

Rice Processing for Export in the Cuu Long Delta Region

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ABSTRACT

The research results showed that capacity of rice plant processing ranged from 30 tonnes to 500 tonnes per day, with an average 170.2 tonnes/day. There were 20 per cent millers who operated over ideal capacity/year, from 130 to 141 per cent. However, most of the millers (80%) operated below ideal capacity/year. The paddy inputs among millers ranged from 6 tonnes to 500 tonnes/day and an average with 136 tonnes/day. The percentage of head rice recovery for brown rice was highest in the winter spring season (ĐX), followed was Autumn-winter season (TĐ) and lastly with Summer-Autumn season (HT), with 73.44 per cent; 71.67 per cent and 68.81 per cent respectively. In case of IR 50404 rice variety, the head rice recovery is highest among other rice varieties so far. This is one of the reasons why this variety is grown in more area even if it is of low quality. The moisture content range of paddy being milled is from 15 per cent to 18 per cent. The ideal moisture content of paddy milled is 16 per cent. The status of rice husk consumption is not stable in the output and beneficial to millers, consumers and environment. The low quality rice varieties such as IR 50404, OM 576, occupied 10-80 per cent of total paddy milled, average with 48 per cent. The varieties with medium quality occupied 35 per cent, while high quality variety was only 20 per cent. The suitable channel for input and output of the millers showed that farmers sold paddy to the traders, and milled paddy into brown rice then sold it to the millers. The millers polished this brown rice and sold to the exporting companies. This channel indicated the high specialization, but it occupied only 33 per cent in the system. The study was also synthesized into 11 main constraints, which millers faced in their rice processing activities and 10 important suggestions aimed to improve and develop rice-processing sector for export in the Cuu Long Delta region of Vietnam.

Key words: Rice processing, milling, export, constraints, rice recovery

INTRODUCTION

Following the success in rice export of the year 2011 with 7.19 million tonnes, the first six months of 2012, the signal remains well when the Vietnam Food Association (VFA) estimated rice export gained 3.7 million tonnes (Phạm Anh, 2012). Before the achievement on the production and export of rice from Vietnam in recent years, many countries have forecasted that Vietnam from second rank of rice export can replace Thailand to become top ranking in the year 2012 (Singh, 2011). It is known that the rice from production to export has to go through many stages, from farmers, purchasing traders, processing millers to exporting companies. The study was conducted among farmers, millers and exporters. In the limitation of this article, the focus is on the millers activities for rice processing for export. The millers have important role in rice processing with suitable quality for the demand of every international market. However, the specific study for this sector is still limited so far. Therefore, the results of this study are very useful for managers, researchers, processors/millers and others relating in rice production and export from Vietnam and international countries for improvement and development of rice export processing sector in particular and for rice production and export in general.

METHODOLOGY

The interview schedule was designed for the millers including the issues such as: Capacity of plant, real and ideal capacity per year, sources of paddy inputs, channels for input and output, kinds and types of byproducts consumption, head rice recovery, the constraints faced in production and opportunities for improving rice processing for export.

Component of the surveying millers: There were 20 surveying millers in the country, in which Cuu Long Delta had 10 millers dividing for three provinces. Can Tho province with 05 millers (50%), concentrating in the rice processing areas such as Thoi Lai, O Mon, and Thot Not districts. Followed An Giang province with 3 millers (30%), concentrating in Thoai Son district, and lastly Hậu Giang province with 2 millers (20%), concentrating in Long My town of Long My district.

The designation or job title of the millers providing information for the study were mainly directors of the mill (70%), Business managers (20%) and only 10% was Head foreman of the millers. Therefore, the confident degree of the information sources for the study is very high. The surveying data were synthesized and analyzed using

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SPSS, and Excel software programmes with the statistical techniques such as descriptive statistics, mean values, standard deviations, percentages, etc. The research conducted from March 2010 to March 2011.

RESULTS AND DISCUSSION

1. Sketching description on the characters of the milling plants

1.1. Capacity and real operation of the rice processing plants

Table 1: Capacity and real operation of the rice processing plants

Items	Capacity/day (tonnes)	Ideal capacity/year (tonnes)	Total paddy milled/year (tonnes)	Compared to the ideal capacity /year (%)
Mean	170.20	43,401	33,360	71.17
Minimum	30	7,650	2,040	6.67
Maximum	500	127,500	100,000	141.18
Range	470	119,850	97,960	134.51

Capacity/day of the mill in the surveying plants were ranged from 30 tonnes to 500 tonnes/day, an average with 170.2 tonnes/day. With these capacities indicated that the sizes of rice processing for export of these plants are relatively large. From the capacity/day, ideal capacity/year was calculated with the assumption that the number of days operated in a year are 355 days.

Total paddy milled in a year was relatively large among mills ranged from 2,040 tonnes/year to 100,000 tonnes/year, an average with 33,360 tonnes/year. There were 20 per cent of the mills operated over ideal capacity/year, from 130 to 141 per cent. Majority of the mills (80%) operated below ideal capacity/year. In which, 50 per cent the mills operated below 50 per cent capacity and other 30 per cent of the mills operated below 80 per cent of ideal capacity/year.

In comparison with ideal capacity, the total paddy milled per year of the plants ranged from nearly 7 per cent up to 141.18 per cent, an average with 71.17 per cent.

1.2. Time of operation and the types of shifts in a day of the plants

The time of operation for rice processing in may not same as the rice-growing season. Because paddy input may come even from late or other seasons. Therefore, the operation time of the mills was allocated according to the operation months in a year. The data are presented in the figure 1.

The data in the figure 1 showed that in the month of December, the rice processing activity is lowest, only 50 per cent of the plants operating. There were 60 per cent of the plants operated in the October and November. There were 70 per cent of the plants operated in the months of January and September. In the months of February, April and May, there were 80 per cent of the plants operating. The highest percentage of operating plants were in the months of March and August with 90 per cent, then June and July with 100 per cent because of the highest demand for export.

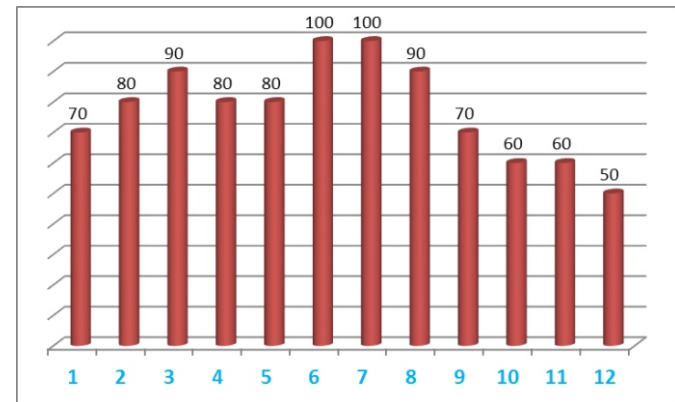


Figure 1: The percentage of the plants operating in the months of the year

According to the millers, the types of shifts depended on the plants situation such as capacity, available workers, and the demand of paddy input for processing, the number of hours operated in a shift were different among different. Plants ranged from 4-24 hours/shift and the shifts per day from 1 to 5 shifts per day.

- The number of hours/shift and number of shifts/day in the months of HT season less than in the ĐX season and this tendency is common in 40 per cent of the plants, while 60 per cent of the mills have tendency to operate more shifts/day and more hours/shift in the months of ĐX season.

- There were 20 per cent of the plants operated below the level of capacity in the months of TĐ season. This reason might due to milling demand of this time was low, or due to low in total paddy input. Therefore, the paddy price those farmers sold in the TĐ season usually higher than other season.

- The same remarks were also reported in case of Bac Lieu and Hau Giang provinces. In these provinces, the paddy price in the TĐ season higher than other seasons and the production efficiency of this season was relatively high. Nguyen (2011) and Nguyen (2012).

Table 2: Types of shifts operation for rice processing in the mills

Avg. number of shifts in a day	No. of plants	Percentage of plants	No. of hours operation/shift
1	6	60	10, 12, 15, 20, 24
2	1	10	10
3	1	10	6
4	1	10	6
5	1	10	4

2. Study on the rice processing activities of the millers

2.1. Total paddy input per day and the head rice recovery after milling

Table 3a: Total paddy input per day and the head rice recovery after milling

Items	Total paddy input (Tonnes/day)	Head rice recovery for brown rice (%)			
		Đong Xuan	He Thu	Thu Dong	Average/year
Mean	136	73.44	68.81	71.67	71.21
Minimum	6	65.00	60.00	65.00	60.00
Maximum	500	77.5	75.5	75.00	77.5
Range	494	12.5	15.5	10.0	17.5

The quantity of paddy input/day of the plants were ranged from 6 tonnes to 500 tonnes/day, average with 136 tonnes/day. Head rice recovery was highest in the ĐX season, followed TĐ season, and lastly in HT season with 73.44 per cent, 71.67 per cent and 68.81 per cent respectively. In average per year, the head rice recovery for brown rice was ranged from 60 per cent to 77.5 per cent, and average with 71.21 per cent.

In the total surveying millers, there were 60 per cent of them milled paddy into brown rice and remaining 40 per cent milled paddy into white rice for export (including milling and polishing). However, they can mill both kinds of rice according to customers demand. Most of the plants processed paddy in to brown rice for the traders, then traders sold brown rice to the exporting companies for polishing and export.

Table 3b: Head rice recovery for white rice after polishing

Items	Head rice recovery for white rice (%)		
	Head rice recovery (%)	Broken rice and bran (%)	% of husk
Mean	62.43	15.75	20.5
Minimum	60.00	10.00	20.00
Maximum	65.00	20.00	22.00
Range	5.00	10.00	2.00

Head rice recovery for brown rice usually higher than white rice (range from 5% to 15%, average with 10%). Head rice recovery for white rice (table 3b) ranged from 60 to 65 per cent, average with 62.43 per cent. The percentage of broken rice and bran ranged from 10 to 20 per cent, average with 15.75 per cent. Another byproduct is husk ranged from 20 to 22 per cent, average with 20.5

per cent. In case of white rice processing with high broken rice up to 25 per cent, the head rice recovery can gain 80 per cent in some plants.

According to www.knowledgebank.irri.org (2012), the maximum milling recovery is 69-70 per cent depending on rice variety, but because of grain imperfections and the presence of unfilled grains, commercial millers are happy when they achieve 65 per cent milling recovery. Some rice mills in the village had 55 per cent or lower milling recovery. However, the percentage of head rice (exclusive broken rice) attained from paddy sample after milling in the controlled condition can reach to 84 per cent compare to total paddy milled.

Majority of the millers revealed that IR 50404 rice variety had highest head rice recovery compared to other varieties currently. This is one of the advantages helping this variety is grown with high rate in the farmers' field so far, although it is low quality. On the sides of cultivating technology and yield, this variety also had many advantages. According to the author Tam Phuc (2012), in Đong Thap province, in some districts, the cultivating area of IR 50404 can reach up to 80-90 per cent. In terms of market, the farmers in Đong Thap, Hau Gian, faced difficulty in the early harvesting time, but in the end of season, it is good sale with the price lower than long grain rice varieties a little bit. At the end of April, 2011, the price of IR 50404 variety was 5,000 - 5,200 VNĐ/kg, while at the same time, long grain varieties had of joined 100 - 200 VNĐ/kg more than IR 50404.

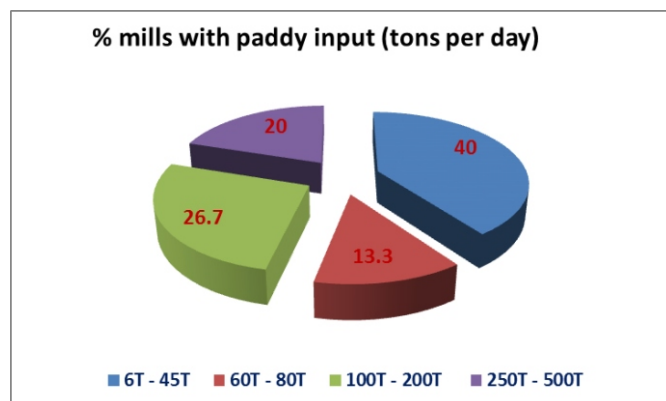
There is a genuine need to have the comprehensive strategy of "four-partner linkage" to reduce the area of low quality rice or reduce IR 50404 variety; the scientists should do research to provide high quality varieties; the managers should organize farmers' production on a large scale, the millers and exporters play should an important role in contract with farmers and should be transparent favorable price and export orientation.

2.2. Distribution of paddy input per day in the different levels of the millers

Based on the surveying data on paddy input per day, they were grouped into four levels. These are from 6 to 45 tonnes/day; 60-80 tonnes/day; 100-200 tonnes/day and 250-500 tonnes/day.

There were 46.7 per cent of the mills have the total paddy input/day very high from 100-500 tonnes/day, of which, 26.7 per cent at 100-200 tonnes/day, and 20 per cent at 250-500 tonnes/day.

There were 40 per cent of millers milled with small quantity of paddy from 6-45 tonnes/day, and 13.3 per cent of millers milled at 60-80 tonnes/day (figure 2).



Picture 2: Percentages of the mills with paddy input per day

2.3. Distribution of paddy milled with moisture content

- The millers purchased paddy from farmers and traders and milled it when paddy had enough moisture content for milling (15-16%).

- Paddy milled with moisture content range from 15 per cent to 18 per cent. Usually, in the dry season there were large quantity (around 80%) of paddy with low moisture content (16-17%) had enough moisture for milling.

Table 4: Distribution of paddy milled with moisture content

Moisture content range of paddy	% paddy milled	Note
15 - 16%	From 60 to 100%, average 80%	Nearly 50% of the millers have selected the ideal moisture content of paddy for milling with 16%
17 - 18%	From 20 to 40%, average 20%	Higher moisture content paddy needs to dried before milling

Paddy with moisture content below 17 per cent gave good head rice recovery for brown rice and by products with around 15 per cent of moisture content.

According to the millers, the ideal moisture content for paddy being milled range from 15-17 per cent, average with 16 per cent. In which, 46 per cent millers selected the ideal moisture content of paddy for milling with 16 per cent; secondly, 23 per cent of millers with 17 per cent; thirdly, 15 per cent of millers with 15 per cent and lastly, 15 per cent of millers with 16.5 per cent.

2.4. Quality component of rice varieties milling for export

The data of study showed that there were 100 per cent of millers who milled paddy with low and medium quality. Only 50 per cent millers milled paddy with high

quality. There was also 20 per cent of millers do not care to distinguish quality rice.

Paddy varieties with low quality such as IR 50404 occupied 70 per cent, and OM 576 occupied 10 per cent. In addition, quantity of low quality paddy occupied from 10-80 per cent, in average with 48 per cent. Paddy varieties with medium quality such as OM 2517, OM 2518, OM 4218, and OMCS 2000 occupied from 15-60 per cent comparing total paddy milled, average with 35 per cent. Paddy with high quality such as Jasmine 85, DS 10, DS 20, OM 4900 being milled with low quantity, in average with only 20 per cent (range from 10-30%). This finding is almost coinciding with the situation of rice export quality of Vietnam in the current years. That is, rice export from our country mostly with low quality (Nguyen, 2012).

Table 5: Variety-wise and type wise break up of paddy milled (%)

Kinds of paddy variety	% of plants	% of total paddy milled	Representative paddy varieties
Low quality	100.0	From 10 - 80, mean 48	IR 50404, OM 576
Average quality	100.0	From 15 - 60, mean 35	OM 2517, OM 2518, OM 4218, OMCS 2000
High quality	50.0	From 10 - 30, mean 20	Jasmine 85, DS 10, DS 20, OM 4900
Not distinguished	20.0	100	

2.5. Types of byproducts consumption by the millers

There were five types of husk consumption from the millers namely: Offer with cost free (unmarketable product) to brick production plants at the locality (30%); Sold with very cheap price from 200-300 VNĐ/kg to the needed people for firewood production (20%); Sold for the other needed people with price about 240 VNĐ/kg (20%); Cost free plus cost of transportation from plants to the brick plants (10%); and sold with very low price from 700,000-800,000 VNĐ/boat (big boat with capacity about 30,000 tons of paddy).

Thus, the status of byproduct consumption with husk has no stable output that benefit for millers, consumers and environment. There were some cases the millers thrown husk into the rivers creating environmental pollution. According to Quoc Dung, (2012), in the peak time of harvesting in ĐX season, the rice processing plants operated noisily, the quantity of discharging husk without consumption have to throw into the rivers, while many brick plants are facing with rare condition of husk and to work perfunctorily. Many plants have to buy husk with increasing price up to 200%, inducing loss in production and stop working.

Basildon the findings, there is a need to have strategy for husk consumption with multi-styles such as fertilizer, electricity, grow-medium, brick production and firewood production to bring social, economic and environmental efficiencies for the export rice-processing plants in the Cuu Long Delta region. This strategy need to have the new and suitable technologies and cooperation from international countries.

Table 6: Types of husk consumption currently in the rice processing plants

Types of husk consumption	Price (VNĐ/kg)	% of milling plants
Offer to brick plants	Cost free (unmarketable product)	30.00
Sold with very cheap price for firewood production	200 - 300	20.00
Sold for the other needed people	240	20.00
Cost free plus cost of transportation	unmarketable product	10.00
Sole very low price from 700,000-800,000 VNĐ/boat	700,000-800,000 VNĐ/boat	10.00
Plants without husk	-	10.00

Table 7: Types of bran consumption after milling in rice processing plants

Types of bran consumption	Price (VNĐ/kg)	% of milling plants
Sold for raising companies	From 2500 – 5000, mean 4000	80.00
Sold crude bran	300	10.00
Plants without bran	-	10.00

Compared to husk consumption, the consumption of bran was stable and effective when almost of the millers (80%) sold bran to the companies raising cattle and poultry. The bran prices were ranged from 2500 to 5000 VNĐ/kg, average with 4000 VNĐ/kg. There were 10% of the plants sold crude bran with the price of 300 VNĐ/kg. Remaining 10% of the plants had no byproduct with bran.

3. Study on the channels of input and output of rice processing plants

3.1. Sources of paddy inputs for export rice processing plants

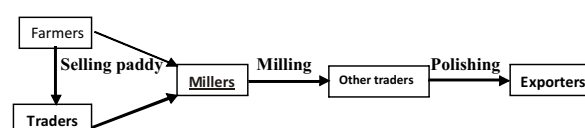
The inputs for rice processing of the plants included paddy to mill into brown rice and brown rice to polish into white rice. Inputs from traders occupied 60 per cent, and then inputs from the farmers occupied 30 per cent. There were small number of farmers who made use of available transportation in their families to go to the plants and milled paddy into brown rice then sold this brown rice to the millers for more return instead of selling paddy directly. In addition, there were 10% of the plants had inputs from other companies or agencies according to contracts.

Table 8: The inputs for export rice processing plants (%)

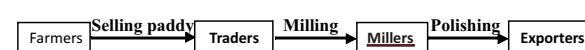
Sources	Mean	Minimum	Maximum	Range	Note
Farmers	30	0	100	100	
Traders	60	0	100	100	
Others	10	0	10	10	Milling for other companies/enterprises according to contracts

3.2. Channels of inputs and outputs of the export rice processing plants

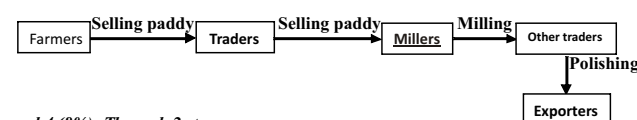
Channel 1: (42%): Through 3 stages



Channel 2 (33%): Through 3 stages



Channel 3 (17%): Through 4 stages



Channel 4 (8%): Through 2 stages

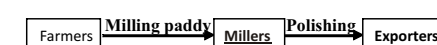


Figure 3: Four channels of inputs and outputs of the rice processing plants

Based on the surveying data, were grouped into of four channels of input and output of the rice processing plants and presented in Figure 3.

Channel 1: This channel is relatively popular due to nearly (42%) of the plants operated. This channel included 3 stages: Millers bought paddy from farmers and traders, after that milled into brown rice, then sold brown rice to other traders. These traders polished and sold white rice to exporters.

Channel 2: Channel 2 is less popular compared to channel 1 (33%). However, it is short and sustainable with only 3 stages. The traders bought paddy from farmers, milling into brown rice and sold it to millers. The millers polished into white rice and sold white rice to exporters.

Channel 3: This channel is operated with 17 per cent of plants and it is of 4 stages. Farmers sold paddy to traders, then traders continuously sold paddy to the millers. The millers milled paddy into brown rice and sold it to other traders. These traders polished brown rice into white rice and sold it to exporters.

Channel 4: This channel is occupied only 8 per cent of the plants and applied in cases of farmers have

transportation condition (boats), and they know how to gain more profit. Instead of selling paddy directly, they go to the plants to mill paddy into brown rice, then sold this brown rice to the millers. The millers polished brown rice into white rice and sold it to the exporters.

It was concluded that channel 2 is the best one for sustainable and efficient production for entire system, and enhances the high specialization of every component.

3.3. Profit in rice processing activities of the millers

The study had only 60 per cent of millers who informed about cost and profit in the process of rice processing for export as follows:

Cost of milling paddy into brown rice was 75,000 VNĐ/tonnes.

Profit for milling paddy into brown rice was ranged from 70,000 to 400,000 VNĐ/tonne.

Profit for milling white rice was ranged from 140,000 to 300,000 VNĐ/tonne.

In addition, there were 10 per cent of the plants gained 3 per cent of profit comparing to total cost.

4. Paddy drying details in some rice processing plants

Drying paddy was applicable only for milling brown rice if the moisture is still high. Seventy per cent of the plants were not dried paddy because farmers and traders were already dried or they milled brown rice into white rice with suitable moisture content.

There were only 30 per cent of the plants dried paddy in sunlight or used dryers when paddy input having high moisture content. Usually these plants dry paddy by sun in the ĐX season, and use dryers in the HT and TĐ seasons.

For milling brown rice with different moisture content into white rice, the millers dried down with suitable moisture content using drying part combine in the milling system of the plants.

The situation of 30 per cent of the plants needed to dry paddy is as follows: Dried by sun inside the plants (20%) and dried by transportation roads with 10 per cent. Time consume for dry by sun about 2-3 days. In case of used dryers, consume from 5- 9 hours.

The initial moisture content of paddy input being milled range from 17.5 to 20 per cent in the ĐX season and

from 18 to 20 per cent in the HT & TĐ seasons. The final moisture content for paddy being milled range from 16 to 17 per cent in the ĐX season and from 15 to 17 per cent in the HT & TĐ seasons. The finish product for white rice is ranged from 12 to 13 per cent.

Thus, paddy moisture content in the raining season was higher than in the dry season, however, this variation on moisture content of paddy was not so clear.

Table 9: Paddy drying details in some rice processing plants

Season	Place where dried	Drying technology (dryer/sun)	How long (days/hrs.)	Initial moisture content (%)	Final moisture content (%)
Winter-Spring season	Yards inside the plants (20%); Roads (10%)	Sun	2-3 days	17.5-20	16-17
Summer-Autumn & Autumn-Winter season	Dryers at companies	Dryer	5-9 hrs	18-20	15-17

Table 10: Distribution of paddy milled with moisture content

Moisture content range of paddy	% paddy milled	Final moisture content of finished products (%)
17.5 – 20% (ĐX season)	60-100	Brown rice 15%
18 – 20% (HT & TĐ season)	20-40	
Moisture content range of brown rice	-	
16-17% (ĐX season)	-	White rice 12 – 13%
15-17% (HT&TĐ season)		

5. Evaluation on electricity supply for rice processing of the plants

In general, the millers have rated electricity supply as good. Usually, every plant had electric generator in anticipation of blackout. The prevailing prices in the ĐX 2010-2011 was 1,000 VNĐ/Kw. Cost of electricity ranged from 15-20 million VNĐ/month, and from 40-50 million VNĐ/month depend on size of the plants. Millers informed that they have received information the time of blackout to arrange activities and strengthen electricity generator.

The millers were asked to rate electricity service for rice processing in the region. There were five levels from very good to very bad. The results were presented in the Figure 5. It was found that 30 per cent millers rated the electricity service as very good, while 30 per cent rated as good and the rest 20 per cent millers rated it as not good. The reasons for this are increasing electricity price (from 50,000 VNĐ to 75,000 VNĐ/ton), unstable electricity supply, and blackout from 2- 4 days/month.

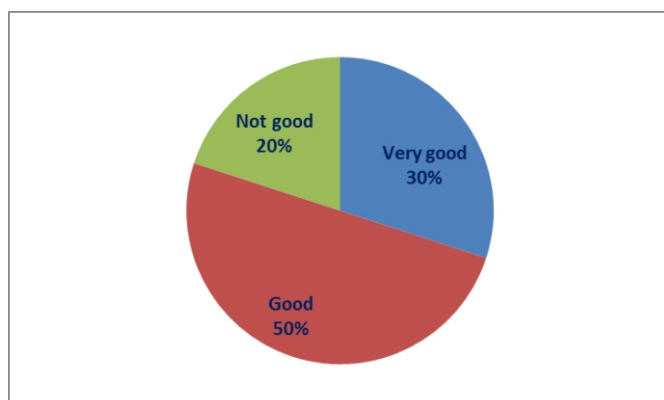


Figure 4: Evaluation on electricity supply for rice processing

6. Major constraints faced by the millers for rice export processing in Cuu Long Delta region

Table 11: Major constraints faced by the millers for export rice processing

Constraints	Rank
Lack of production capital and enlarge size of the plants	I
Small and scattered plants, backward means, not invest for enhancing and modernization yet	II
Product price is low and unstable	III
Lack of exporting markets and unstable outputs	IV
Lack of storehouse, drying yards, and dryers	V
Electricity and fuel prices are high	VI
Lack of paddy input in the middle of seasons	VII
Unstable in working labours everyday	VIII
Difficulty in the transportation by rivers and canals	IX
Electricity supply for rice processing is unstable	X
Fees for money transfer through interbank and to other companies are still high	XI

The study has synthesized into 11 main constraints which were faced by the millers in rice processing for export. In the level of importance, these main constraints have been arranged as follows: Lack of production capital and enlarge size of the plants; Small and scattered plants, backward means, and not invest for enhancing and modernization yet; Product price is low and unstable; Lack of exporting markets and unstable outputs; Lack of storehouse, drying yards, and dryers.

In addition, some millers revealed that they have equipped the modern equipment such as colour sorter (the machines use to classify rice grains, to reject different colour and different size of grains, to make rice grains become uniform). However, many of millers not yet use the colour sorter or not demand for equipment this machine. This meant that the rice export products from Vietnam mostly come to the countries with demand of low quality rice and with low value.

Some millers were found its face no constraint due to deficient staffs and workers, and facilities to operate rice processing smoothly. Another advantage in some millers is in the care of income tax and VAT. These taxes in the initial time was 28% of net profit after tax, but after that, thanks to the subsidy from local government, this tax has reduced at 15% creating the favorable condition to the millers.

Table 12: The crucial suggestion for improvement and development of paddy milling sector

Suggestions	Rank
Credit investment with low interest rate for production and upgrade the plants	I
Modernization from rice processing, packing, storage to transportation systems	II
Upgrade and improve small, scattered and backward plants; develop modern and large plants	III
Organize and promulgate stimulating policy for farmers to grow high quality price in the way of large scale, cooperative and consumption for export	IV
Provide good and comprehensive equipment for white rice processing	V
Improve and develop warehouses, drying yards and dryers	VI
Keep stable, and high price of outputs	VII
Decrease fuel price, and stable supply	VIII
Need the support from local governments	IX
Need to take part in the exporting food association	X

The study also synthesized 10 suggestions for improving and development the export rice processing sector. These suggestions have been arranged according to their importance in the Table 16 as follows: Credit investment with low rate for production and upgrade the plants; Modernization from rice processing, packing, storage to transportation systems; Upgrade and improve small, scattered and backward plants; develop modern and large plants; Organize and promulgate stimulating policy for farmers to grow high quality price in the way of large scale, cooperative and consumption for export; Provide good and comprehensive equipment for white rice processing.

CONCLUSION

The millers have the important role in the rice processing for export in the Cuu Long Delta region. Therefore, the findings from this study are very useful for the all-relating peoples. Data showed that the capacity/day of the plants ranged from 30 tonnes to 500 tonnes/day, average with 170.2 tonnes/day. Total paddies milled in a year among the plants were ranged with the big quantity, from 2,040 tonnes/year to 100,000 tonnes/year, average with 33,360 tonnes/year. There were 20 per cent of the plants operated over ideal capacity/year, from 130 141 per cent. Most of the plants (80%) operated below the

ideal capacity/year. The paddy input/day of the plants were ranged from 6 tonnes to 500 tonnes/day, average with 136 tonnes/day.

The percentages of head rice recovery got highest in the ĐX season, followed TĐ season and lastly with HT season (with 73.44%; 71.67% and 68.81% respectively). In case of IR 50404 rice variety gave highest head rice recovery as compared to other varieties currently. This is one of the advantages that this variety is grown in the large areas in the Cuu Long Delta, although it is low quality. The moisture content of paddy being milled range from 15 per cent to 18 per cent. The ideal moisture content for paddy being milled according to the millers range from 15 per cent to 17 per cent, but 46 per cent of millers had selected ideal moisture content with 16 per cent. The situation for byproduct consumption such as husk was not stable yet. In some cases, the millers thrown husk into rivers due to no way for consumption and induced water pollution. Therefore, this is needed to call for new technological investment for useful husk consumption.

For the quality of rice processing, there were 100 per cent of the plants milled with low and medium paddy quality. Only 50 per cent of the plants milled high quality of paddy. In addition, there were 20 per cent of the millers without concern about rice quality when milling. The low quality of paddy varieties (such as IR 50404 and OM 576) occupied from 10 to 80 per cent, average with 48 per cent. The medium quality of paddy was 35 per cent and high quality of paddy was only 20 per cent (range from 10-30%). These findings are coincided with current rice quality export from Vietnam.

The popular channel of input and output is channel 1 with 3 stages: Millers bought paddy from farmers and traders, milling into brown rice, then sold brown rice to other traders. These traders polished and sold white rice to the exporters. However, the channel 2 is the best one with sustainable and efficiency production for entire system as well as enhance the high specialization of every component. For the efficiency of electricity supply, the millers rated at “very good” level with 30 per cent; at “good” level with 50 per cent and still 20 per cent of the millers rated with “not good” due to increasing in electricity price, unstable supply and blackout from 2-4 days/month.

The study have synthesized 11 main constrains which are faced by the millers in rice processing for export and 10 suggestions from millers' point of view to improve and develop rice processing sector for enhancing quality and value of rice export.

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