ITO is the major supervisor of the first author who provided supervision and guidance throughout this study along with reviewing the manuscript.

## ACKNOWLEDGEMENTS

The authors are grateful to the individuals who contributed directly or indirectly in the field survey of rice markets in Afghanistan. The responsibility of any error remaining in this article is ours.

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**Appendix 1.** Description of the secondary data used in this study and their sources.

| Data Series | Discerptions | References |
|---|---|---|
| High and Low Quality Rice Prices | Retail prices of rice in the eight provincial central markets, namely, Kabul, Jalalabad, Kandahar, Hirat, Nilli, Maimana, Balkh and Faizabad<br>*Period: January 2007 to October 2016* | *Market Price Bulletins*, Vulnerability Analysis and Mapping Project of the World Food Program (WFP), Afghanistan Office |
| Rice Production | Rice production at the provincial levels.<br>*Period: 2011/12 to 2015/16.* | *Statistical Yearbooks*, Central Statistics Organization (CSO), Afghanistan |
| Rice Imports | The value and quantity of rice imports.<br>*Period: 2013/14 to 2015/16* | *Trade Yearbooks*, Central Statistics Organization (CSO), Afghanistan |
| Rice Balance Sheet | Rice production, consumption and trade<br>*Period: 2001/02 to 2014/15* | *FAOSTAT2016*, Food and Agriculture Organization of the United Nations |
| Weekly Rice Consumption and District Level Prices | The pattern and quantity of rice consumption during a week and rice prices at the district level.<br>*Years: 2007/08 and 2011/12* | *National Risk and Vulnerability Assessment* (NRVA), Central Statistics Organization (CSO), Afghanistan |