Effective Management System of Rice Processing Industry in Indonesia

R Rachmat1)*, E Rahayu1), M Hadipernata1), and J Kim 2)
1Indonesian Center for Agricultural Postharvest Research and Development, Jl. TentaraPelajar 12, Bogor, West java, Indonesia
2Korea Rural and Economic Institute (KREI), 4-102 Hoigi-dong, Dongdaemun-ku Seoul 130-710, South Korea

*Email: rdwn2000@gmail.com

Abstract. Unbalance ratio between rice plant area and number of rice milling unit causes tight business competition on its business so it has low productivity and profitability. Measures for enhancing productivity need to be taken. There are some similarity situations between Indonesia and Korea related to rice consumption and industry. Objectives of this study are to conduct comparative study between Indonesian and Korean rice industry and arrange recommendations about providing stable paddy supply for the rice processing industry in Indonesia. Methodology of the study are discussion, field observation, data analysis, and arrange recommendations. The results showed that Indonesian Government and Korean Government have different structure on rice processing industry. Therefore, Indonesian Government and Korean Government enacted different policies priority on strengthening and fostering rice processing industry. Based on lesson learn from Korean experiences, some recommendations for sustainable paddy supply for the rice processing industry in Indonesia are Indonesian Government should improve postharvest system and management on rice processing, to revitalize agriculture cooperative, and to conduct business networking among rice processing industries to reduce competition in the rice business.

1. Introduction
One of Indonesian Government programs to secure rice production is improving rice postharvest handling in order to reduce food losses and produce high quality of rice through increasing rice processing industry performance. Definition of rice processing industry in this research is limited on rice postharvest handling from harvesting until producing polished rice without changing chemical content. Rice processing industry in Indonesia is performed by rice milling unit (RMU). One of problems in rice processing industry in Indonesia is the ratio between rice plant area and number of rice milling unit which play important role in the rice processing industry is not balanced so its business face tight competition that causes most rice processing industry have low productivity and profitability.

According to Indonesian RMU Bisnis Association [1], total number of RMUs are excessive when compared to total rice production. In somen parts in Indonesia, mobile RMUs have contributed to increase level of competition on rice milling business. Some rice milling units are collapsed because of lack of paddy for producing rice products. Even if RMU are survived, mostly they are working under capacity. This research intend to arrange some suggestions on sustainable paddy supply for rice processing industry in Indonesia through lesson learned from Korea experiences on rice processing industry.
2. Methodology
Methodology of this research is consisted of the activities as follow:
1. Literature study on technical reports, policies, scientific papers, lectures, etc. both from Indonesia and Korea;
2. Field observation related to RPC in Korea which conducted in “Rice Plaza RPC” located in Buan-Gun, Jeollanam-do, Korea;
3. Interview with RMU owners in SerdangBedagai District, North Sumatera, Indonesia and “Rice Plaza RPC” owner located in Buan-Gun, Jeollanam-do, Korea;
4. Consultation and discussion with advisors, experts in KREI;
5. Data analysis
6. Arranging recommendations about providing sustainable paddy supply for the rice processing industry in Indonesia.

3. Result and Discussion
3.1. Current situation of Rice processing industry in Indonesia and Korea

3.1.1. Policy on Rice Processing Industry
Rice milling unit is important element supporting the rice processing industry in Indonesia. Indonesian Government has established some policies to support and fostering rice processing industry. Facing global market, technological modernization of rice processing industry was started by introduction Rice Processing Complex (RPC) in 2000 [1]. However, the modernization of rice milling was not followed by development of supply chain of paddy as raw material so RPCs were working less than installed capacity because of lack of supply raw material and they could not compete with small rice milling owner which had closed relationship with farmers [1].

Due to excessive number of rice milling units, government enacts policy about moratorium of establishment of new rice milling units start from 2016 [2]. According to Indonesian Rice Milling Businessman Association (2015), RMU business particularly small scale RMU, face many problems such as they have low performance and productivity, weak milling skill to produce good quality of rice, low awareness about quality and safety of rice products, low skill in management business. Ideal number of rice milling industry in Indonesia to process around 70 million tons of paddy is about 37,648 RMUs with composition 88.23% are small scale RMU; 8.82% are middle scale RMU; and 2.95% are big scale RMU.

Most RMUs in Indonesia owned by private sectors, with accumulated capital by personal or joint venture. Financial support from government for rice milling business in Indonesia is still limited. There are two kinds of financial support for the rice processing industry provided by Indonesian Government, i.e., subsidy and loans. Government provides low interest loans for small and medium enterprises that could be accessed for all business sectors, not only for agriculture business, which distributed by government bank. However, loans for small and medium enterprises is small, so rice milling owners may choose loans for productive sectors or business investment.

Korean Government through Minister of Agriculture, Food, and Rural Affairs (MAFRA) formulates policy on rice processing industry [3] in purposes to stabilize rice price, enhance competitiveness of rice processing industry, and promote increasing of rice farmers’ income by providing necessary matters to develop new demand for rice, improve product quality through rice processing, support rice processing industry. Based on Act No. 12055, Aug. 13, 2013, MAFRA formulate and implement a five-year master plans for supporting rice processing industry and encourage the utilization of rice include the following matters:

a) Basic objectives and direction-setting for supporting rice processing industry and encourage the use of rice
b) Development and diffusion of technology related to rice processing industry
c) Maintaining sustainable supply and demand of rice for processing industry
d) Training of professional manpower for rice processing industry

e) Strengthening the linkage among rice processing industries;

f) Encouragement rice consumption and distribution assistance and rice products

In order to formulate a master plan, MAFRA collaborate with other internal government institutions When a master plan is implemented, MAFRA should conduct intensive monitoring and evaluation to ascertain the process relevant to master plan. Based on Act No. 12055, Aug. 13, 2013, MAFRA conducts assistance program in order to strengthen rice processing industry, include the following matters:

a) MAFRA executes measures for assisting rice processing business entities in improving business management, such as procurement of raw materials, improvement of facilities, markets expansion, and provision of consulting service related to rice processing industry

b) MAFRA provides subsidy for rice processing to increase production of rice products and improve products quality

c) State or local government provide subsidy for person who establishes and operates an exhibition hall for rice products or rice culture in order to encourage the use of rice and promote rice processing industry

d) State or local government provide assistance to a person or organization that advertises representative brands of rice products

Korean Government has enacted financial policy on agriculture, fisheries, and food sector [4] in purposes to contribute balance national economy development by promoting investments in agricultural, fisheries and food industry and laying foundation for measuring growth of agricultural, fisheries and food enterprises. Food enterprises scope determined in this act are companies which manufactured agriculture, fisheries, and foods materials from raw materials used for producing agriculture, fisheries, and foods or intermediate products. Based on this act, government has obligation to formulate and implement comprehensive policies for promoting investments in agriculture, fisheries, and food industry and laying the growth foundation on its sectors. According to Act No. 12058, Aug. 13, 2013 Article 5, State Government may establish or designate specialized organizations for managing investment of funds agriculture, fisheries, and food industry to promote investments for agricultural and food enterprises, then this organization collects funds from state or local government or others to invest the fund for agricultural and food enterprises.

Korean Government nurture of rice distribution business which serves a comprehensive channel for distributing rice from purchasing of rice from producers to drying, selection, storing, processing, selling, etc. For improving rice distribution structure, enhancing rice quality and stabilizing rice price according to Grain Management Act [5] also provide funds required for establishing facilities to dry, store, process, and distribution, such as a comprehensive rice processing plant, and purchase rice from agricultural cooperative or other produces. In order to provide financing and subsidization for rice processing industry, MAFRA should consult with Minister of Strategy and Finance regarding financing conditions, such as interest on such loans.

Rice Processing Complex (RPC) had been introduced in Korea since 1991. As the first step, Korean Government established pilot plan in two regions and later in 1993 Korean Government continued to build RPC in 83 regions in Korea. According to Gil-Haeng et.al (2000), in order to increase competitiveness of Korea RPCs for facing global market, Korean Government provides capital support for encouraging RPCs business. In 1995, Korean Government provided capital support per RPC in 2000. Total Korean Government support is different depend on internal situation of RPCs business. Government provides higher capital support for RPCs which have good condition of business than its on worse condition of business. Due to excessive number of RPC in 1998, there was tight competition between RPCs both in obtaining raw material or marketing products that caused decreasing of Korean RPCs profitability. In 2000, Korean Government had enacted policy to discontinue capital support program for developing new RPC. Moreover, in 2004 Korean Government reduced number of RPC from 400 to be 360 to maintain rice business situation.
Based on information gathered from observation in Rice Plaza RPC located on Buan Gun, Jeollanam-Do, Rice Plaza RPC is private RPC and also get capital support from government for introducing advance technology, around 60% of total assets. There are two types of government capital supports for RPCs, i.e., developing new RPC and introducing advance technology on RPC. In addition, Rice Plaza RPC also get routine subsidy from government for purchasing paddy from farmers or Agricultural cooperative (Nong-Hyup) as explained at Grain Management Act Article 22. In order to supervise and evaluate the business, Korean Government performs routine audit on Rice Plaza RPC every year.

3.1.2. Status on Rice Processing Industry

According to Directorate General Processing and Marketing of Agricultural Products, Ministry of Agriculture, total rice milling unit in Indonesia is 182,199 units which spread out in 34 provinces [12]. Category of rice milling units operated in Indonesia based on capacity, i.e., (1) big scale rice milling unit, producing rice more than 3,000 kg/hour; (2) middle scale rice milling unit, producing rice 1,500 – 3,000 kg/hour; and (3) small scale rice milling unit, producing rice less than 1,500 kg/hour. Distribution of RMU in Indonesian shown in Figure 1.

Mostly, rice milling units in Indonesia are private company both personal owner or joint venture. Actually, there are some rice milling units owned by agricultural cooperatives, but most of them do not operate as well as agricultural cooperatives business because of management problems so they low trust of farmers. Some cases in several regions, agricultural cooperatives are judged give less contribution to support farmers business and enhance farmers’ income because some of them manage unprofessionally. Low participation of farmers on agricultural cooperatives is main factor which cause of agricultural cooperatives business collapse s in everal regions in Indonesia.

There is no standard pattern about business networking model of rice milling units which applied in the whole regions in Indonesia. It is meant that pattern of rice business networking in one region might be different with other regions. Rice milling units in Java and Sumatera Island have non-cluster business networking where the whole milling processes from purchasing paddy until producing rice are conducted by the same rice milling unit [27]. Another business networking model of rice milling unit is cluster model. In this model, paddy purchasing until husking process are conducted by small scale rice milling unit, whereas rice polishing process until labeling the products are conducted by middle or big rice milling unit. Model of business networking of rice processing industry in Indonesia shown at Table 1.

Figure 1. Distribution of rice milling unit in Indonesia
Table 1. Model of business networking of rice processing industry in Indonesia [27]

| Process Subject | Harvesting | Drying | Milling | Marketing |
|-----------------|------------|--------|---------|-----------|
| Subject         | Farmers    | Rice milling unit | Small/Middle scale rice milling unit | Big scale rice milling unit |
| Product         | Wet paddy  | Dried paddy | Medium rice | Premium rice |
| Yield (%)       | -          | -       | 66 - 68 | 64        |
| Model 1         | Cluster    | Non-cluster |                     |                       |
| Model 2         | Inti       |          |                     |                       |

Business types of RMU in Indonesia are various depend on capital and rice milling configuration. Some rice milling owners provide milling service, and another one provide milling service and perform rice business. Business type is operated in rice milling unit influence to its management system. In general, raw material of rice milling unit may come from farmers or collector. Type of raw material is influenced by facilities provided in rice milling unit, business networking, capital, and others. In some places in Indonesia, there is rice milling units which purchase unpolished rice or once polished rice to be polished using their machineries. Mostly, this method is applied by middle or big scale rice milling units which have business networking with small scale rice milling units. In case of rice milling unit in North Sumatera, most rice milling unit owners apply non-cluster business networking so they obtain rough paddy from farmers directly or collectors. However, nowadays, main problem faced by most small scale rice milling owners in North Sumatera are having tight competition with mobile rice milling units in order to obtain rough paddy. This situation forces some small scale rice milling unit to modify their business from operating fixed rice milling unit to mobile rice milling unit. When they do not have enough capital for modifying their business, most of them choose to close their business.

According to Indonesian Rice Milling Businessman Association (2015), total fixed RMUs in North Sumatera is 5,473 units, whereas mobile RMU is 575 units. Generally, farmers prefer use mobile rice milling service rather than milling paddy in fixed rice milling service because it is more efficient. In addition, rice milling unit owners have less capital for managing paddy stocks. However, some weaknesses of mobile rice milling are being judged as illegal business because they do not have business license and producing low quality of rice because they apply one pass milling configuration (H-P) and have poor skill of milling operator. This rice milling unit obtains raw material from member its group, around 70%, Usually, rice milling owner purchases paddy which have moisture content around 22% so he has to conduct drying process and in some situation he also purchases dried paddy, moisture content around 14%, which are more expensive. Due to lack of paddy supply, this rice milling unit is working 30-40% of installed capacity.

Milling configuration of RMU effects to milling yield and milling capacity. Based on survey conducted by Rahayu et al. (2014) in several regions, farmer rice milling unit in several regions operate milling machines which have capacity 1-3 tons/hour. Due to lack of capital, labor and length of milling process, rice milling units only produce rice less than installed capacity, average around 3.5 tons/day of rice or equal with 5.6 tons/day of paddy if milling yield around 62.28%. Rice milling configurations applied in several regions are Husker-Husker-Polisher-Blower, Husker-Husker-Polisher, and one pass rice milling unit with range yields from 55 – 64.74%. It showed that differences of rice milling configurations and paddy quality causes various rice quality.

Characteristics of agricultural products are changeable depend on season so it influence to operational business on rice processing industry. Work day in farmer rice milling unit depend on harvest season, in peak season average work day around 5 days/week included drying and milling process with average work time 7 hours/day. After drying process, paddy are stored at least 1-2 days, called tempering
period, to reduce broken rice. Furthermore, small scale rice milling unit operates simple storage management. Generally, storage for paddy and polished rice is conducted in the same area with milling process area. For having efficient production process, paddy stored nearby inlet raw material of husking machine, while polished rice are stored nearby polishing machine. Farmers prefer to store paddy rather than to store polished rice because shelf-life of paddy longer than rice polished. Storing time depend on moisture content of material, season, and storage capacity.

Consumer preference on the rice product in Indonesia is different, based on ethnics, so they tend to consume local variety of rice. For example, Javanese prefer to consume the sticky rice, whereas Padang ethnic prefers to consume the rice with hard texture. Nowadays, consumers not only think about quantity, but they also think about good quality of food. Related to the rice products, mostly, Indonesian people prefer to consume rice which has white performance and high ratio of head rice. Consumer preference also influence by the households income. Consumers who have high income tend to consume premium rice products which have white performance and high ratio of head rice.

Based on field observation conducted in Rice Plaza RPC located on Buan Gun, Jeollanam-Do, Rice Plaza RPC has implemented advance technologies on rice milling process from drying process of paddy to the end step of milling process. In drying process, Rice Plaza RPC implements integrated drying and storing tank with capacity 500 tons/tank so total capacity for 11 tanks is 5500 tons paddy. Before performing drying process, paddy is cleaned up from the waste so drying process could be performed effectively and efficiently. The next step is milling process include sorting, husking, separating brown rice, sorting color of brown rice, picking stone, storing brown rice, polishing, separating broken and head rice, sorting color of brown rice, and storing rice process. Total production capacity is 6 tons/hour or 14,400 tons/year with milling yield 72%. In order to maintain quality of rice, Rice Plaza RPC conducts daily laboratory testing on rice include physical and cooking testing at testing laboratory. The end of production process is packing process which use automatically packing machine to produce product in weight from 1 kg-20 kg. Rice Plaza RPC obtain paddy from farmers at October to December every year, around 70% of total production input per year, while from January to September every year paddy gained from Agricultural cooperative, around 30% of total production input per year. Total production input per year in Rice Plaza RPC is 20,000 tons. In order to gain paddy from farmers, Rice Plaza RPC have a contract with around 300 farmers. In this partnership project, Rice Plaza RPC owner supplies seeds to farmers, sometimes he supplies fertilizer, and then when harvesting season is coming, he purchases its rice crops. Before harvesting process, government officers would perform quality inspection of paddy then farmers would get quality certificate that is useful for RPC owner to know initial paddy quality. In 2016, price of paddy is ₩40,000/40 kg. Determination of paddy price in Korea is conducted by Agricultural cooperative, whereas evaluation of agricultural products quality as raw material for industry is conducted by National Agricultural Products Quality Management Service (NAQS).

There are three steps of safety inspection process, depend on the characteristics of agricultural products, performed by NAQS, i.e., production, distribution, and consumption. Safety inspection procedures include the following matters [6]:

(i) **Sampling process.** It is conducted by regional branches on production and distribution step.

(ii) **Analysis process.** It is performed by provincial and local analytical laboratory to examine residue of hazard materials on agricultural product such as pesticide residue, heavy metals, mycotoxins, pathogenic microorganism, radioactivity, dioxin, and antibiotics.

(iii) **Result.** In this step, analysis result on agricultural products would be checked whether it is below or excess Maximum Residue Limit (MRL) based on CODEX standard or Korean MRL.

(iv) **Management.** This step is performed by regional branches. If analysis result is below MRL, agricultural products could be consumed by consumers. While if it is more than MRL, disqualification procedures would be performed on agricultural products such as delay, conversion, and disposal. On production stage, delay process would be performed in the case of residues on agricultural products will decline to MRL in short period. If residues on agricultural products which used for seeds or raw materials for industry are not decreased to MRL in short
period, conversion process would be performed. Agricultural products would be disposed if it contain materials which are unable to be recycled. Farmers who produce disqualified products would be blacklist for 1 year. Safety inspection process is a mandatory system for evaluating quality of the whole agricultural products as raw material for food industry. If farmers are avoiding this process, farmers would get penalty or imprisonment.

Rice Plaza RPC implements integrated drying-storing paddy in storage tanks which adopt blower drying system using 30 HP for supplying 1 month production. Using existed drying method, Rice Plaza RPC is able to maintain paddy quality for 8 months. For storing rice product, Rice Plaza RPC applies first in first out (FIFO) storing system in the warehouse, and then distribution process is performed within 1 week after finishing production process. Mostly, grains, including rice, are distributed directly from processing companies in producing areas to stores in consuming regions [7]. In order to sell rice products, Rice Plaza RPC has opened distribution retail to distribute rice products to customers in 3 locations, i.e., in Gwangju, Gyeonggi, and Seoul to sell 6 brands of rice products. Compared to rice import, price of local variety of rice is more expensive. Decreasing of rice products in Korea is estimated because of some factors such as global market and tight competition between RPCs that force RPC owners to perform production process efficiently so they can sell products in competitive price.

3.1.3. Supply management

Most farmers in North Sumatera, around 85%, sell paddy to middle and big scale rice milling units, while the rest 15% of farmers sell paddy to small scale rice milling units in the village[8]. Small scale rice milling units which usually located in the village depend on local farmers to obtain paddy as raw material[9]. Total rice milling unit in North Sumatera is 6,048 units including fixed and mobile rice milling unit [14]. Calculation of the use of paddy as raw material for rice processing industry in North Sumatera as shown at Table 2. Based on the calculation, total paddy which are available be able to provide raw material for 948 rice milling units with maximum capacity consist of 316 of small scale, 369 middle scale, and 263 big scale, while the rest of rice milling unit might not operate even if in half capacity because of lack of paddy as raw material, around 5,100 units including small scale, middle scale, and big scale.

![Figure 2](image.png)

**Figure 2.** Paddy production in North Sumatera from 2010 to 2015 (paddy basis) [24]
Table 2. The use of paddy as raw material for rice processing industry in North Sumatera

| Paddy Production in North Sumatera 2015 (tons) | Milling Scale | Processing share (tons) | Production Capacity (per Year/Unit) | Working rice milling unit (unit) |
|----------------------------------------------|---------------|-------------------------|-------------------------------------|---------------------------------|
| 4,044,829                                    | Small scale   | 606,724                 | 1,920                               | 316                             |
|                                              | Middle scale  | 1,415,690               | 3,840                               | 369                             |
|                                              | Big scale     | 2,022,415               | 7,680                               | 263                             |
| Total                                        |               |                         |                                     | 948                             |

Assumption:
1. Production capacity = small scale : 1 tons/hour; middle scale : 2 tons/hour; big scale : 4 tons/hour
2. Workday = 8 hours/day; 5 days/week; 4 weeks/month; 12 months/year
3. Processing share of rice milling unit is calculated based on paddy marketing trend in North Sumatera where 15% of farmers sell paddy to small scale rice milling unit in village, while 85% of farmers sell paddy to middle and big scale rice milling unit in district based on research conducted by Supriatna (2005).
4. Calculation is conducted by used paddy basis

Based on observation at Rice Plaza RPC, there are two paddy sources used by RPC from farmers (70% of total raw material needs) and Agricultural cooperative (30% of total raw material needs). Calculation of the use of paddy as raw material for rice processing industry in Korea as shown at Table 3. The table showed that there is over supply of paddy as raw material of RPC more than 40% of total paddy production in 2015 if average production capacity of RPC about 6 tons/hour. If RPC number and paddy production are constant, every RPC is possible to increase production capacity until 70% (maximum).

Figure 3. Paddy production in Korea from 2010 to 2015 (paddy basis) [26]

3.2. Comparative study
Based on observation related to rice processing industry situations both in Indonesia and Korea, there are some differences in rice processing industry policy which effect to development of rice processing industry in both countries. Comparation summary of rice processing industry in Indonesia and Korea is shown at Table 3. Information showed at the table showed different situations and priority on agricultural development on both countries generates different policies.
Table 3. The use of paddy as raw material for rice processing industry in Korea

| Parameter                        | Total  |
|----------------------------------|--------|
| Paddy production in 2015 (tons)  | 4,330,000 |
| Production capacity per year/unit RPC (tons) | 11,520 |
| Existed number of RPC (units)    | 220    |
| Expected number of RPC (units)   | 376    |
| Total paddy demand RPC/year      | 2,534,400 |
| Over supply of paddy (tons)      | 1,795,000 |

Assumption:
1. Production capacity = 6 tons/hour
2. Workday = 8 hours/day; 5 days/week; 4 weeks/month; 12 months/year
3. Calculation is conducted by used rough paddy basis

3.3. Recommendation for Sustainable Paddy Supply to Rice Processing Industry in Indonesia

Based on lesson learn from Korean experiences, there are some recommendations in order to provide stable paddy supply for the rice processing industry in Indonesia include the following matters:

a. Indonesian Government should enact new rules that focus on enhancing and strengthening business and competitiveness of the rice processing industry
b. Indonesian Government should improve postharvest management system on rice commodity
c. Indonesian Government should revitalize and empower agricultural cooperatives to strengthen agriculture business, sustainable supply to rice processing industry
d. Indonesian Government should continue to initiate formation of business networking among rice processing industry to reduce competition in the rice business

4. Action Plan for Increasing Agricultural Competitiveness

4.1. Improving Postharvest Management System on the Rice Commodity

On the pattern, Ministry of Agriculture, as government institution which in charge on managing and strengthening agriculture sector, has functions to provide educating and fostering system for farmers through extension agency and evaluate quality and safety of rice through quality assurance agency in order to provide good quality of rice commodity as raw material for rice processing industries so they be able to produce good quality of rice products. In addition, Ministry of Agriculture also has function to distribute subsidies for enhancing agricultural business to farmers and rice processing industry. Then, Ministry of Agriculture should arrange evaluating and monitoring system to evaluate performance of farmers and rice processing industry. Government through National Logistic Agency plays important roles to stabilize rice supply in the market and manage rice stock for preparing emergencies situation such as natural disasters and inflation.

Started from 1984 agricultural cooperatives got monopoly right to manage agricultural sector and played important roles as an executor of government program on rural economic development. Due to top-down system on agricultural cooperatives establishment, the boards and managers are less managerial skill to develop agricultural cooperatives business. As a result when government revoked monopoly right at 1998, many agricultural cooperatives be unable to compete with other rural financing institutions so total number of agricultural cooperatives was declined, around 40%, from 1997 to 2002 [10]. Regarding roles on supporting agricultural sector, agricultural cooperatives in Indonesia have low contribution to strengthen agricultural sector. In some regions, farmers have low participation on the agricultural cooperatives business because of authority abuse of boards of directors and weak management on the business. In Korean cases, agricultural cooperatives have great contribution to strengthen agricultural business and increase farmer’s welfare. In 2014, Korean National Agricultural Cooperatives Federation (NACF) had gross business revenue around ₩12,484,500 million and contributed to provide dividend for 2.4 million member cooperatives around ₩689,000 million[11]. In order to increase farmer’s welfare, Indonesian Government should revitalize agricultural cooperatives and empower it to support and strengthen agriculture business.
5. Conclusion
Indonesia requires policy about enhancing and strengthening competitiveness of rice processing industry.
1. Improvement of management system and implementation of advance technology are needed to enhance productivity and profitability of rice processing industry.
2. Sustainable agricultural business requires the involvement of many stakeholders, both government and private sectors.

6. References

[1] Thahir R 2010 Revitalisasi Penggilingan Padi Melalui Inovasi Penyosohan Mendukung Swasembada Beras Dan Persaingan Global. Pengembangan Inovasi Pertanian 3(3), 2010: 171-183
[2] Directorate General Food Crops 2016 Meserospon Moratorium Pengembangan Penggilingan Padi (Rice Milling Unit) Baru Ditjen TP Menggelar FGD. Provided at http://tanamanpangan.pertanian.go.id/informasi/113. Accessed at June 16th, 2016.
[3] Republic of Korea 2013 Act on the Support for The Rice Processing Industry and The Promotion of Use of Rice. Seoul : Korea Legislation Research Institute
[4] Republic of Korea 2013 Act on Formation and Operation of Agricultural, Fisheries and Food Investment Funds. Seoul : Korea Legislation Research Institute.
[5] Republic of Korea 2012 Grain Management Act. Seoul : Korea Legislation Research Institute.
[6] Ju-hyun, C September 8th 2016 Lecture: Safety Management for Agricultural Products. National Agricultural Products Quality Management Service, Ministry of Agriculture, Food and Rural Affairs.
[7] Korea Rural Economic Institute 2015 Agriculture in Korea. Chapter 3: Agriculture Industry Trends. Naju: KREI
[8] Supriatna A 2005 Analisis Sistem Pemasaran Gabah/Beras : (Studi Kasus Petani Padi di Sumatra Utara) Provided at ojs.unud.ac.id. Accessed at Agustus 25th, 2016.
[9] Limbong I, Darus M, B Emalisa 2016 Analisa Kelayakan Usaha Penggilingan Padi Skala Kecil (Studi Kasus: Kecamatan Tanjung Morawa, Kabupaten Deli Serdang, Provinsi Sumatera Utara). Provided at http://journal.usu.ac.id. Accessed at October 11st, 2016.
[10] Baga L M 2005 Revitalisasi Koperasi Petani. Agrimedia, Vol 10 (2 Desemper 2005). Provided at http://agrimedia.mb.ipb.ac.id. Accessed at October 24th, 2016
[11] Seongjai P May 26 2016 Lecture : The Experience of Korean Agriculture Cooperatives. Lecture. Korea Rural Economic Institute
[12] Directorate General Processing and Marketing of Agricultural Products, Ministry of Agriculture. 2015a Pemantapan Swasembada Beras Melalui Revitalisasi Penggilingan Padi Rakornas dan Rakernas PERPADI : Jakarta, 28 – 30 April 2015.
[13] Directorate General Processing and Marketing of Agricultural Products, Ministry of Agriculture. 2015b Pedoman Revitalisasi Penggilingan Padi Kementerian Pertanian, Jakarta
[14] Indonesian Rice Milling Businessman Association 2015 Kondisi Penggilingan Padi Di Indonesia Presented on Forum Group Discussion on Revitalization of Small Rice Milling; Bogor, 7-8 December 2015
[15] Kwang Hwan, C. 2003 Post-harvest management technology and policy on agricultural products in the Republic of Korea Proceedings: APACAEM Regional Seminar on Post-Harvest Technology. UN Centre for Sustainable Agricultural Mechanization, Beijing, China. November, 2003
[16] Mardianto, A Supriatna, Y Agustin 2005 Dinamika Pola Pemasaran Gabah dan Beras di Indonesia Forum Penelitian Agro Ekonomi 23(2) : 116 – 131
[17] Patiwiri A W 2006 Teknologi Penggilingan Padi Gramedia Pustaka Utama Jakarta.
[18] Rahayu E 2014 MutuBeras Dan RendemenGiling Di PenggilinganPadi Kecil PadaBeberapa Daerah Sentra ProduksiPadi Prosiding Seminar Nasional 2014
[19] Republic Indonesia 1998 Keputusan Menteri Pertanian tentang Pedoman Pembinaan Perusahaan Penggilingan Padi, Huller and Penyosohan Beras Jakarta : Ministry of Agriculture
[20] Republic of Indonesia 1954 Peraturan Pemerintah tentang Pembatasan Perusahaan Penggilingan Padi dan Penyosohan Beras Jakarta : Ministry of Judiciary
[21] Republic of Indonesia 1971 Peraturan Pemerintah tentang Perusahaan Penggilingan Padi, Huller, dan Penyosohan Beras Jakarta : Secretary of State
[22] Republic of Indonesia 2009 Instruksi Presiden tentang Kebijakan Pengadaan Gabah/Beras dan Penyaluran Beras oleh Pemerintah Jakarta : Secretary of State.
[23] Statistic Indonesia. 2016a Produksi Padi Menurut Provinsi (ton), 1993-2015 Provided at www.bps.go.id. Accessed at July 25th, 2016
[24] Statistic of North Sumatera 2016a Luas Panen, Produksi dan Rata-Rata Produksi Padi Sawah, 2003 – 2014 Provided at www.sumut.bps.go.id. Accessed at October 10th, 2016
[25] Statistic of North Sumatera 2016b Luas Panen, Produksi dan Rata-Rata Produksi Padi Ladang, 2003 – 2014 Provided at www.sumut.bps.go.id. Accessed at October 10th, 2016
[26] Statistics Korea 2015 Rice Production in 2015 Provided at http://kostat.go.kr Accessed at October 7th, 2016
[27] Suismono, Ridwan R, Soemantri A S, Tjahjohutomo R 2013 Kajian Model Agroindustri Padi Berbasis Klaster Jurnal Pangan (22) : 2.
[28] Thahir R, R Rachmat, dan Suismono. 2008 Pengembangan agroindustri padi 34-76 dalam Suyamto, I N. Widiarta, dan Satoto (Ed.). Padi, Inovasi Teknologi dan Ketahanan Pangan Balai Besar Penelitian Tanaman Padi, Sukamandi.
[29] Tjahjohutomo R., Handaka, Harsono, dan T W Widodo 2004. Pengaruh konfigurasi mesin penggilingan padi rakyat terhadap rendemen dan mutu beras giling Jurnal Enjiniring Pertanian II(1): 1-23.

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