Enhancing Bhutanese Rice in the Domestic Market through increased Production and Favorable Pricing Regime

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Abstract

Rice (*Oriza sativa* L.) is one the most important food crops in Bhutan. Due to its national importance the Department of Agriculture (DoA) under the Ministry of Agriculture and Forests initiated technical interventions in the major rice growing dzongkhags (districts) to improve rice yield and production from 2008-2009. The aim of the program was to commercialize domestically produced rice through enhanced yield, production and rice value chain. The program involved increased investment for intensified promotion of higher yielding varieties of rice, farm mechanization, post harvest and marketing, capacity building, nutrient management and crop protection as the software component. The hardware part saw the constructions and renovations of many irrigation schemes and construction of rice processing units. As a result of the intensified interventions the productivity of rice yield has increased to 3.88 t/ha in 2013 from about 2.81 t/ha in 2009. Favourable pricing mechanism is essential for both farmers and the consumers although farmers want higher prices and the consumers the lower. To facilitate smooth trade the DoA has recommended prices for different varieties of paddy for farmers by maintaining reasonable margins

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besides associated costs. Therefore, adjusted farm-gate prices have been worked out so as to serve as the recommended paddy procurement prices or basis for calculation. The formal domestic rice trade has come to mainstream markets by involving the Food Corporation of Bhutan Limited. Due to the strategic interventions the domestically produced rice in circulation is estimated to be 255 t currently (as of June 2015) and it is expected to increase further with the prioritized investments, good pricing mechanism and policy support. In conclusion, the commercialization program brought about the increase in yield and overall production and has successfully main streamed trade of domestically produced rice in Bhutan.

Background

Rice is the most important cereal crop of Bhutan and it is often equated with food security of the country. It constitutes the main source of calorie and Bhutanese people, in general, consume rice three times a day. However, the domestic production barely meets 50% of the country's requirement, and rest is imported, mainly from India. Starting from the 10th Five Year Plan (FYP) in 2008-2009, the Department of Agriculture (DoA) has successfully piloted a rice commercialization program in Chuzargang geog under Sarpang dzongkhag (Chhogyel *et al.* 2014a). However, the actual implementation of rice commercialization activities commenced in 2010 under the aegis of Accelerating Bhutan's Socio-economic Development (ABSD) Initiative for Rice Productivity improvement. The ABSD was then continued into the 11th FYP as the Rice Commercialization Program. The objectives of rice commercialization program were: (1) to enhance rice production and productivity; (2) to enhance profitability of rice farmers through enhanced income and employment generation; and (3) to formalize marketing of local rice in the country. The rice commercialization program began with initial target of about 15,000 ha in area covering potential rice growing dzongkhags or clusters such as Sarpang, Samtse, Samdrup Jongkhar, Wangdue-Punakha, and Tsirang-Dagana (Chhogyel *et al.* 2014b; DoA

2012, RNR RDC-Bajo 2012). The activities undertaken under the program included vigorous promotion of high yielding varieties and quality seeds, promotion of balanced application of NPK nutrients, farm mechanization, crop protection from insect pests and diseases, capacity building, establishment of modern rice processing units for enhanced quality of milled rice, and marketing (RNR RDC-Bajo 2013; DoA 2012). Initially, a modern rice mill of 1.5 t per hr capacity was installed in Chuzargang geog under Sarpang dzongkhag with required facilities for cleaning and packaging the milled rice for marketing. This intervention was the beginning of formal marketing of local rice in the country through the involvement of Food Corporation of Bhutan Limited (FCBL).

Following the success of pilot project at Chuzargang, rice commercialization program is being continued into the 11th FYP with increased budgetary outlay and ambitious target of covering all rice potential dzongkhags (PPD 2014). In 2012-2013, three more modern rice processing units (0.5 t per hr capacity) have been installed, one each for rice potential dzongkhags or clusters of Wangdue-Punakha valley, Tsirang-Dagana and Samdrup Jongkhar (Chhogyel *et al.* 2014a). Additionally, another 3 ton per hr capacity modern mill has been installed at Phuntsholing to cater to the need of Samtse and adjoining dzongkhags. This is, however, being taken up by a private firm through a tripartite agreement signed with the Ministry of Agriculture and Forests. With the installation of such modern rice processing units, availability of local rice is expected to increase in the mainstream domestic markets. Thus, there was an urgent need to have a proper pricing system for different categories of domestically produced rice. Accordingly, the DoA initiated a cost analysis of different categories of rice for two generalized regions of the country, southern and northern regions. The purpose behind the exercise was to regulate paddy procurement and selling prices of milled rice through price recommendation by the Ministry of Agriculture and Forests. Proper pricing system was essential to benefit both the farmers (producers and sellers) and to protect the consumers against over-pricing.

The current prices are based on the generalized cost of production within the agro-ecological zones. The cost of rice production including rice milling, processing and marketing was undertaken to understand the costing at different levels. Such an understanding is necessary in recommending paddy procurement prices and the final cost of milled rice in the local markets. By doing so, DoA was able to recommend paddy procurement and milled rice prices of domestically produced rice to the FCBL which was entrusted to take up rice marketing in the country. Globally, the volatility of rice production output and price trends are dependent on the political decisions and are markedly affected by climate change (Subramanian 2013). As our food security issue largely hinges on the domestic production of rice grown under varied ecosystems, uncertainties and price shocks are imminent. Although the domestic rice trade in the country is small, it should be encouraged and formalized because it is the main food grain of national importance. The best that we could do is to regulate price regime through incentivized production strategies and policy frameworks. For a country like Bhutan which depends on import of mostly medium quality Indian rice, strategic policy framework on rice commercialization is imperative for enhanced production and reduction in importation of rice. Price regulation is very important. Lower rice prices will not only increase consumption, but also increase importation (Mohanty *et al.* 2010) which is not favourable for Bhutan. Increase in rice trade is crucial for reducing price volatility which mainly affects poorer sections of the society. This is because rice stocks and supply in the market actually affects price volatility and availability of rice (Subramanian 2013). Thus, there should be an improved marketing system including proper pricing mechanisms backed by rice development policy.

Trends in rice processing and sale

To start with, a total of 8.698 t of paddy of 8 different varieties was collected in 2008-2009 in Chuzargang, Sarpang dzongkhag. This was worth Nu. 113,533. The collection was basically for test run of the new rice mill which was

inaugurated in late 2009. The actual paddy collection began in early 2009-2010 with the involvement of FCB through signing of Memorandum of Understanding (MoU) with the Department of Agriculture. In the same year, a total of 56.609 t of paddy was collected, yielding a marketable 34.236 t of head rice. Based on prescribed selling prices of FCB for different varieties, the revenue generated was Nu. 1.08 million. In addition to head rice, there were also other products or by-products viz. broken rice, rice bran and hull which generated additional revenue. Initially, most of the rice was sold in urban markets like Thimphu and Gelephu. This was just the beginning of formalized rice marketing in the country.

From 2010-2011, paddy collection, milling and marketing of rice in the project area was undertaken by a newly formed farmers' cooperative called Chuzagang Agricultural Farmers' Cooperative (CAFCO). Although the CAFCO planned to collect 120 t of paddy that year, it could collect only 56.578 t due to inadequate working capital. In 2011-2012, the total paddy collection was 53 t which resulted in about 38 t of milled rice, although the target was much higher (RNR RDC-Bajo 2013). In the following year (2012-2013), the CAFO's collection was a meager 23 t as against the DoA's hope of doubling the paddy collection and enhanced trade. This was a major concern for the DoA which ultimately led to signing of another MoU with the FCBL to take up the processing and marketing of domestically produced rice in the country. The CAFCO's performance was unsatisfactory and the DoA had to involve the business experience and expertise of the FCBL. Currently, the FCBL has started paddy collection, milling and marketing of rice in Sarpang, Wangdue-Punakha valley and Samdrup Jongkhar. The records with the DoA showed that the 2014-2015 collection was 386 t paddy which is equivalent to about 255 t milled rice and is over 700% more than the averages of the preceding 6 years (Figure 1). It included different varieties of rice produced and branded from these regions. The milled rices were made available to the consumers at the FCBL outlets throughout the country. DoA and FCBL is also all set

to supply domestically produced rice to the school feeding program of the Ministry of Education in the near future. This is a already a huge success and milestones are in the offing with strategic plans to ensure supply of adequate quantities of rice to the schools. Such schemes would ensure availability of local rice in the domestic market. According to Ghimiray *et al.* 2007, the proportion of domestic rice in the urban Bhutan was just 26% of the total rice consumption, all of which were marketed informally. Opportunities thus exist for greater domestic sale of rice through organized marketing.

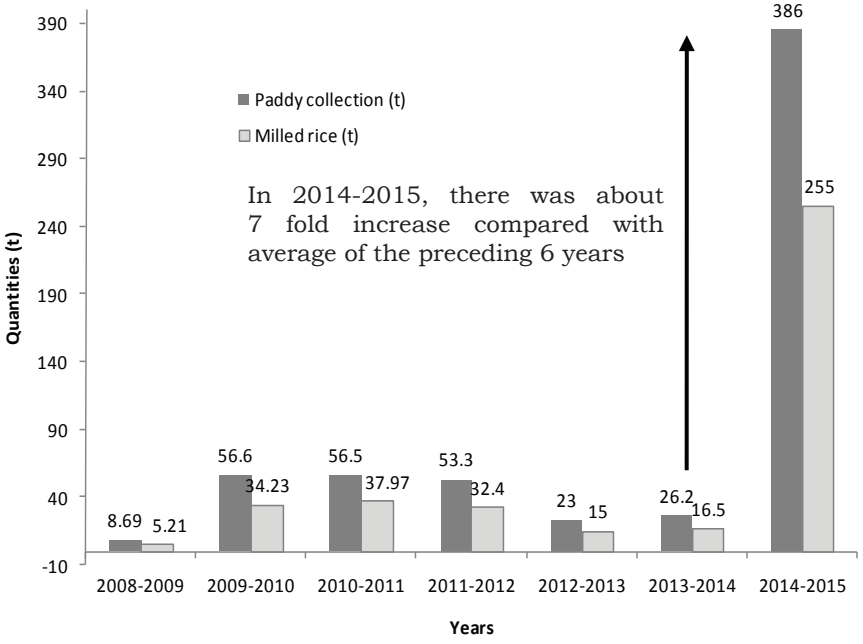

Figure 1. Information on paddy collection and marketable milled rice as maintained with the DoA (2009 to 2015)

Projection of marketable surplus

As per the initial plans, DoA initiated various interventions to improve rice productivity and production in Wangdue-

Punakha valley, Tsirang-Dagana, Samtse, Sarpang, Samdrup Jongkhar and Thimphu-Paro clusters. The rice yields are calculated to be increasing at the rate of 5-10% per annum (DoA 2013b; DoA 2012; DOA 2011). With the national rice yield average of just 3.88 t /ha (DoA 2013b) as against the global average of 4.49 t/ha (FAO Stat 2013), there lies tremendous scope to increase total production through interventions like promotion of modern varieties and management practices. Although the rice yields are already quite high in the mid-altitude regions of Wangdue-Punakha valley and high altitude regions of Thimphu - Paro, the DoA's target is to increase productivity to bring about two fold yield increase especially in Southern Bhutan, where yields are the lowest (PPD 2013).

According to the DoA (2013b), rice was grown on an area of 48,361 acres with a total production of 75, 228 t in 2013. The six cluster dzongkhags together constituted about 75% of the total area which corresponded to 36,209 acres. Currently, these cluster dzongkhags account for more than 77% (58,024 t) of the country's total production. To enhance rice productivity and production, the DoA initiated major interventions such as construction and renovation of irrigation channels, farm mechanization, promotion and supply of improved seeds, and intensified capacity building programs (DoA 2013a; RNR RDC-Bajo 2012). With such interventions, the rice yields are projected to increase by at least 10% giving an increase of about 25,000 t from that of 2013 production figure. According to the DoA's 11FYP target, rice production should cross over 100,000 t in 2018 to attain rice self sufficiency of 65% (Figure 2). For such a trend in production, increase of 4955 t should follow every year and strategies are in place to support this target.

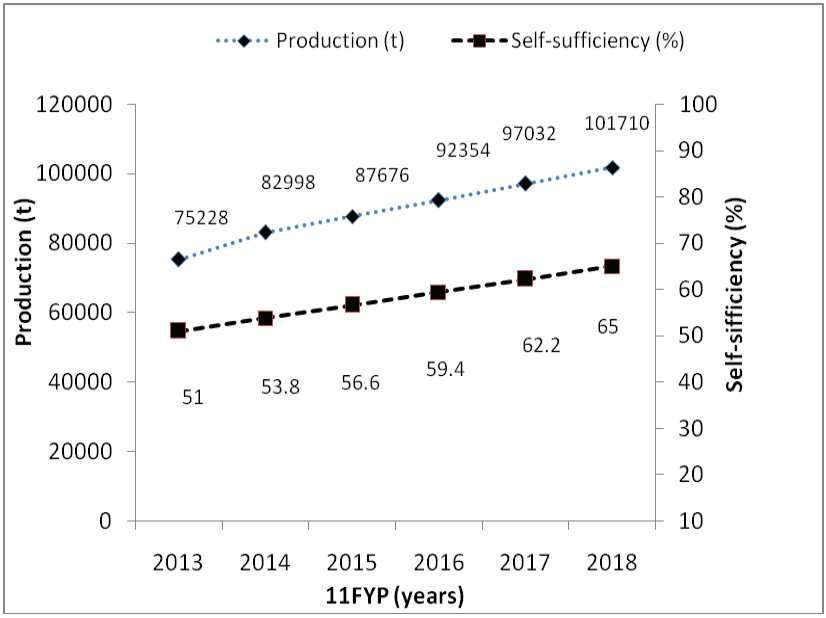

Figure 2. Rice production target of the Department for the 11th Five Year Plan

Based on the DoA's projection, from the cluster areas, where modern rice processing facilities exist, a modest 20% surplus collection from farmers would amount to 14,571 t of paddy for milling every year. For rest of the dzongkhags, the yield projection and percent collection were estimated at 5% and 10% respectively (Table 1). Considering milling recovery of 65%, the projected 14,571 t paddy would yield about 9,471 t of head rice for sale which is worth over Nu 4735.7 million (cost of milled rice calculated @ Nu.50/kg). The amount of paddy for milling and hence milled rice for sale should increase every year as rice farming becomes more market-oriented. Investment on the rice commercialization program would increase availability of local rice in the domestic market, thereby reducing import from India, thus reducing outflow of the Indian currency reserve. This would bring about a positive impact of agriculture to the national economy.

Currently, domestic rice trade which happens informally is worth just about Nu. 124 million with about 1,667 t rice in circulation (DoA 2013b). This informally marketed rice is just about 2% of the projected rice trade envisaged through formal marketing involving the FCBL. Globally, the rice trade is on the increase with about 9% of the total production traded annually as against mere 4% in 80s (Mohanty 2015).

Table 1: Projection of production (t) increase and additional rice for domestic market

Dzongkhag/ cluster	Current production (t) (2013)	Projected Production 2014 @10% yield increase (t)	Market surplus @20 collection (t)	Head rice @ 65% milling recovery (t)	Revenue Generation@ Nu.50/kg (million)
Sarpang	5518.000	6070.000	1214.000	789.000	39.450
Samtse	8969.000	9866.000	1973.000	1282.000	64.100
S/ Jongkhar	**2663.000**	2929.000	585.000	380.000	19.000
Wangdue-Punakha	19390.000	21329.000	4265.000	2772.000	138.600
Tsirang-Dagana	10526.000	11578.000	2315.000	1505.000	75.250
Thimphu-Paro	10958.000	12053.000	2410.000	1566.000	78.300
Rest of the dzongkhags	17204.000	18064**	1806*	1174.000	58.700
	75228.000	**63825.000**	**12762.000**	**9468.000**	**473.400**

*n**: 5% increase over the current projection; n*: 10% collection from the projected production.*

Cost of production

The unit cost of production for domestically-produced rice varies from dzongkhags to dzongkhags and regions to regions. Although the cultivation practices in different parts of the country are similar, the variations in labour costs and yield differences results in the variation on the cost of production in different parts of the country. Average cost of production of rice is higher in Northen regions of Punakha-Wangdue

in comparison to the southern dzongkhags of Sarpang, Samdrup Jongkhar and Samtse (Table 2 & 3). The higher costs of rice production in the Northern part of the country (Punakha and Wangdue) could be attributed to higher labour costs and comparatively higher quantities of inputs use, such as farmyard manures, chemical fertilizer and weedicides. Generally, the farmers use fertilizers and plant protection chemicals in the Northern regions whereas the farmers in the Southern part hardly use them. Some of the important factors of cost of production are listed below:

1. Cost of labour wages: This forms an important component as wage rates in Northern varies between Nu.350-500 per day, while it was about Nu.150-200/day in the South.

2. Mechanization: Mechanization has been assessed to not only reduce cost of production but also increase the farm efficiency. It has potential to reduce cost of production by about 10-20%.

3. Use of higher yielding varieties reduces the cost of production due to increased production at same level of costs due to the productivity gains.

4. Other factors include use of modern inputs such as plant protection chemicals to control diseases and insect pests, herbicides and fertilizers determine the harvestable yield of crop.

One of important interventions undertaken by the DoA is promotion of mechanization which has slightly reduced the cost of production. Partial mechanization of rice cultivation could lower the cost of production by about 10%. However, for our analysis here, the averages of the traditional and partial mechanization figures were used (Table 2 and 3). The cost of producing a kg of paddy grain in Wangdue-Punakha valley ranged between Nu.19.00 to 36.00 depending on the variety. Similarly, the cost of producing a kg of rough rice ranges

between Nu. 12.00 to 23.00 depending on the variety grown by the farmers in the Southern region (Table 3). Yeshey (2012) also reported that the cost of producing a kg of rough rice (Bajo Maap) in Wangdue under full mechanization was about Nu.14.00 which is close to Nu. 17.47 recorded in the current analysis under partial mechanization. The difference could have been due to added labour cost in partial mechanization as compared to reduced labour cost in the fully mechanized field.

Table 2: Generalized rice production costs (Nu.per kg rough rice) for some of the popular improved and local rice varieties in Northern region.

Variety	Traditional method (Nu./kg)	Partially mechanized (Nu./kg)	**AVERAGE** (Nu./kg)
IR 64, BajoKaap, BajoMaap	19.55	17.47	**18.51**
KhangmaMaap	21.25	18.99	**20.12**
Tan Tsheri & DawYangkum	30.55	27.3	**28.92**
Local Kaap & Local Maap	32.58	29.12	**30.85**
Ngabja & Bondrey	37.59	33.59	**35.59**

Table 3.Generalized rice production costs (Nu.per kg rough rice) for some of the popular improved and local rice varieties in Southern region.

Variety	Traditional method (Nu./kg)	Partially mechanized (Nu./kg)	**AVERAGE** (Nu./kg)
Bhur Rey kaap	13.38	11.09	**12.23**

Bhur kamja	15.17	12.57	**13.87**
Ranjit, Mama	16.25	13.46	**14.86**
Champa & Khamti	22.75	18.85	**20.8**
Masino, Bhog and other local varieties	25.28	20.94	**23.11**

Adjusted paddy procurement prices

Looking from the economic point of view, neither very high prices nor very low prices are desirable or suitable, although the producers want higher prices and the consumers the lower. While higher paddy procurement prices are going to be favorable for the farmers, there is going to be proportional increase in prices of milled rice hurting the consumers negatively. Therefore, adjusted farm-gate prices have been worked out so as to serve as recommended paddy procurement prices keeping a reasonable margin for farmers besides the associated costs (Tables 4 and 5). The pricing strategy is quite sensitive given the fact that Bhutanese people heavily depend on rice for their daily calorie requirement. Fluctuations in commodity price will be accompanied by both economic and un-economic situation such as the rice crisis of 2007-2008 (Clarete *et al.* 2013). As for other commodities, a strategic pricing is likely to drive production and adoption of rice technologies. Globally, higher prices are said to stimulate rice cultivation (OECD-FAO 2008) and specifically for Bhutan, higher prices should drive expansion in areas and spread of improved rice varieties.

Farm-gate prices have been adjusted to make it more attractive for the farmers to sell their raw paddy to the rice millers. The adjusted prices shown in Tables 4 and 5 would give the farmers' a margin of at least 10 percent. These adjusted prices not only benefit the farmers with higher margin but would also ensure that the mills would have enough raw materials (paddy) supplied by farmers. Thus the adjusted farm gate prices are the prices recommended for the procurement of paddy from the farmers.

Table 4: Farmers' margin and adjusted farm-gate prices in the Northern region

Variety	Farm-gate price	Production Cost	Current Farmer's margin		Adjusted Farmers' margin		Adjusted Farm Gate price
	Nu/kg	Nu/kg	Nu/ kg	%	Nu/kg	%	Nu/kg
IR- 64	22	18.51	3.49	19%	7.49	40	26
Bajo Maap (other Maaps, improved)	22	20.12	1.88	9%	5.88	29	26
Tan Tsheri	25	28.92	-3.92	-14%	5.08	18	34
Local Kaap (Yangkum, Shenga Maap, etc.)	25	30.85	-5.85	-19%	5.15	17	36
Local Kaaps (other than aromatic)	25	30.85	-5.85	-19	1.15	04	32
Ngabja & Bondrey	30	35.59	-5.59	-16%	1.77	05	37

Table 5: Farmers' margin and adjusted farm-gate prices, Southern region (Sarpang-Samtse)

Variety	Farm-gate price	Production Cost	Current Farmer's margin		Adjusted Farmers' margin		Adjusted Farm Gate price
	Nu/kg	Nu/kg	Nu/kg	%	Nu/kg	%	Nu/kg
Bhur Rey kaap	15	12.23	2.77	23	9.77	79	22
Bhurkamja	13	13.87	-0.87	-6	8.13	58	22
Ranjit, Mama	10	14.86	-4.86	-33	5.14	34	20
Champa&Khamti	18	20.8	-2.8	-13	9.20	44	30
Masino, Bhog and other local varieties	19	23.11	-4.11	-18	6.89	29	30

Farm-gate prices of milled rice

Traditionally, farmers mill their rice at the village rice mills and whatever surplus they have is then transported to the markets for sale. Some quantity of the surplus is sold at the farm at farm-gate prices. Normally, the farm gate prices are lower by Nu. 5/kg than market prices.

Computing the break-even selling price is an important calculation while establishing a selling price. It is the minimum price at which one can sell the product for and still re-cover the costs. Here the break-even prices are presented in two ways – one based on the prevailing farm-gate prices and the other on the recommended farm-gate prices, or the production costs. The break-even prices based on prevailing farm gate prices of paddy are apparently lower compared to the break-even prices based on the recommended farm gate prices. The recommended selling prices of rice are presented in the Table 6. These prices were based on both the prevailing prices and recommended farm-gate prices. Another very important consideration for price recommendation was the market demand and quality of certain rice varieties and brands. This is why the recommended prices of some rice varieties are above the recommended farm gate prices. The forces of market demand for certain varieties due to their quality led to increased prices. At the government prescribed recommended rate, the farmers would not be willing to sell their produce and therefore, in order to have such varieties in the market, the rates are increased in accordance with forces of market. However, the recommended selling prices, in general were derived in a simple and straightforward way by adding a certain percent (5% or more on the break-even price).

Table 6: Recommended Farm-gate Prices of milled Rice for the Northern and Southern region

Northern Region		Southern Region	
Variety	Rate (Nu./kg)	Variety	Rate (Nu./kg)
IR 64 and Bajo Kaap	50	Bhur Rey kaap	50
Bajo Maap	55	Bhurkamja 1	50
Tan Tsheri & DawYangkum	61	Ranjit, Mama	35
Local Maap	64	Champa&Khamti	60
Local Kaaps	64	Choti Masino	65
Ngabja & Bondrey	70-74	Bhog and other premium local varieties	65

Conclusion and recommendations

As the rice commercialization program of the DoA gains momentum, increased rice trade in the domestic market is imminent. This would generally reduce price volatility which would otherwise hurt the consumers, specially those in the lower rung of the income group. The DoA's rice commercialization program is a success as it enabled availability of domestically produced rice in the formal urban markets in the country. Thought the formal rice trade is small, it has made a beginning and the 2014-2015 collection showed that there is a tremendous potential in improving domestic rice trade in the country. As we continue with interventions to enhance rice value chain, pricing policy would assume greater significance and would require strategic regulations based on the market forces and technical considerations. The government pricing mechanism should be looked at both from the perspective of producers as well as the consumers aimed at striking a balance. A small country like Bhutan cannot afford to keep the prices of domestically-produced rice low, because that would discourage domestic production and favour importation. Therefore, the best approach is to enhance domestic rice production through all possible

support to the farmers backed up by a well organized efficient rice marketing system. Though Bhutan imports over 50% of its rice requirement, an improved rice value chain has potential to offset volatility of rice price and sustain requirements. However, the domestically produced rice varieties will still sale at a premium price and are superior to imported rice. With increased support for rice commodity program, a sustained production is possible for the DoA. The figures presented especially on the prices should be guided as of 2014 and the figures should change with changes in costs of production. However, it would serve as an important basis for the formulation of pricing structure for the marketing of rice in the country.

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