

RICE SECTOR OF PAKISTAN

ABSTRACT

This report analyses the rice value chain in Pakistan with the aim of identifying the value capture opportunities in the sector, attractive international markets for locally produced rice, and the key constraints in the rice value chain and possible solutions to address these issues.

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2020

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Background

The rice sector in Pakistan is extremely important in terms of export earnings, domestic employment, rural development, and poverty reduction. Rice is an important food as well as cash crop in Pakistan. It accounts for 3.0 percent of the value added in agriculture and 0.6 percent of GDP. After wheat, it is the second main staple food crop. During 2018-19, rice crop area decreased by 3.1 percent (to 2,810 thousand hectares compared to 2,901 thousand hectares of last year). The production stood at 7,202 thousand tonnes against the target of 7.0 million tonnes and remained short of 3.3 percent to 7,450 thousand tonnes against last year. The production declined due to decrease in area cultivated, dry weather and shortage of water. The area, production and yield of rice last five years are shown in Table 2.6 and Figure 2.3.

Year	Area		Production		Yield	
	(000 Hectare)	% Change	(000 Tonnes)	% Change	(Kgs/Hec.)	% Change
2014-15	2,891	-	7,003	-	2,422	-
2015-16	2,739	-5.3	6,801	-2.9	2,483	2.5
2016-17	2,724	-0.5	6,849	0.7	2,514	1.2
2017-18	2,901	6.5	7,450	8.8	2,568	2.1
2018-19(P)	2,810	-3.1	7,202	-3.3	2,562	-0.2

Source: Pakistan Bureau of Statistics, P: Provisional (July-March)

The present government's resolution is to enhance agriculture productivity. In this connection Prime Minister's Agriculture Emergency Program has been initiated which primarily focused on productivity Enhancement of Wheat, Rice & Sugarcane

Strong credit demand for working capital stemmed from manufacturing sector of which major contributors are textiles, food products & beverages, rice processing. Export oriented industries of textile and basmati rice availed higher credit due to higher raw material prices amid currency depreciation

Food group constituting 19.6 percent of overall exports posted a decline of 2.4 percent as compared to same period last year. Within the food group, export of rice comprises 44.4 percent of total food group declined by 0.5 percent causing a major setback in overall food exports. The quantum drop in rice was 5.0 percent but its value declined by 0.5 percent. This underwhelming picture is attributed to the competition faced by Pakistan from its competitors like Africa and China. Pakistani exporters are facing tough time against Chinese competitors as they are offloading their stock at lower prices. However, to tackle this situation government is taking necessary steps

including reclaiming traditional markets besides accessing to new markets. Removal of restriction by Qatar on Pakistani rice export is a step in this direction that will reclaim Pakistan's share in the global rice market. Moreover, China has agreed to give duty free access to 200,000 tons of rice from Pakistan in the current calendar year.

Types of Rice

Rice is traded in three primary forms: fully milled, brown, and rough rice.

Rough rice is rice that has not been milled, thus both the husk (outermost layer of the paddy grain) and the bran layer remain attached to the kernel.

Brown rice is rice that has the husk removed but the bran layer is still attached.

Fully milled rice has both the husk and bran layer removed. The more of the bran layer that is removed the greater the degree of milling and typically the higher the price.

In addition, the fewer broken kernels, the higher the price. There are four major categories of rice worldwide:

Indica Rice: Indica rice is the dominant type of rice traded worldwide, accounting for almost four-fifth of global trade. Indica rice cooks dry, separate, and fluffy.

Japonica Rice: Is short grain and mostly grown in Japan. When cooked it has a sticky texture such that it can easily be picked up and eaten with chopsticks. Outside Japan it is sometimes labelled sushi rice.

Aromatic Rice: Medium- to long-grained and known for its nut-like aroma and taste. Varieties of aromatic rice include basmati and jasmine.

Glutinous Rice: Has opaque grains, very low amylose content, and is especially sticky when cooked

Three types of rice varieties are cultivated in Pakistan, such as Basmati type, IRRI type and Cold tolerant (bold and short grains). These varieties are area specific depending on environmental conditions.

Area of cultivation	Varieties
Central Punjab	Super Basmati, Basmati 370, Basmati Pak, Basmati 385, Basmati 2000, Shaeen Basmati, Basmati 515, PS-2,KS-282, KSK-133, NIAB IR-9, and rice hybrids.
Southern Punjab	Basmati 198, Super Basmati, PS-2, KS-434, KS-282, KSK-133, and rice hybrids
Upper Sindh	IR-6, DR-82, DR-83, DR-92, Sada Hayat, Sarshar, Shahkar and rice hybrids
Lower Sindh	IR-6, Shadab, Shua-92, Khushboo-95 and hybrids
Baluchistan	IR-6, DR-83, Sarshar, Sada Hayat, Shahkar and rice hybrids
KPK (plains)	IR-6, KS-282, KSK-133, KSK-434
KPK (Swat area etc)	JP-5, Kashmir Nafees, Swat-I, Swat-II, Dilrosh-97, Fakher-e-Malakund

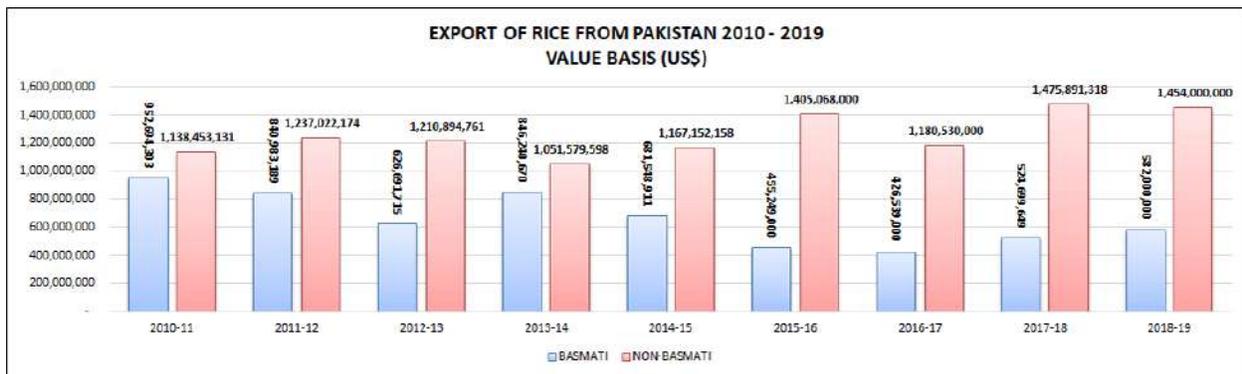
Rice products and sub-products are classified according to the stages of production in the following table. The classification of these products is necessary for mapping and identifying the processes in the value chain

Stage of Production	Rice Product
Primary	Rice in the husk (paddy/rough)
Semi-processed	Husked Rice (Brown Rice)
Processed Milled Rice	Broken Rice

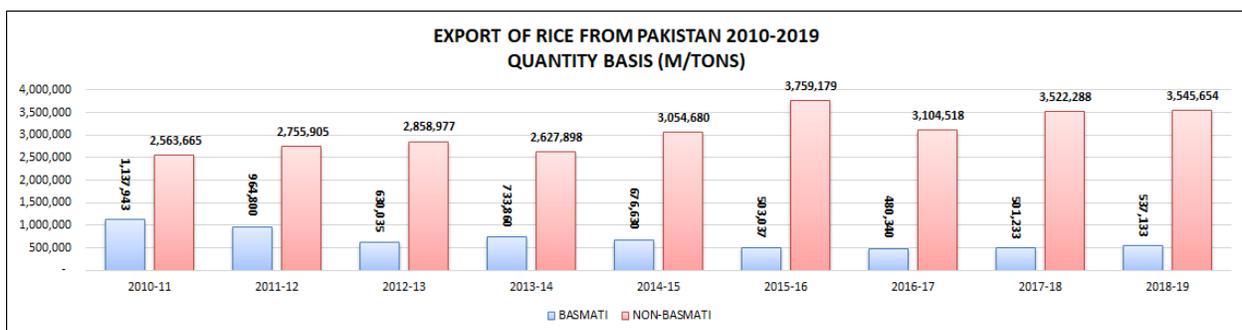
Rice Statistics

In Pakistan's context, rice statistics are pretty impressive. Sown on 2.89 million hectares (about 10 per cent of total cropping area), it earned \$2 billion (around 8pc of export income) for the

country. Put it in the agricultural context, it is second to wheat in acreage and, in economic terms, only second to cotton (and its allied products as per Pakistan Bureau of Statistics data) in export earnings. It accounts for 3.1pc of value-addition in the agriculture sector and varyingly contributes 1.3-1.6pc to the GDP. Last year, it assumed added significance when production hit 7.4 million tonnes placing Pakistan on the list of the 10 largest producers on the world rice chart. According to the Economic Survey of Pakistan (2017-18), the area under rice increased by 6.4pc — 2.74 million hectares in 2016-17 to 2.89 million hectares and production swelled by 8.7 per cent — from 6.84 million tonnes to 7.44 million tonnes.



Both these factors helped Pakistan post a 28pc increase in rice export. According to data from the Rice Exporters Association of Pakistan (Reap), it sent out a little over four million tonnes (for \$2 billion) in 2018, as compared to 3.44 million tonnes for \$1.6 billion in 2017. This showed a significant growth of 27.7 per cent in terms of value and 17 per cent in terms of quantity.



As far as profiling of rice is concerned, its three board categories are: basmati (long grain and aromatic), coarse (IRRI type) and a generic term called “others.” The last type comprises of hybrid, unapproved and some smuggled varieties that have crept in due to relaxed official control.

What adds to national seed confusion is the fact that the country has approved 108 varieties in the last 15 years — from 2003 to 2018. All of them are now entitled to sale. However, only 48 of them are actually released and found in the field, depending on requirements of different ecological zones. It is the Chinese hybrids which have made the difference in the last two years.

This scenario has two sore points: it is still stuck in a low yield groove and failing in international retail markets. Despite a massive influx of seeds, Pakistan has not been able to break beyond 2.56 tonnes per hectares production. The world average is 4.7 tonnes per hectare production. With high yielding seeds and recommended practices, 4 tonnes per hectare is easily achievable.

The federal Ministry for Food Security and Research took an initiative in 2015 for improving yield and tradable surpluses and enlisted the Chinese for help. For the next two years, both sides made a beeline towards each other's' fields and laboratories. It resulted in better hybrid seeds arriving in Pakistan and making a difference the very next year i.e. 2018. Last year's three-pronged increase was the result of the same effort: the area increased by 6.4pc, production went up by 8.7pc and average yield jumped from 825 kilogram per acre in 2010-11 to over 1,000 kilograms.

Despite this, improvements on the supply side and corresponding initiatives on the marketing side — domestic and international — is still a distant dream. Exports are largely restricted to bulk dumping in Middle Eastern markets while brand development is encouraged for domestic markets. These brands can then go beyond national borders and claim a niche in the world market.

Value Chain

To add value to this sector necessitates introduction of new technologies in the rice supply chain, from paddy, husking, and removal of foreign elements to grading, polishing storage, warehousing, and packaging. Quality assurances, conformity with quality, hygiene standards branding and research for evolving new, high-yielding rice seeds, will directly benefit growers and ensure higher entry in the Global Value Chain.

The rice value chain needs to be strengthened for Pakistan to remain competitive in the international market.

The mapping of the value chain identified that the rice value chain in Pakistan is short and highly disconnected. Most of the actors involved in the rice value chain perform their duties in isolation. Knowledge sharing mechanisms and advisory services are nearly non-existent. The lack of coordination between direct actors (farmers and millers) and indirect actors (research institutes and government) has resulted in limited innovation in farming practices, milling activities and development of new varieties. It is mainly due to this lack of coordination that Pakistan has been unable to improve its productivity in the last few years.

The value distribution for rice revealed that as the level of processing increases, the export unit value increases. Milled rice was identified as the product with the highest export unit value and profit margins.

The value chain performance indicates that Pakistan is one of the most competitive exporters of milled rice, broken rice and brown rice. The export competitive performance analysis revealed that Pakistan exports high value added products within the rice value chain. Pakistan's export performance is compared with regional competitors such as Thailand, India, Vietnam and Cambodia. India was identified as the regional benchmark for Pakistan due to the close proximity, similar weather conditions and cultivation of similar rice varieties in both countries. Vietnam and Cambodia were identified as Pakistan's future competitors due to their sustained improvement in export performance.

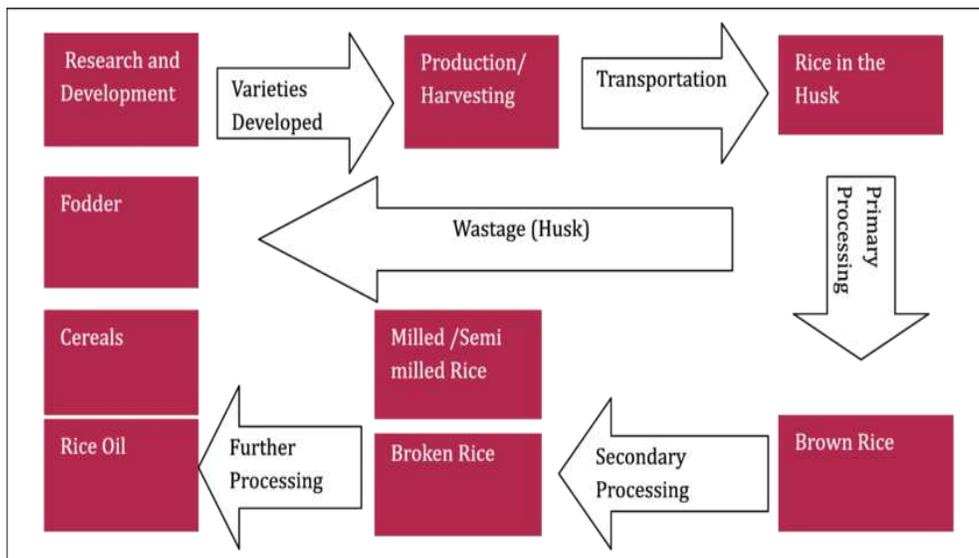
This value chain mapping exercise covers three fundamental aspects of the rice production process. The first aspect defines the processes that are involved in the transformation of rice from raw material to the final product. The second aspect identifies the chain actors, for example the

processing firms, suppliers, service providers, and institutional players. The third aspect identifies the linkages and relationships between the participating actors in the rice value chain.

Process

Figure 1 highlights the various stages of production in a rice value chain. It begins with the research and development of new rice varieties, seeds, and fertilizers, and supplements for plant nutrition, disease control, and plant protection. The rice research institutes are responsible for developing resistant varieties of Basmati and IRRI rice (two main types of rice grown in Pakistan) that can adapt to the geographical and climatic conditions of Sindh and Punjab. These varieties are distributed to the farmers who cultivate rice and ensure adequate provision of fertilizers, pesticides, and irrigation

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At the mill, the paddy rice undergoes various stages of processing. The level of moisture in paddy rice in Pakistan is around 30-32% whereas ideally it should be around 20-22%. Therefore, in the primary processing stage, the paddy rice is dried and the outer most layer of the rice is removed; at this point in the process the product is called husked or brown rice. In the secondary stage of processing, the husk of the rice is removed and the rice is polished, producing the semi or the wholly milled type of rice. A by-product of this process is the broken rice, which is also in great demand in the local and international markets due to its low price; further processing of rice leads to the production of high-value added goods such as flour rice, cereals, rice oil and fodder.

Actors

The direct actors involved in the rice value chain in Pakistan are the rice producers/farmers, the wholesalers, and the millers. Small-scale farmers usually cultivate rice on 1-6 acres of land and large-scale growers cultivate rice on 25-50 acres of land. A majority of farmers focus on fulfilling the domestic demand for rice and therefore lack the good practices required to grow rice that caters to the international standards. Farmers do not receive adequate information and advisory services regarding inputs such as high yielding varieties, fertilizers, pesticides and processes. According to market sources, farmers incur heavy losses during harvesting and the percentage of the broken rice is constantly on the rise. Moreover, the farmers do not get any assistance from the government in the form of price support.

The role of the 'agent' or the 'wholesaler' is to mainly collect the paddy rice from the growers and transport it to the millers. In some cases, the agent or the wholesaler also takes on the role of a 'sheller'. A sheller removes the shell from the paddy rice and supplies the product to the millers for further processing. The wholesalers have been heavily criticized for hoarding the rice supplies and setting the rate at which rice is traded in the domestic market.

The rice millers in the rice value chain are mainly responsible for cleaning, drying, husking and polishing the rice. There are numerous medium-scale millers in Pakistan but only a few large-scale millers like Guard Rice. The millers obtain the raw material from Pakistan but the machinery required for milling is imported from countries like China. Rice mills are capital intensive and employ skilled labour for the operation of machines. Female labour participation is limited to packaging operations. Rice millers supply rice in the domestic and international markets, thus in most cases the millers also take on to the role of the exporter.

Government institutes and public sector universities are conducting research and development exercises in the rice sector. Agriculture University Faisalabad and the Rice Research Institutes at Kala Shah Kaku and Dokri (Sindh) are actively carrying out research. However, the research being carried out by these institutes is not feasible at the commercial level. The Trade Development Authority of Pakistan (TDAP) is a public sector organization under the Ministry of Commerce mandated to work for Pakistan's integration in global trade. It assists rice exporters by organizing trade fairs and international expos aimed at facilitating rice exporters' access to potential markets. TDAP also regulates the tariff rate quotas issued under bilateral and multilateral trade agreements.

TDAP announces the availability of these quotas at spaced intervals to ensure their optimal utilization by the exporters. Other than this, public sector support for the rice sector is limited. Despite rice being an essential commodity for local consumption and one of the highest income generators of foreign exchange for the country, price subsidies and price regulation for farmers, millers or exporters are non-existent.

The Rice Exporters Association of Pakistan (REAP) is a private association which provides certification and accreditation to its members. The Association also facilitates exporters' access to buyers by organizing and participating in various trade fairs. The exporters at REAP are eager to participate in research and development activities in the rice sector

Linkages

Paddy rice from the producers reaches the millers through various channels. Two major channels were identified in the rice value chain in Pakistan. The first channel is direct, whereby the millers purchase paddy rice directly from the farmers. When this direct relationship is in place, millers are able to engage with the farmers during the cultivation of rice, provide them information and link them to advisory services about increasing the yield of rice. The second channel, which is the indirect channel, is the widely prevalent mechanism of trading rice in the local markets in Pakistan. This indirect method involves an intermediary- a wholesaler- who acts as a link between the farmer and the miller. The wholesaler buys paddy rice from the farmers and sells it to the millers. The exchange between the wholesaler and the miller takes place in a makeshift wholesale market in a central location of the town and is referred to as a Mandi in the local language. Millers process the paddy rice into final products such as husked rice, parboiled rice, and wholly/semi milled rice and supply them to the domestic and international markets. The wholesalers or the agents were identified as the most influential actors in the domestic value chain, who determine the price and quantity of rice being traded.

Governance

Governance in the value chain primarily refers to the formal and informal systems of coordination between the factors of production and the actors in the value chain. It basically identifies the global power relations between the firms participating in the value chain.

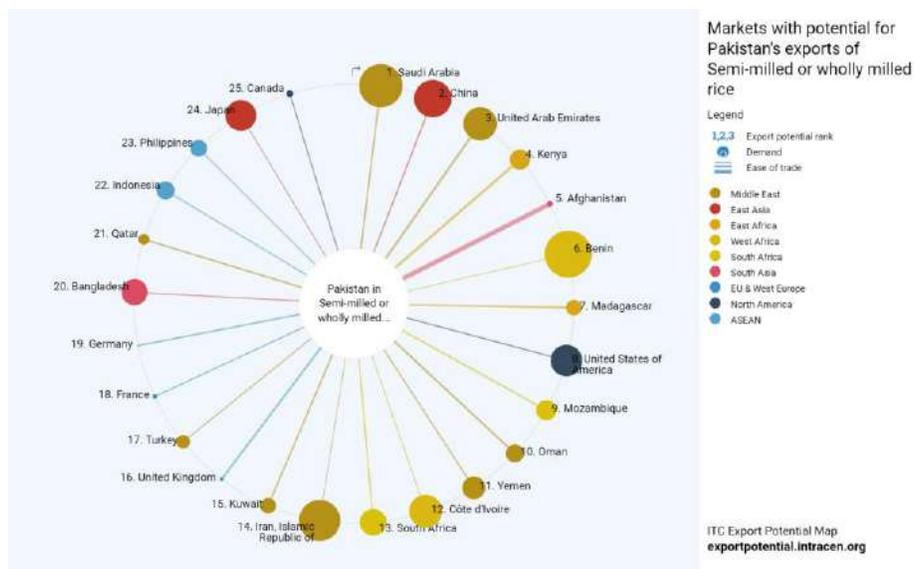
Due to the issue of food security attached to staple food items, rice trade in many countries is regulated by the government. Policy makers in countries such as Thailand, China and Vietnam control rice trade flow to ensure stability of prices in the domestic rice market. Their state agencies intervene to regulate rice trade and often time's import and export rice through government-to-government (G-G) contracts. The extent of the hold of the governments in rice trade was evident during the 2007-08 rice crisis, when exporting countries such as India and Vietnam enforced a ban on the export of rice, and importing countries such as the Philippines, Indonesia and Nigeria faced domestic food security issues (Mohanty, 2010). In Pakistan, TDAP advertises the government-to-government contracts and informs the private millers and exporters regarding the available export quota. Pakistan, Uruguay and Australia are the only countries that follow a market-oriented policy in the rice sector. The price of rice in these countries is determined solely by the interplay of the forces of demand and supply in the domestic and international market. There are no major multinationals in the global rice market that control the supply of rice. The local value chain mirrors this feature and there are no multinationals operating in the rice sector in Pakistan.

Exports and Global Markets

Pakistan exports 1.4bn worth of rice to the world whereas total imports of the world amount to 19.2 bn. Semi-milled or wholly milled rice shows the largest absolute difference between potential and actual exports in value terms, leaving room to realize additional exports worth \$715.3 mn.

On the demand side, the market for rice is geographically fragmented. The top rice importers are located in Asia, Middle East and Africa. China is one of the major importers of rice and its import accounts for a quarter of the total trade. Demand for rice is rapidly rising in African countries such as Nigeria. A rapid increase in the demand for rice products has also been seen in the Middle Eastern countries.

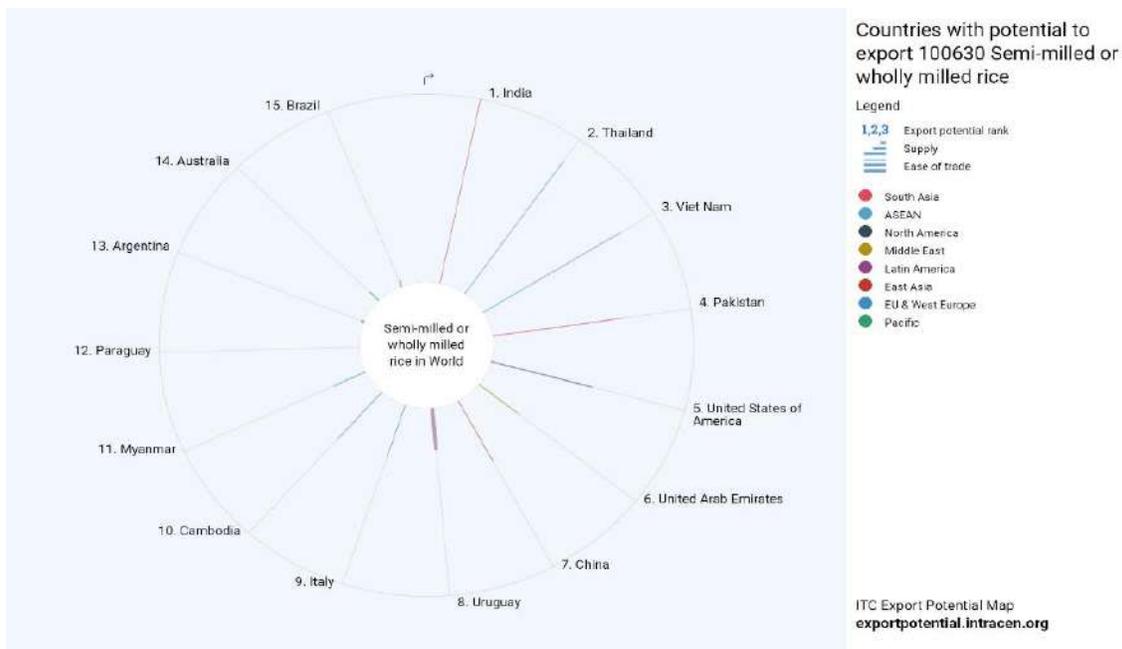
Product wise, the global trade for rice is clustered around two main products: fragrant rice and non-fragrant rice. The fragrant rice includes the basmati and jasmine rice. Basmati rice is mainly produced and exported by India and Pakistan. It is highly demanded in the European Union and the Middle Eastern countries. With the Indian government lifting the ban from the exports of rice, India has become the leading exporter of basmati rice. Jasmine rice is mainly grown in the East Asian countries such as Thailand, Vietnam and Cambodia and is highly demanded in the United States, China, Senegal and Ghana. All major exporters are involved in the export of the non-fragrant rice to destinations in Africa and the Middle East



The markets with greatest potential for Pakistan’s exports of 100630 Semi-milled or wholly milled rice are Saudi Arabia, China and United Arab Emirates. Saudi Arabia shows the largest absolute difference between potential and actual exports in value terms, leaving room to realize additional exports worth \$91.5 mn

The markets with greatest potential for Pakistan’s exports of 100640 Broken rice are Afghanistan, Senegal and China. Afghanistan shows the largest absolute difference between potential and actual exports in value terms, leaving room to realize additional exports worth \$45.9 mn

The suppliers with greatest potential to export 100630 Semi-milled or wholly milled rice to World are India, Thailand and Viet Nam. Paraguay has closest export links with World. India has the highest supply capacity in 100630 Semi-milled or wholly milled rice.



The international demand for rice and its products is quite dynamic, primarily because it is a staple food in many countries, especially in the East Asian and African regions. Due to the issue of food security attached to rice, trade for rice is limited and the largest producers of rice are not necessarily its largest exporters. Moreover, most of the rice producing countries are also the main consumers of rice, which results in strict controls on rice exports in these countries. Major Rice exporters of the world include Vietnam, Thailand, Cambodia and India. Historically Pakistan has been one of

the leading suppliers of rice in the world. According to the statistics issued by the International Trade Centre (ITC), Pakistan's exports of rice represent around 7.6% (2017-18) of the world exports, making it one of the top five global rice exporters.

Importing markets for a product exported by Pakistan

Unit : US Dollar thousand

Importers	Exported value in 2014	Exported value in 2015	Exported value in 2016	Exported value in 2017	Exported value in 2018
World	2199636	1927200	1703049	1743503	2001813
Kenya	261362	206026	191421	229104	188457
China	137478	167050	220821	95507	161302
Afghanistan	89677	138493	119496	124274	131367
United Arab Emirates	207827	135057	134721	179320	120483
Indonesia	20053	51779	41177	30369	119908
United Kingdom	113075	54052	30943	37467	95247
Tanzania, United Republic of	67927	56109	62316	67834	73051
Kazakhstan	2364	6990	15541	52181	68509
Saudi Arabia	133612	87937	61767	66549	65936
Oman	115820	104898	50537	64447	60967

Sources: ITC calculations based on UN COMTRADE and ITC statistics

Kenya, China and European Countries were leading importers of Pakistani rice. While, during the last fiscal year, exports to Indonesia also resumed and some 70,000 tons non-basmati rice was exported. Kenya is the largest buyer of Pakistani non-basmati rice and approximately Pakistan has exported over 400,000 metric tons of rice during the last fiscal year. One of the largest buyer of

Pakistani Basmati rice was Iran, but due to the non-availability of banking channel, Pakistani rice exporters are unable to export rice to Iran. Qatar has recently lifted ban on export of rice from Pakistan and also placed a 5000 tons rice export order.

List of Top 10 exporters for HS code 1006 rice

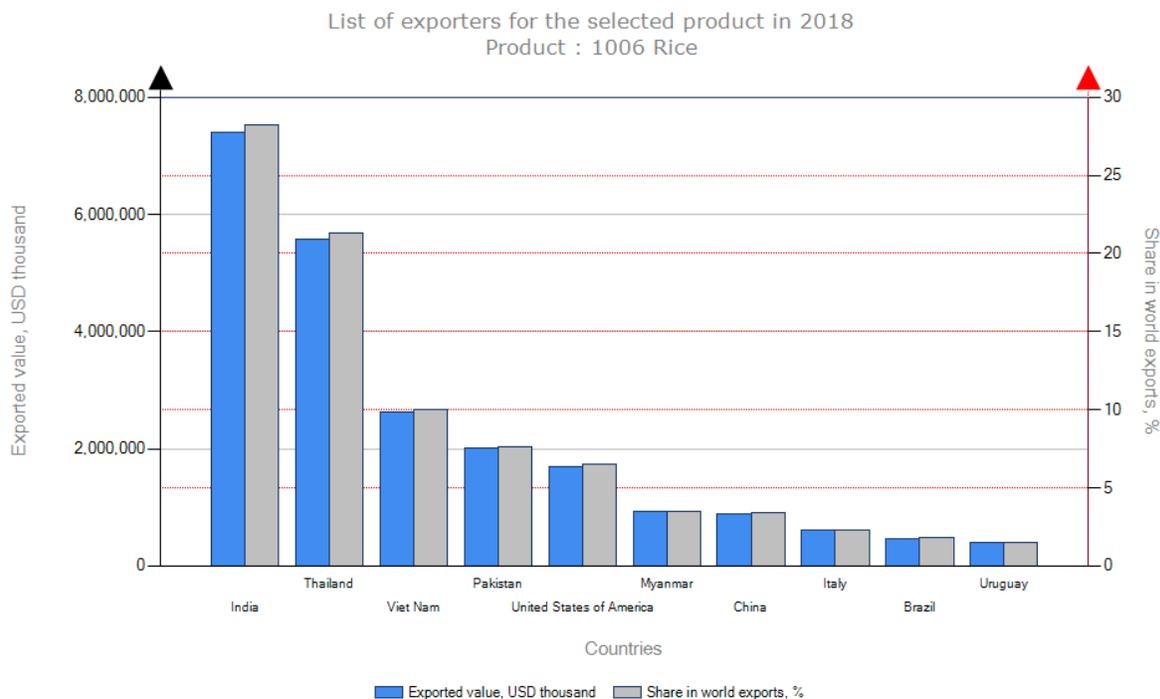
The export market of rice is highly concentrated. The top five rice exporters account for more than half of the global rice trade. Global top suppliers of rice include Thailand, India, Pakistan and Vietnam. India emerged as one of the top exporters of rice after the Indian government removed the protectionist restriction on the exports of rice.

Unit : US Dollar thousand

Exporters	Exported value in 2015	Exported value in 2016	Exported value in 2017	Exported value in 2018	Exported value in 2019
World	23215966	20749716	24682356	26209928	
India	6380082	5315535	7081187	7399161	
Thailand	4542595	4370867	5159864	5571029	4197726
Viet Nam	2807904	2159977	2634588	2626994	
Pakistan	1927200	1703049	1743503	2001813	
United States of America	1993147	1793601	1718139	1690926	1877045
Myanmar	611826	438936	1030824	921754	
China	267177	378807	596164	887311	
Italy	591095	565293	602230	613645	
Brazil	350179	251941	244570	467911	367586

Sources: ITC calculations based on UN COMTRADE and ITC statistics

Uruguay	361419	413846	459358	400159	375820
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Potential Markets for Pakistan

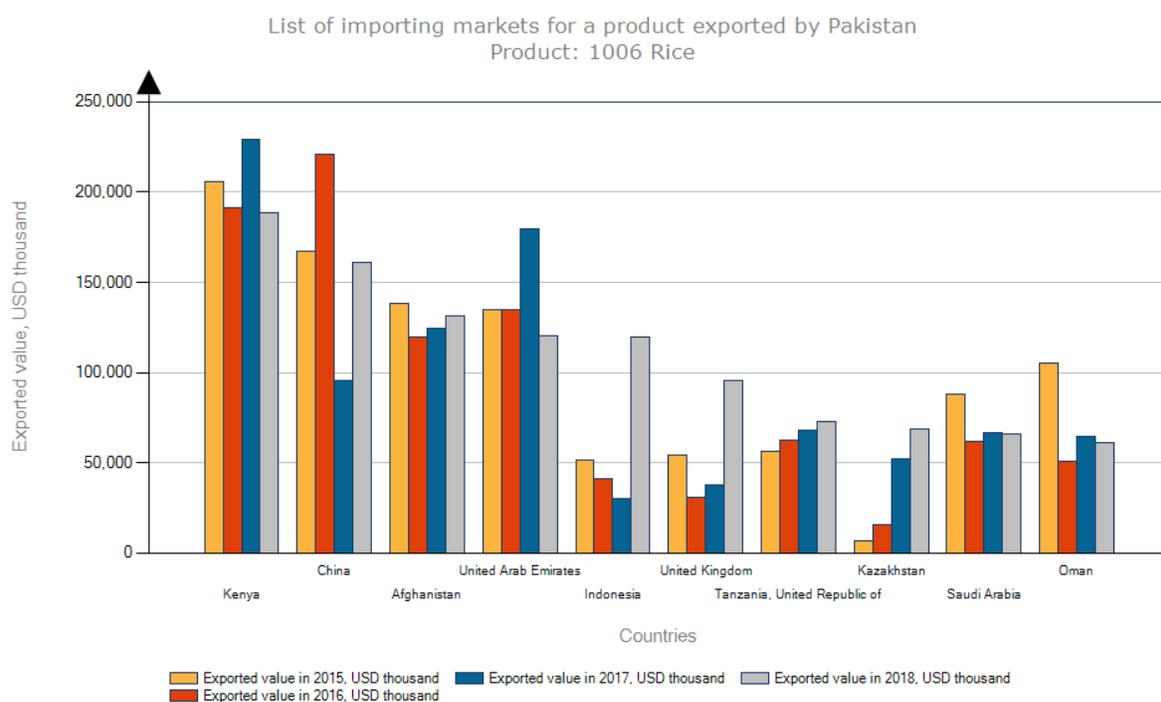
List of Top 10 importers for HS code 1006 rice

Unit: US Dollar thousand

Importers	Imported value in 2015	Imported value in 2016	Imported value in 2017	Imported value in 2018	Imported value in 2019
World	22624035	20055712	23670894	26522773	
Iran, Islamic Republic of	681618	690737	1214041	1628522	

China	1470951	1586120	1828133	1599660	
Saudi Arabia	1504728	917304	1021031	1314680	
Indonesia	351602	531842	143642	1037128	
United States of America	791438	714438	727648	966569	1086333
Benin	457215	773532	1079385	873533	
Iraq	660290	520161	634320	845082	
Philippines	464729	210672	357721	736649	
United Arab Emirates	949206	844762	760770	700209	
Côte d'Ivoire	488487	518415	567720	688922	
France	463992	448000	475260	522378	540477

Sources: ITC calculations based on UN COMTRADE and ITC statistics



As seen in the table below the top importers of rice, and Pakistan's exports to the world, while highlighted countries are the potential markets of export for Pakistan.

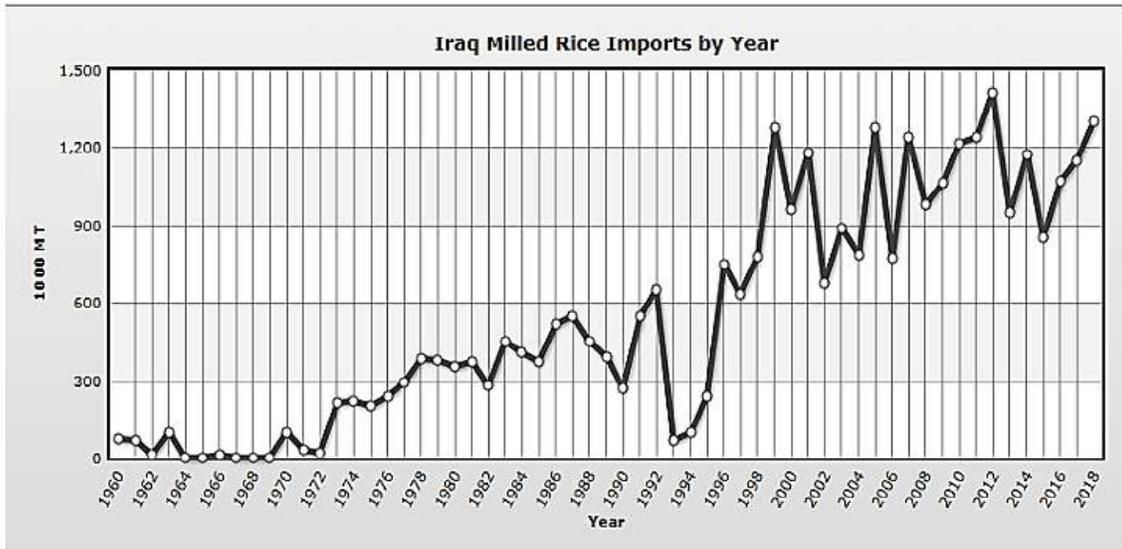
Top 20 Importers of Rice	Countries Pakistan is exporting rice
China	Kenya
Islamic Republic of Iran	UAE
Benin	Afghanistan
Saudi Arabia	Madagascar
UAE	China
USA	Tanzania
Bangladesh	Saudi Arabia
Iraq	Oman
Cameroon	Kazakhstan
Côte d'Ivoire	Mozambique
United Kingdom	Yemen
South Africa	United Kingdom
France	Philippines
Senegal	Belgium
Mexico	Benin
Ghana	Indonesia
Japan	Sierra Leone
Philippines	Somalia
Germany	Spain
Malaysia	Guinea-Bissau
Brazil	USA
Belgium	Italy
Sri Lanka	Sri Lanka
Republic of Korea	Malaysia

Islamic Republic of Iran

Pakistan is the second largest exporter of rice to the Iranian market, after India. India's share in Iranian rice imports is 69 percent, followed by Pakistan which is only 19 percent. As Iran is the immediate neighbor, and Pakistan has also signed a Preferential Trade Agreement (PTA), with the country, Iranian market could be further explored with better trade facilitation measures and establishment of banking channels for the exporters. The exported quantity to Iran in the year 2017 was only 2,954 thousand USD, much less than its potential.

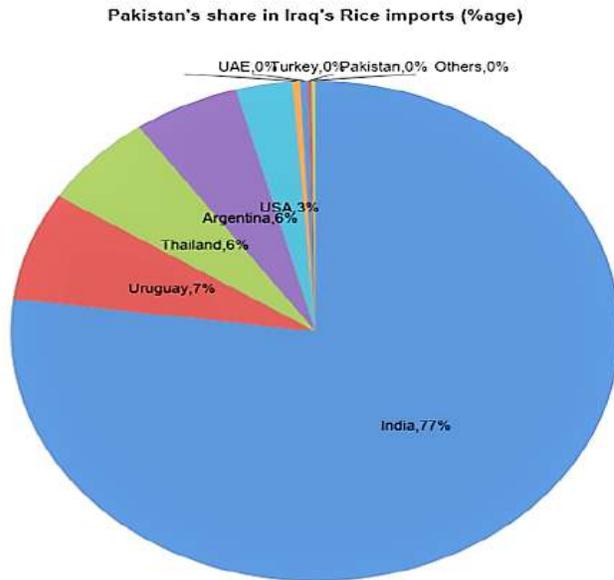
Iraq

Iraq is another potential nontraditional market for Pakistan's rice exports, as there is growing demand of rice, particularly Basmati rice in Iraq. Iraq is also among the top importers of rice in the world. The increase in rice imports can be seen from the following graph.



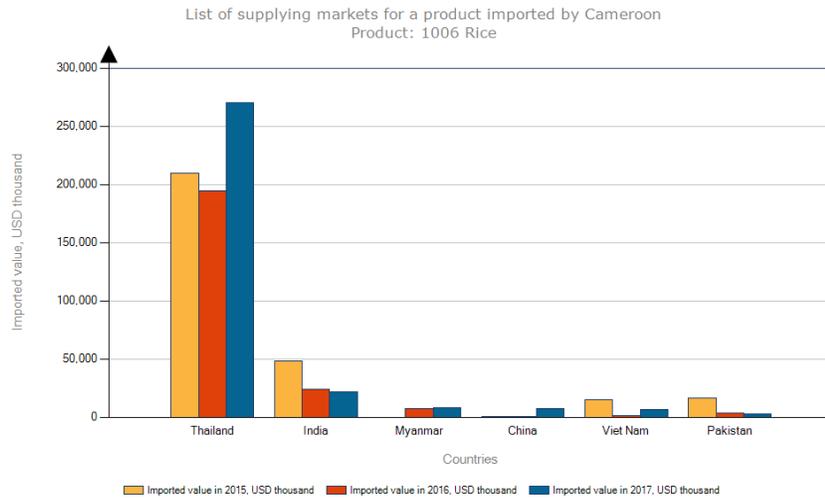
Source: Statistica

As shown in the following pie chart, India is the major market supplying rice to the Iraqi market and Pakistan holds a negligible share.



Source: ITC- Trade Map

Cameroon

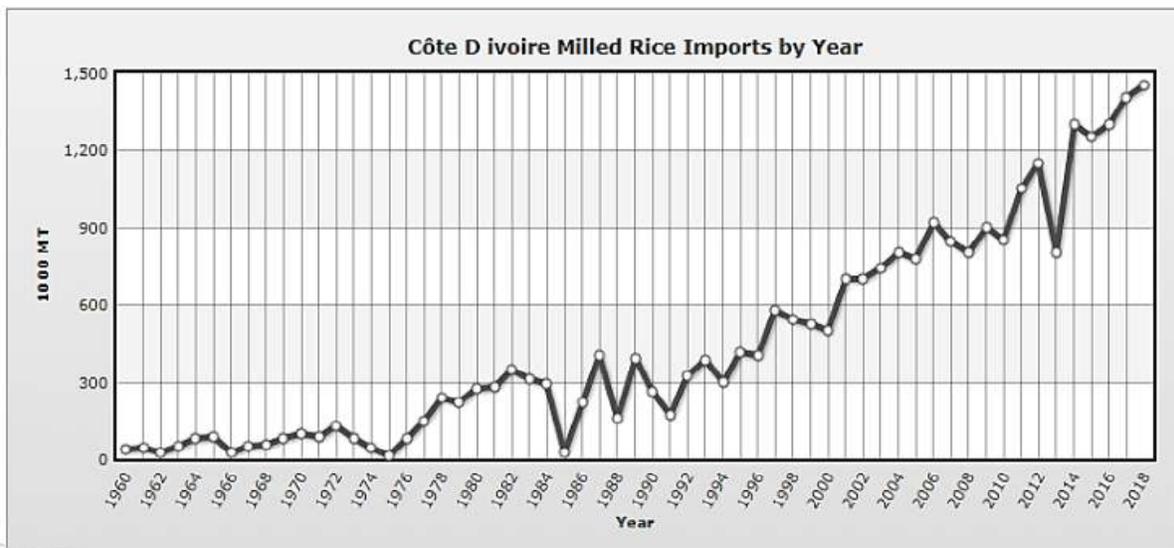


Source: ITC-Trade Map

Cameroon is also among the top importers of rice. Pakistan is not catering to. Pakistan's exports to the country are negligible compared to Thailand and India. Its share in the Cameroon's market is only 1 percent.

Cote d'Ivoire

Is an African country among the top global importers of rice. Its rice imports are increasing every year as shown in the following figure.

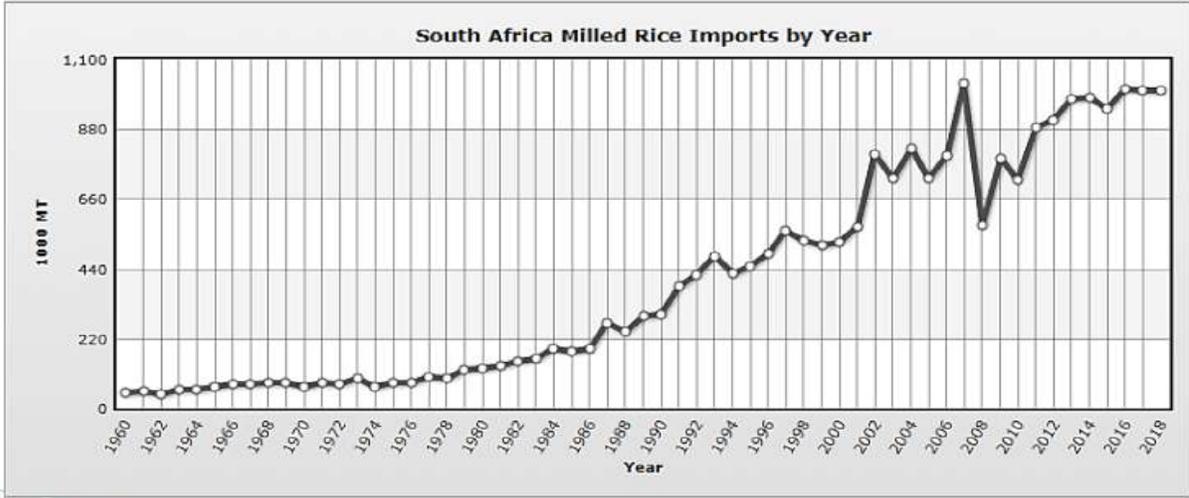


Source: Statistica

Thailand, Vietnam, India and China are the largest importers of the country’s market, while Pakistan’s share is negligible.

South Africa

The country like the countries above is among the top importers of rice, and imports of rice are also increasing, as shown in the following graph.



Source: Statistica

Thailand and India are the major rice exporters, while Pakistan’s share is negligible.

The Export Supply Chain Analysis (ESCA)

ESCA, maps the business processes, actors and documents involved in exporting Basmati rice from Pakistan to Iran and China; it identifies any policy, regulatory, or operational bottlenecks that create time delays along the export supply chain and proposes recommendations to the Ministry of Commerce and the Federal Bureau of Revenue (FBR) to alleviate these bottlenecks and reduce the time it takes to get Basmati rice to the market.

Problems in Value Chain

The major bottleneck in Pakistan's basmati value chain is at the upstream segment, or farm production. High production costs and declining yield of current basmati varieties make its cultivation a less profitable venture for Punjab rice farmers, resulting in some farmers shifting to other varieties for better yields. Key constraints of basmati farm production are the following:

Limited basmati varieties.

Compared to Indian farmers, who have access to several high-yielding basmati varieties, Pakistani farmers have access to and cultivate mainly one variety, Super Basmati, which was introduced in 1996 and is grown in 70% of the total basmati area in Punjab. Basmati 515, an improved variety, was introduced in 2011, but its adoption has been slow as farmers have limited access to certified seeds and proper training for its production. Both Super Basmati and Basmati 515 are neither resistant to bacterial leaf blight (BLB) nor tolerant of extended dry spells, which occur increasingly in basmati growing areas.

Inadequate research and development funds.

The Punjab Agricultural Research Board (PARB) allocates funds for research and development (R&D) relevant to the province's agriculture sector. The PARB's role has significantly improved R&D administration, management, and coordination among all institutions involved. However, the PARB's annual R&D budget of about PRs180 million remains modest given the size and requirement of Punjab's agriculture. The Rice Research Institute at Kalashah Kaku, the leading institution on rice development in the province, has a meager annual budget of PRs30 million. Because of this resource constraint, Punjab's agriculture R&D remains significantly underfunded.

On-farm challenges.

Basmati farmers face a number of production constraints, such as lack of access to certified seed; low plant population (an average of 125,000 plants/hectare against the recommended 200,000); BLB; input supply quality and quantity; labor shortage during transplanting and harvesting; unavailability or inappropriate types of combined harvesters that result in a 3%–7% loss of paddy; high moisture content at harvesting (more than 30% compared to the desired 20%–22% at harvest and 12%–14% for storage); lack of sufficient mechanical drying and storage facilities, contributing to aflatoxin growth; and poor extension services.

These constraints result in an average basmati paddy yield of about 2.4 tons/hectare, compared to about 3.2 tons/hectare in India. Given the potential yield of current basmati varieties, average paddy yield could be more than 3 tons/hectare if most constraints are addressed

Export Related Issues

The Basmati rice export supply chain comprises of 13 core business processes and 14 different actors. It takes, on average, 16 business days for stakeholders to fulfill commercial and regulatory requirements of export business processes and get the Basmati rice from the exporter's warehouse

	AS-IS SITUATION FINDINGS	TO BE SCENARIO SOLUTIONS
Time to market	16 days	12 days
Arranging transport	1 hour	1 hour
Cargo insurance	1 day	1 day
Arranging goods declaration	30 minutes	30 minutes
Arranging empty container	10 hours	10 hours
Inspection	6 hours	6 hours
Transporting cargo to port	3 days	2 days
Phyto Certification	1 day	1 hour
Customs procedures	8 hours	4 hours
Cargo handling onto vessel	2 days	1 day
Prepare export support documents	1 day	30 minutes
Document numbers	16	7

to the shipping vessel en route to the port of discharge in the country of destination. The documentary requirements of exporting Basmati rice include a total of 16 documents, of which 8 documents require an official seal or stamp. (TRTAII/ PITAD report, 2016)

Conclusion

Pakistan's basmati export could be increased by additional funding for basmati R&D, the question arises as to the best remedy. Two important aspects need attention: first, the source of funding, and second, the oversight and transmission mechanism of the funding.

Modern models of R&D funding rely on a combination of public grants, industry contributions, and fees and levies. However, a substantial increase from Pakistan's public exchequer is unlikely. One option is to institute a cess (levy) fund based on contributions from farmers. An expanded version could involve all participants of value chain, so that all participants' resources can be pooled for mutual benefit, given that rice R&D is advantageous to all stakeholders in the value chain. However, the expectation that Pakistan's farmers will willingly agree to an R&D levy is unrealistic, as their ability to pay is uncertain and they frequently complain about input costs and lack of subsidies.

Alternately, the other end of the chain might be more conducive to such an initiative. Processing and export stages involve the greatest value addition for rice. Such stages of the value chain are also better documented, better organized, and more cognizant of the need for better R&D to be able to compete in international markets. The burden of a cess at the export end is less onerous than at the farm end, and the amount that can be collected will be greater. Given that the exporters gain the most in the rice value chain, it is only fair that R&D contributions should come from them. And, imposing a levy at the farm end could distort the growers' behavior to the detriment of rice cultivation if they switch to other crops.

Furthermore, an additional levy on exporters would not be needed if the current levy is channeled as intended. In 1999, Parliament passed the Export Development Fund Act. Under the Act, all exporters, including rice exporters, pay a surcharge of 0.25%, which is deducted by the exporter's bank from foreign receipts and submitted to the State Bank of Pakistan. The bank transfers the collected cess to the Ministry of Finance (MOF). Under the Act, the MOF must transfer all

proceeds of the Export Development Fund to the Ministry of Commerce (MOC), which is responsible for disbursing the proceeds according to the stipulations of the Act.

In reality, the MOF has not been transferring all the amounts to the MOC. The MOC has, as a result, a large sum due from the MOF. The cess collected in 2017 from rice exporters is equal to half of all expenditure on rice R&D for the last 20 years. The Act specifies that the cess funds can be used for R&D, technical institutes, market and product development, and other areas related to export enhancement.

Stakeholder Input

An ADB sponsored project promoted the use of innovative technologies and machinery successfully through the active participation of service providers and the use of ICT in linking farmers and service providers with experts. The project showed that a conventional approach to extension services in agriculture, such as field visits and meetings, are not effective in transferring knowledge to farmers. Instead, building the capacity and capability of local service providers provided a sustainable vehicle for demonstrating and transferring agricultural technologies to many farmers. By using ICT, the project reached many farmers and linked them and service providers with knowledge institutions, which provided technical knowledge on a real-time basis.

Some farmers have suggested expanding the use of ICT from WhatsApp groups to a Facebook page. ICT may also be used in partnership with knowledge institutions to disseminate best practices from the project.

Another lesson learned from farmers is that their income is linked not just to one commodity and their resources (capital, water, and land) are on a per farm basis. Therefore, future assistance and investments should focus on sustainable farming systems.

Farm mechanization may later displace some landless workers, particularly women who currently do the manual planting of seedlings. Future projects for rural development and agriculture should consider this and include assistance for displaced workers, such as alternative livelihoods.

Service providers also identified three necessary inputs for the provision of high-quality services to farmers:

Establishment of service centers under the guidance of manufacturers of precision machinery for the repair and overhaul of machines and availability of spare parts, capacity building of service providers and linking them with leasing companies so that credit support is available at reasonable interest rates, and provision of technical support for importing the right type of precision machinery.

The amount of funding required to revive growth in basmati production and export is not huge. Recent policy work, especially in Punjab, has recognized the need for investment in R&D.¹ Funds are available in the government's annual development budget. The ongoing ADB Punjab Basmati Rice Value Chain Technical Assistance Project has found a dearth of good project proposals and project management capabilities. The current project has highlighted the problem that scientists find it difficult to spend even small grant amounts within a project duration. Any effort to modernize and streamline agriculture R&D must involve a holistic approach that includes the use of government development funds and the application of the Export Development Fund. Policy makers and treasury officials need to be convinced that the amount of R&D funding required is small compared to the contribution made by the cess on rice exporters. The important point is to commit continuing funding every year for the whole value chain, which should be under the administration of a single entity.

Recommendations

Recent emphasis on public–private partnership (PPP) models of development offers a new avenue for changing the private sector's current rent-seeking approach and aligning it with the public sector policy revival. A PPP approach can considerably lower the funding burden on the public sector while at the same time creating an environment to align private sector goals with government policy. While implementing PPP interventions can be technically challenging, their potential benefits can be gained by resolving current bottlenecks.

The Malaysian Palm Oil Board (MPOB), a government body, is a good model of how the coordinated efforts of a whole value chain can improve the prospects of a particular crop. From plantations to processing to exports, the MPOB looks after the research, development, and commercialization of Malaysian palm oil. The MPOB has made Malaysian palm oil an

¹ Government of Punjab. 2015. *Punjab Growth Strategy 2018*. Lahore.

international benchmark product and has invested heavily in R&D and commercialization. The key feature of the MPOB model is that the MPOB oversees the whole value chain and research scientists are included in international marketing efforts as well.

Pakistan could create a basmati rice board (or an overall rice body for all varieties), based on the MPOB model, and funded by the rice exporters' contributions to the Export Development Fund. The board should have representation from all stakeholders and should be able to accomplish the goals of commercially viable R&D for rice. Most of the components for such a model exist—the missing link is political will and policy decision-making.

As is the case for all R&D in Pakistan's agriculture, basmati R&D suffers from a low quality and quantity of funding. The core issue relates to an absence of policy commitment and the recognition of the need to invest a minimum amount consistently. The irony is that the amount of research investment needed is tiny compared with its potential return.

For the country's premier export product to be handled as an orphan is a tragedy. In the absence of R&D-based preparedness, the subsector is exposed to multiple risks from internal as well as external sources. While overall revenues from rice are stable, the lack of growth of basmati revenues should be a red flag for policy makers. A reform program is urgently needed because years of underinvestment have weakened the system; however, some practical measures can reverse the trend.

The overriding requirement is for government to commit to a strategic road map that fills the R&D gap. It should create an environment that enables the public and private sectors to engage in commercially viable research. The rice sector is already paying the bills for its development. The missing link is the utilization and channeling of the resources.

In addition:

- Reducing the time to carry out Customs procedures – needs investment in facilities and detection and weighing equipment.
- Reducing the time it takes to prepare paper export support documents and the phyto certificate - needs investment in an electronic single window system (SWS)
- Reduce the time it takes to arrange insurance
- Eliminate the time delay it takes to find and deliver empty containers

- Increase seaport efficiency with the objective to reduce container handling times
- Better coordination between freight forwarders and shipping lines to reduce seaport container storage times and costs
- Get predictable export supply chains by combining Customs, Phyto and Insurance procedure changes with road, border crossing and seaport infrastructure investment
- Develop and implement trade facilitation, customs and logistics strategies in a “whole of Government” approach
- Train public sector staffs and managers in international good practice trade facilitation, customs and logistics
- Implement the articles of the World Trade Organization Trade Facilitation Agreement
- Develop and implement international logistics education and training
- Ensure free access to the Pakistan logistics and transport industries
- Harmonize the Pakistan Customs Law with the revised Kyoto Convention
- Develop and implement a Pakistan Basmati rice export marketing strategy
- Rice growers to develop and implement business plans
- Develop and plant new rice seed varieties and improved growing techniques