

EMPIRICAL RELATIONSHIP OF RICE PRICE AND QUALITY AT MARKET LEVEL

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ABSTRACT

The price of rice at local market is a true indicator of consumer preference and may not necessarily follow government standards even where they exist. Rice consumers tend to buy the best quality that they can afford and discriminate using a range of different factors depending on locality and economy. The most common factors considered are variety, impurity, aroma, color, and percentage of broken grains, degree of milling, grain shape and size. The objective of the research is to analysis and to assess the relationship between price and the relevant quality parameters in market place. The method of the research was done by survey to record the change in rice price and quality over time in three rice market centers representing a village market, provincial capital market and the national capital market. Locations of the survey were Karawang, Subang in West Java, and Jakarta. The activity was conducted from April 2004 to March 2005. Monthly rice samples were taken from two traders at each market, and three samples per trader. The data collection covered the variety, quality class (grade 1, grade 2, and grade 3) and the prices for each. Samples were analyzed monthly for physical properties and three times for chemical quality using Rapid Visco Analysis.

Seasonal price fluctuations were found to be bigger on provincial markets than in the capital and could reach up to 35 US\$/t (~10%). The quality incentive, defined as the additional return assuming the quality level can be raised from Grade 3 to Grade 1, was up to 70\$/t (~25%). Depending on the month the price difference among markets could reach 63\$/t (~22%).

Major quality criteria in the market were moisture content, head rice percentage, purity and color. Kernels were long and slender; chalkiness was between 10-20% and head rice between 69 and 84 %. The chemical quality analysis indicated that the amylose content was 20-21% or intermediate level, gelatinization temperature was high to intermediate and gel consistency was 65-70. It also showed that the chemical quality of the individual grades varied over time. The potential increase of the rice price due to better quality resulted in incentives to improve quality that will increase profits for the traders and potentially also for farmers through higher paddy prices. Based on the analysis of chromameter data on rice's color, the yellowness of kernel influenced the consumption preference, which resulted in a price difference. In the large retail outlets showed there was no correlation between rice variety and retail price but a strong correlation was found between retail price and the grade.

Key words: Rice price, quality incentive, amylose content, consumption preference

INTRODUCTION

As population improve in purchasing power, their staple food tend to shift from roots, tubers, plantains and bananas to cereals, and later on from rice and corn to wheat product with higher fat content. In places such as Japan; Republic of Korea; and Taiwan, China, efforts are being made to maintain rice production by offsetting the declining consumption of new value-added rice food products and convenience foods. Concentrating future increases in import demand in developed countries draws into sharper focus the importance of improving rice quality, packaging, and marketing for improving sales in the future (Yap 1996).

Although the importance of rice as a staple food tends to decline with economic growth, the demand for rice will grow for many years to come, in large part due to population growth. The world demand for rice has been projected to increase by at least 150 million tons by 2025, an increase of about 26% relative to the production level of 580 million tons in 2002 (Sombilla, 2004). To meet this challenge, continued growth in rice productivity is the key to meet the demand for more rice, as well as to solving the increasing problem of poverty in Asia. Moreover, high productivity in the rice sector will benefit the poor directly by increasing production, employment, and income.

Indonesia exhibits wide variability in consumer taste, preference, and consumption patterns, largely because of the archipelagic nature of country. Consumers in Sumatera and Sulawesi prefer non-sticky cooked rice than hardens when cooked. Consumers in Java prefer sticky and soft-cooked rice. Poor rural Indonesians who live in upland rain fed areas eat more non rice staples, such a corn, cassava and sweet potato; poor people in the lowland wet areas consume more rice.

The evaluation of consumer preference for rice quality characteristics had been done by Damardjati et al. and they concluded that Jakarta exhibited high consumer heterogeneity probably as a result of the diverse backgrounds and origins of its population. Consumer preferences for specific quality characteristics varied widely (Damardjati *et.al.*, 1989).

The Jakarta rice market exhibited the most physicochemical characteristics that significantly affected price (Table 1). This suggests that rice quality carries more weight in buying decisions of Jakarta consumers, and that they are willing to pay more for local rice than those are consumers in other cities. In general, brand name (i.e. modern or traditional varieties) affected price the most. Jakarta consumers expressed preferences for improved or modern varieties, which are sticky when cooked. Medan consumers also wanted rice those are sticky when cooked, but they

preferred traditional varieties. Ujung Pandang consumers preferred modern varieties that are sticky when cooked, but the majority purchased modern varieties that produced hard cooked rice.

Table 1. Regression of price on selected physicochemical characteristics of rice in urban areas, Indonesia, 1987 * (Damardjati and Oka 1989 in Toquero, 1991)

Variable	Medan	Ujung Pandang	Jakarta	All cities
Whiteness (%)	-6.796	21.193	457.240	67.494
Chalkiness (%)	-29.966	9.456	-18.106	-1.677
Milling degree (%)	270.560	-41.373	-171.380	-142.610
Head rice (%)	20.036	88.965	116.530	100.600
Yellow and damaged grain (%)	-10.483	-4.863	-58.924	-31.634
Amylose content (%)	-8.154	-193.870	135.120	196.670
Alkali spreading value	1.415	13.894	34.856	19.637
Softness (consistency/stickiness)	-95.137	-77.636	-61.892	-133.160
Brand name dummy	81.168	118.780	34.538	70.611
constant	-675.950	836.470	-1333.100	-102.720
R ²	0.6282	0.6522	0.4786	0.4134
R-adj	0.5874	0.6162	0.4612	0.4019

* Regression equation is in semi-log form; price of rice was used as independent variable. Significance is at the 5% level

Nowadays, the consumers have become more discriminating in terms of rice quality due to increasing incomes and better life quality. There is a trend in Indonesia that consumers are now willing to pay higher price for the specific rice quality that they desire. However, the adoption of modern post harvest technologies and practices those are needed to produce better quality rice has not kept pace with the increased demand for good rice quality. Inappropriate technologies, unsuitable management techniques and lack of knowledge during grain harvesting, drying, storage and milling often result in quality deterioration and low market price. Rice quality deterioration can be in the form of high grain breakage, incomplete milling, yellowing or discoloration, impurities or undesirable odors or taste.

Historically, research on rice quality improvement has largely focused on changing quality characteristics by means of genetic improvement and evaluating the effect of component technologies on qualitative changes in the grain. So far, research on grain quality management throughout the entire post harvest system has taken a backseat (Bell et al, 2000). It is therefore important to consider the entire post harvest systems and its various players as a system. The requirement characteristics of the program are that all research activities should take

on a systems-based approach. Research is focused on the entire post harvest system rather than on component technologies alone. In addition, private sector companies involved in rice processing or manufacturing are engaged as true collaborating partners as they are considered a legitimate beneficiary of public sector research.

This study was conducted in an activity of the Indonesian Center for Agricultural Post harvest Research and Development (ICAPRD) and IRRC postproduction workgroup as part of an integrated research approach that assesses and monitors postharvest techniques and management of rice and collects information about market systems. The objective of the study was to collect and analyze market information in three different market places and establish price / quality relationships over time. Data was collected in the markets of the national capital Jakarta, a prefectural capital market in Karawang and a village market in Subang. Better market information helps rice producers make more informed decisions on what qualities to produce, when to sell and where to sell in order to maximize their returns from rice.

MATERIALS AND METHODS

The research included surveys to monitor the change in rice price and quality over time at three rice market centers. The locations of the survey were a prefectural capital market in Karawang, a village market in Subang in West Java, and the national capital market in Jakarta. The activity was conducted from April 2004 to March 2005. Monthly rice samples were purchased from the three markets. In each market two traders were selected and samples of 0.5 kg each from three different quality classes (grade 1, grade 2 and grade 3) were purchased from each traders. Information on the variety, quality class and the price of each sample was collected.

The quality of the purchased samples was analyzed at the Karawang Post Harvest laboratory of Indonesian Center for Agricultural Post Harvest Research and Development (ICAPRD). Physical properties analyzed comprised of moisture content, grain characteristics (length/width), percentage of whole kernels, grain color, and impurities. Chemical quality analysis included amylose content and gelatinization temperature.

The gelatinization properties of the samples were also analyzed by Rapid Visco Analysis (RVA) at Rice Chemical Laboratory of International Rice Research Institute (IRRI), Los banos-

Philippine. The price versus time is analyzed each month based on the information of the price at the same rice quality from at least one rural market.

RESULTS AND DISCUSSIONS

Rice market survey conducted in three locations those are Jakarta, Karawang and Subang. Grades found in the market were Grade 1, Grade 2 and Grade 3. Sometimes “Superior” or Cristal grades were also found at some traders but this varied from month to month and therefore those quality classes are not included in the discussion.

Determinants for quality in local markets:

The major determinant for the grade is the head rice, discoloration and moisture content.

Head Rice

The positive relationship between the grades and head rice is as shown in Figure 1. According to the Indonesian National Standard (SNI 01-6128-1999) (Table 2), the existing rice quality at market level would fall under the quality classes III to IV indicating that the grading system in the local markets doesn't follow the national standard.

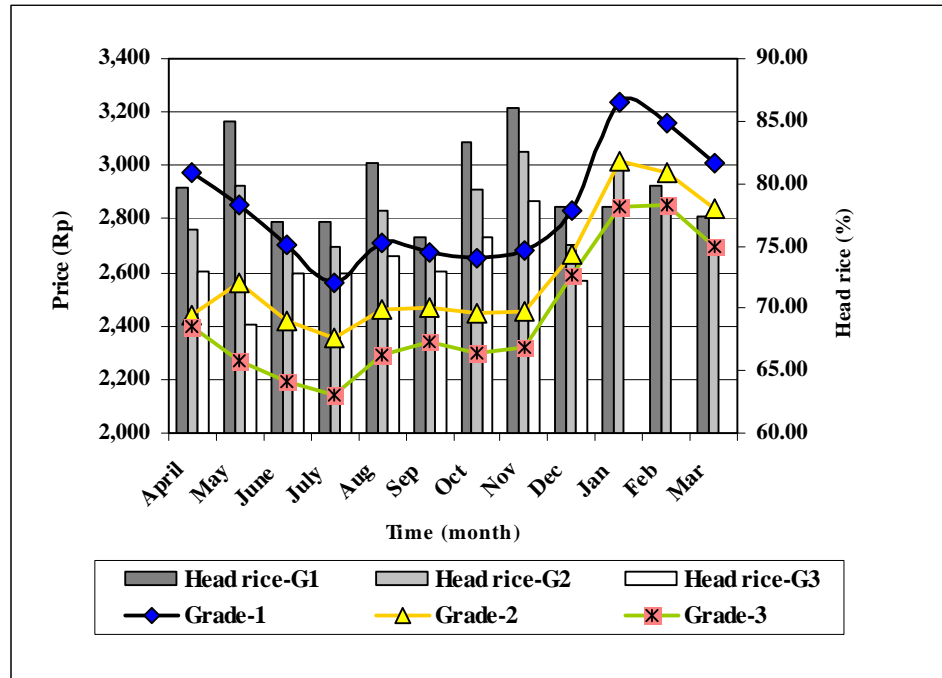


Figure 1. Relationship between price, and head rice for each grade

Table 2. Rice grade and head rice based on Indonesian National Standard 01-6128-1999

No	Component	Quality				
		I	II	III	IV	V
1	Milling degree (%)	100	100	100	95 min	85 min
2	Moisture content (%)	14	14	14	14	15
3	Head rice (%)	100	95 min	84 min	73 min	60 min

Discoloration

Based on chromameter analysis on rice's color, the yellowness of kernel influenced the consumption preference. This will result in price difference. In the traders side the large retail outlets showed that there was no correlation between rice variety and retail price but a strong correlation was found between retail price and the grade as mention in Figure 2.

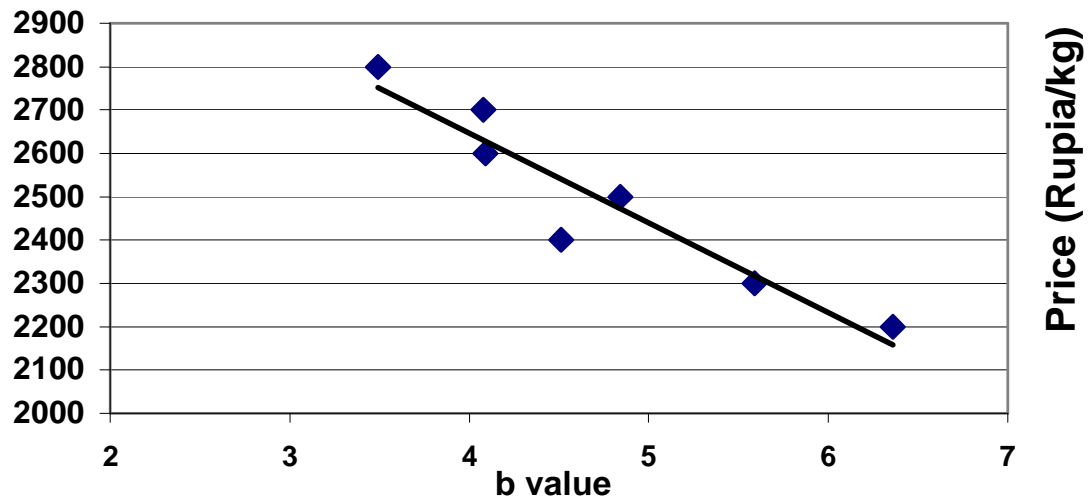


Figure 2. Relationship between the yellowness (b value) of rice kernel and rice price.

Price difference in different locations

Information about local price differences of paddy with the same quality is important because it provides the basis for decisions where to sell. The difference of rice price among the three market places is tabulated in Table 3. The difference of rice price indicated that between rice markets center at Jakarta and Karawang fluctuated and the highest different value is in November. This time is the period of the lowest stock that paddy available both at farmers and market place, because of crop establishment period and the plantation term was just in transplanted term. The price difference among markets for the same grade can reach up to 63US\$/t or 22%.

Figure 3 shows that the difference of rice price for the same grade over one year period increase reach up to 35 US\$/t or 10%.

Table 3. Monthly rice price and price difference between Jakarta and Karawang markets in rupiahs(RP)

Time	Jakarta	Subang	Karawang	Jak-kar
Apr	3,117	3,125	2,657	460
May	3,033	2,833	2,683	350
Jun	3,018	2,533	2,567	452
Jul	2,867	2,333	2,483	383
Aug	2,817	2,767	2,550	267
Sep	2,817	2,700	2,517	300
Oct	2,833	2,667	2,467	367
Nov	3,000	2,567	2,483	517
Dec	3,000	2,683	2,800	200
Jan	3,517	2,950	3,250	267
Feb	3,550	2,850	3,067	483
Mar	3,050	2,967	3,017	33

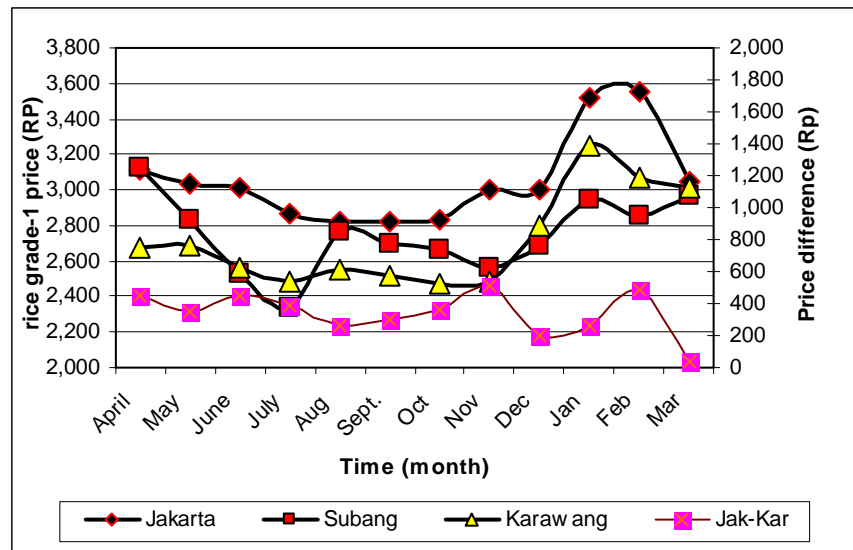


Figure 3. The different rice price among the markets

The quality incentive defined as the additional return gained from increasing the quality level from Grade 3 to Grade 1 is shown in Figure 4 and Table 4. That will be an additional profit for the traders and supposed this will also reach the farmers. The study found that the maximum difference between Grade 1 and Grade 3 was around 70US\$/t or 25%.

Table 4. Rice price grade 1, 2 and 3 at market level

Time	G-1 (Rp.)	G-2 (Rp.)	G-3 (Rp.)	G1-G3 (%)
Apr	3,117	2,933	2,683	14
May	3,033	2,633	2,417	20
Jun	3,018	2,617	2,400	20
Jul	2,867	2,633	2,433	15
Aug	2,817	2,583	2,417	14
Sep	2,817	2,617	2,533	10
Oct	2,833	2,617	2,533	11
Nov	3,000	2,633	2,550	15
Dec	3,000	2,850	2,817	6
Jan	3,517	3,300	2,067	41
Feb	3,550	3,200	3,100	13
Mar	3,050	2,867	2,700	11

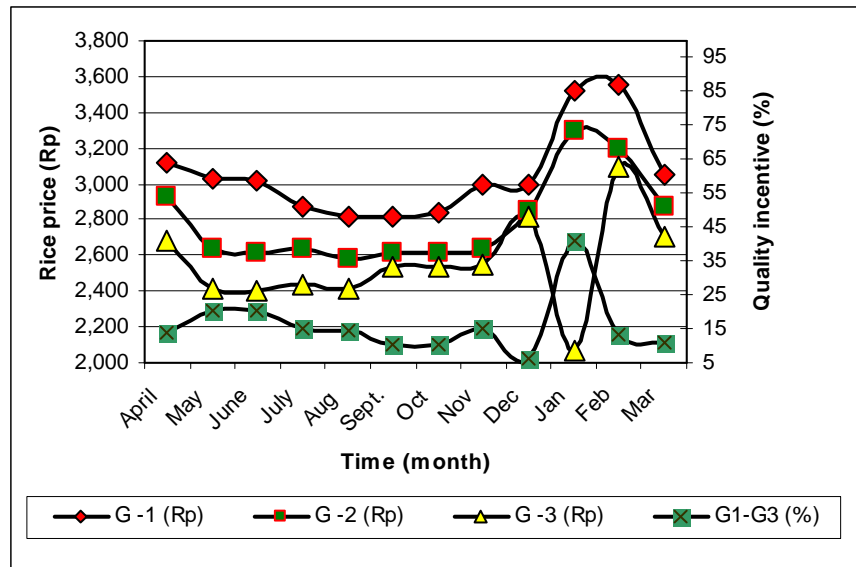


Figure 4. Quality incentive by better grade of rice quality

Chemical quality

The chemical quality analysis showed an amylose content of intermediate level and a chalkiness of 10-20% (Table 5).

Table 5. Chemical characteristic of rice grade 1, 2 and 3 at market level

Grade	% Amylase	Gel Temp	Gel Con	Size	Shape	Chalkiness
1	20.7	HI/I	65	3	1	5
2	21.4	HI/I	70	3	1	5
3	21.2	HI/I	65	3	1	5

Note : HI: High; I : Intermediate

Cooking quality

The analysis based on the amylogram from Rapid Visco Analysis on the rice samples from Subang, Jakarta and Karawang mentioned in Figure 5 and Figure 6. In April, the rice characteristics of grade 1 in Karawang and Subang showed the lowest amylose content than grade 2 and 3, moreover with the import rice. The rice at Jakarta market exhibited that grade 3 is the lowest amylose content than other grade.

The difference from the monthly rice grading at market level (Figure 5 and 6) showed lower grading consistency especially in Karawang and Jakarta rice market than that in Subang market. In general the grade 3 in April exhibited consistent high amylose content and the rice is firm.

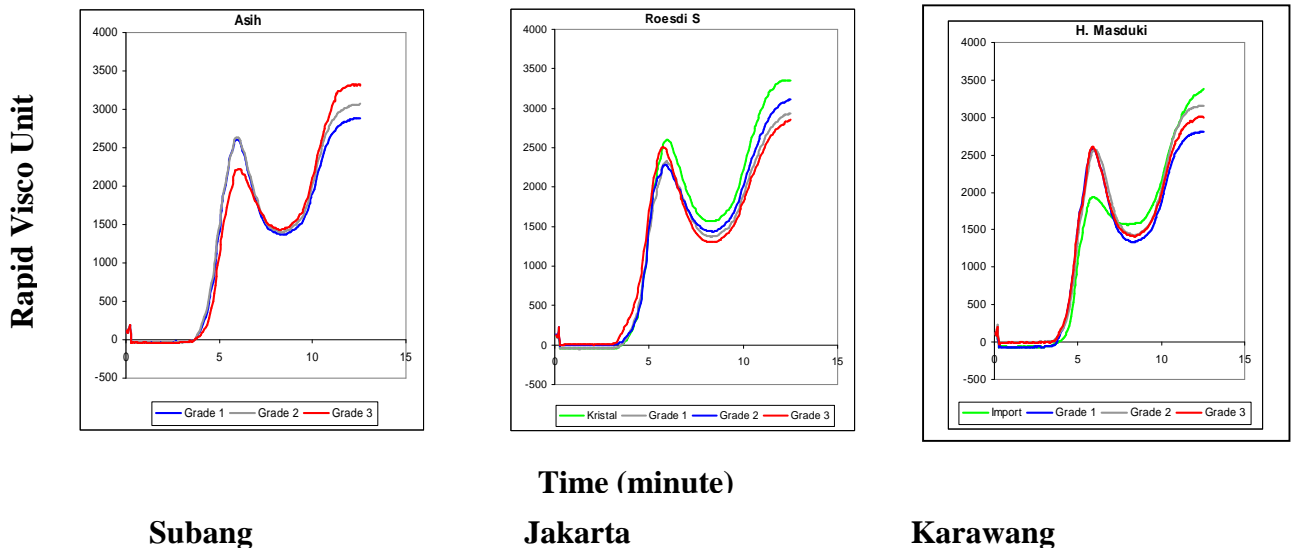
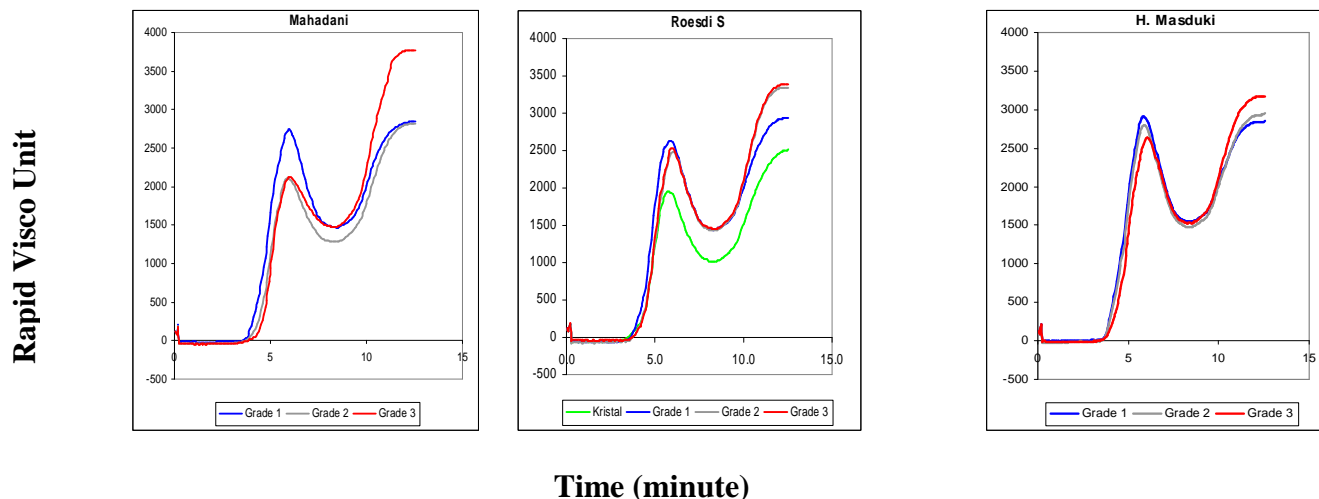


Figure 5. Rapid Visco Analysis of milled rice samples in April 2004



Subang

Jakarta

Karawang

Figure 6. Rapid Visco Analysis of milled rice samples in May 2004

The consistency of the cooking quality of grades over time looking at selected traders (one trader from Jakarta market, grade 1) and comparing the amylograms of April / May / and October indicates that in different months the same grade can consist of different varieties or aged paddy (for older paddy the initial peak is lower).

CONCLUSSION

1. There was no correlation between rice variety and retail price but a strong correlation was found between retail price and the grade.
2. The current study shown that rice grade is dependent on the physical and chemical characteristics considered relevant by consumers were color, amylose content, percent of head rice, and foreign matter. While the previous studies shown that in general, urban rice consumers and those with higher incomes were more discriminating, consider more quality characteristics, and attached higher implicit prices to those attributes than were rural, lower income consumers.
3. The grading system found in the markets has no correlation with the national standard. The increasing of the rice price due to better quality resulted in gaining the incentive of quality improvement and becoming an additional profit for the traders and supposed

- this will also reach the farmers.
4. Significant increase of the rice price can be achieved for producers if they are enabled to store the paddy and can take advantage of seasonal price fluctuations.
 5. Producers and traders can increase their returns if new marketing channels (e.g. by selling to higher price markets) can be accessed.
 6. Through better post harvest technology and management producers and processors can get higher returns if they can increase the quality.

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