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Investment of rice mills in Vietnam

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Chapter 4

The rice-milling industry in the Mekong River Delta

4.1 Introduction

This chapter is aimed at providing the reader with a general picture of the rice-milling industry in the MRD and giving insights into some specific aspects of the industry that are relevant in the framework of this dissertation, especially regarding the uncertainty facing private rice millers. As discussed in Chapter 2, Vietnamese enterprises, especially private ones, have responded positively to the opportunities created by *doi moi*. A visible response can be seen in the rice-milling industry in the MRD, the rice bowl of Vietnam. In a short period, *i.e.*, only one year, from 1988 to 1989, this industry, accompanied by a strong demand for Vietnam's rice from foreign markets, helped to transform Vietnam from a net food importer into a rice exporter. Despite this, private RMs that play an important role in this industry remain at a distinct disadvantage, not only in terms of access to external finance, as discussed in Chapter 3, but also in terms of access to foreign markets (see Chapter 2) as well as access to market information.

The rest of this chapter is structured as follows. Section 4.2 gives a description of paddy grain and discusses the technical aspects of the rice-milling process. Section 4.3 describes relevant aspects of the milling technology applied in the MRD. Section 4.4 discusses the emergence of private RMs in the MRD and the uncertainty facing them. Section 4.5 concludes the chapter.

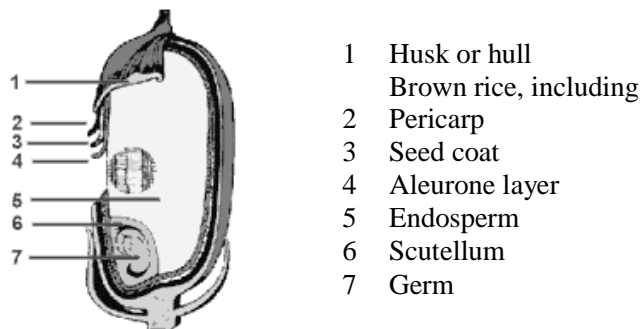
4.2 Paddy grain, the rice-milling process, and loss in milling

4.2.1 Paddy grain

Picture 4.1 depicts a paddy grain. Paddy grain basically consists of a husk (or hull) and a grain of brown rice. Brown rice consists of a bran layer (including pericarp, seed coat, and aleurone layer), a germ and scutellum connected on the ventral side of the grain, and an edible portion or endosperm.

Basically, paddy grain is not suitable for eating. It becomes edible only if the husk and the bran are removed.⁵⁷ The removal of the husk and the bran can be done in the milling process, which will be described as follows.

Picture 4.1 Paddy grain



Source: <http://www.buhler.ch>.

4.2.2 The rice-milling process, loss in milling, and rice-milling techniques

The rice-milling process

Rice milling involves the removal of the husk and the bran layer to produce the edible portion for consumption. Rice-milling process embraces two basic operations. One operation is the removal of the husk to produce brown rice; this operation is called dehusking (or dehulling). The other operation is the removal of the bran layer from brown rice to produce polished (or white) rice; this operation is called polishing or whitening. Milling also removes the germ and a portion of the endosperm as broken kernels and powdery materials.

⁵⁷ It may be better, in terms of nutrition, if the bran is not removed. However, in most cases consumers prefer white rice, *i.e.*, rice with the bran being removed, because white rice may have better smell and taste.

Output of a milling process comprises one main product, *i.e.*, milled rice (or the edible portion) and several by-products, *i.e.*, the husk, the germ, the bran layer and the broken kernels.⁵⁸ Rice milling results in loss the extent of which depends on the milling technique chosen.

Loss in milling

Loss in milling is an important determinant of the efficiency of a rice mill. Loss in milling is quantitative as well as qualitative by nature. Quantitative (or physical) loss is manifested by a low milling recovery rate;⁵⁹ qualitative loss is manifested by a low rate of head rice recovery or a high percentage of broken grains in the milled product.⁶⁰ In order to reduce loss in milling, the rice-milling operations, *i.e.*, dehusking and whitening, should be accomplished with care to prevent excessive breakage of the kernel. Loss in milling depends on the milling technique applied, among other factors. Differently stated, better milling techniques may result in lower loss in milling, as will be discussed below.

Rice-milling techniques

The rice-milling process can be done using different milling techniques. Rice-milling techniques range from a simple form like pestle and mortar to very sophisticated, expensive multiple-pass milling machines. All these forms of milling techniques have existed in Vietnam; some of them have been extinguished.

Pestle and mortar

This process is a manual form of milling. Mortar and pestle (see Picture 4.2) are used by farmers and usually operated by female members of the family. In this process, the milling is done through the impact and friction acting among the paddy kernels. The grain is dehusked and whitened every time when it is pounded in the mortar by the pestle. This process is highly inefficient for two main reasons. First, it is very labori-

⁵⁸ Among these by-products, the husk can be used as an energy generating material; the germ, the bran layer, and the broken kernels can be used to feed animals.

⁵⁹ Recovery rate, also referred to as conversion rate, is the percentage of the quantity of rice recovered to the quantity of paddy fed into the milling process. For example, if 70 kilograms of rice are recovered out of 100 kilograms of paddy, the recover rate will be 70 per cent.

⁶⁰ Head rice is unbroken rice.

ous and time-consuming. Second, the excessive impact and pressure result in high breakage of milled rice (qualitative loss). At first, farmers in remote areas did not mind the loss because of the low volumes of paddy milled and the absence of better alternative techniques to mill paddy. Pestle and mortar have not been used to mill paddy since the time machine-led machinery appeared. Nowadays, people bring paddy to rice mills to reduce workload.

Picture 4.2 Pestle and mortar

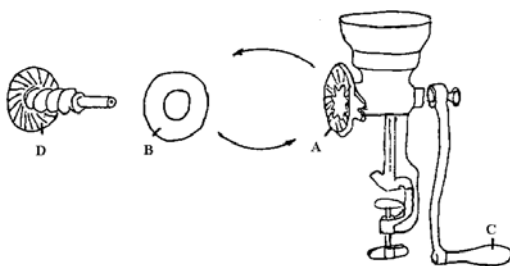


Source: <http://www.fairtradeonline.com>.

Steel huller

Steel hullers (see Picture 4.3), also referred to as Engleberg steel hullers, are more efficient than pestle and mortar. A rotating steel roller inside a screen cylinder provides pressure and friction among the grains, simultaneously dehusking and polishing of the kernels. Thus, the impact force in steel hullers is absent. Nowadays, hand-operated steel hullers are rarely observable in the MRD.

Picture 4.3 Hand-operated steel rice huller



Note: (A) – stationary disk;
(B) – rubber disk;
(C) – handle; and
(D) – rotating disk with auger.

Source: <http://agronomy.ucdavis.edu>.

Under-runner disk sheller (or disc sheller)

Under-runner disk shellers, often referred to as disc shellers, consist of two horizontal iron discs partly coated with abrasive layers (see Picture 4.4). One disc is stationary and the other rotates. The distance between the two discs can be adjusted to suit the size of paddy grain. Paddy is fed into the centre of the machine and moves outwards by centrifugal force. Paddy is evenly distributed over the surface of the rotating disc. Under the centrifugal pressure and friction of the disc, most of the paddy grains are dehusked.

The main advantage of disc shellers is its operational simplicity and low running cost since the abrasive coating can easily be remade at the site with inexpensive materials. Its main disadvantage is the high level of grain breakage and the abrasions caused to the outer bran layer. Under-runner disk shellers are still popular in the MRD.

Picture 4.4 Under-runner disk sheller



Source: <http://agronomy.ucdavis.edu>.

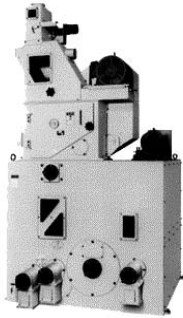
Rubber roll paddy husker

Rubber roll paddy huskers (see Picture 4.5), also referred to as hullers or shellers, significantly reduce grain breakage. Rubber roll paddy huskers consist of two rubber rolls rotating in opposite directions at different speeds. One roll moves about 25 per cent faster than the other. The difference in speed subjects paddy grains falling between the rolls to a shearing action that strips off the husk.

Compared to disc shellers, rubber roll huskers are at an advantage in the sense that they reduce grain breakage and the risk of damaging the grain. They do not remove the germ, and hence sieving the resulting rice is not necessary. Their hulling efficiency is high. The main disadvantage is the cost of replacing the rubber rolls. This disadvantage is offset, however, by the reduction of breakage and the increase of total rice overturn. Rubber roll paddy huskers are most popular in the MRD in these days,

according to our observation during the survey.

Picture 4.5 Rubber roll paddy husker



Source: <http://www.satake-usa.com/aspirated.html>.

Multiple-pass milling machines

A large capacity multiple-pass machine RM uses different machines for each processing step: cleaning, dehusking, separating, bran removing, and grading. These processes are integrated into one system by bucket elevators linking machine to machine to accomplish each stage of processing to the end where output in the form of polished rice comes out. A modern multiple-pass milling machine uses about one-half to two-thirds of the electric power of a steel huller operating at the same capacity. Modern multiple-pass machines result in much lower loss in milling.

Modern multiple-pass machines are known in Vietnam. However, they are few and mainly owned by foreign companies (such as Satake Factory in Ho Chi Minh City) or by joint-venture enterprises between foreign and state-owned food companies (like Toyo Dragon Factory in Cantho). Most of private rice millers cannot afford buying such expensive machines.

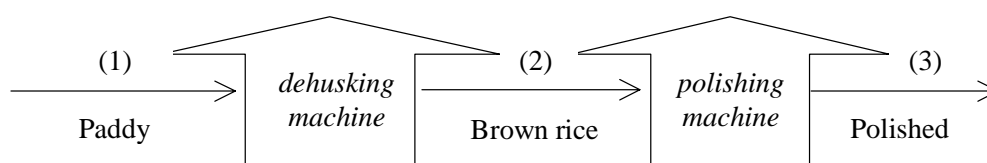
4.3 The rice-milling technology in the MRD in practice

As we have seen in Subsection 4.2.2, there is a wide range of rice-milling techniques. An appropriate choice of rice-milling technique should be right in terms of investment costs and technical efficiency (loss in milling). In principle, more costly techniques in terms of investment cost per ton of milling capacity tend to be more efficient in terms of generating lower loss, both quantitatively and qualitatively. Cheaper milling tech-

niques have advantages in terms of needing smaller investments but at the same time result in high milling losses.

As discussed in Chapter 2, *doi moi* has brought about chances for Vietnam's rice to be exported. Given the then existing rice-milling technology that was only able to produce rice for domestic consumption, the milled rice did not meet export standards. Private rice millers in Vietnam, especially those in the MRD who produce most of export rice of the country, were under pressure of improving the quality of their output. Those rice millers that already had rice-milling factories established might find it wasteful to demolish the existing factories to build up new ones. Therefore, they tend to set up polishers separately to only polish rice to export. Those rice millers that started from scratch might have insufficient capital to set up factories that can perform both milling and polishing functions.⁶¹ They thus opt for either milling or polishing function. This way of investing helps to explain the existence of the so-called "two-system" milling process in the MRD, which is illustrated in Chart 4.1.

Chart 4.1 The "two-system" rice-milling process



Note: (1) Paddy is fed into dehusking machines in order to get brown rice; (2) brown rice is taken out of dehusking machines and is then fed again into polishing machines to get polished rice; and (3) polished rice comes out of polishing machines.

As discussed earlier, multiple-pass milling machines use different machines for each processing step such as cleaning, dehusking, separating, bran removing, and grading. These steps are integrated into one system by bucket elevators. We characterize this process as "one-system" process, which is usual in other countries. A basic difference between the "two-system" process and the "one-system" one is that in the "two-system" process milling and polishing are done in two separate systems. More specifically, in the "two-system" process the output of the dehusking operation in the form of brown rice is taken out of the dehusking machine and is fed again into the polishing machine in order to get white rice (see Chart 4.1). As a result of this, the "two-system" process leads to higher losses, making it much less efficient than the "one-

⁶¹ According to our survey, as much as 88.6 per cent of the sample's population used only own savings to set up new RMs.

system” one.

In addition to the existence of the “two-system” process, the backward technology that rice millers have used adds to the inefficiency, in terms of loss, of the rice-milling industry in the MRD. Since it is often expensive for entrepreneurs to import rice-milling equipment, they have to use domestically manufactured equipment, which can be characterized by backward technology. In general, according to Harvie (2001) a majority of Vietnamese enterprises have used obsolete technology that may be three or four generations behind the world’s average level. This finding appears to hold for the rice-milling industry in the MRD.

As a result of the “two-system” process and the backward rice-milling technology, the rice-milling industry in the MRD is regarded as inefficient mainly because of high loss. A good milling technique is able to yield 67 kilograms of milled rice out of 100 kilograms of paddy, of which 52 kilograms are head rice.⁶² In Vietnam a normal private RM is, on average, only able to yield 60-66 kilograms of milled rice out of 100 kilograms of paddy, of which only 40-48 kilograms are head rice. More specifically, only 33 kilograms of milled rice that qualifies for export can be obtained from 100 kilograms of paddy if the paddy goes through the two-system process.⁶³ This figure hints at a huge loss as several million tons of rice have been milled every year in Vietnam (see Table 4.1). This loss may be avoided by, *e.g.*, adopting better rice-milling technology.

4.4 A profile of private RMs in the MRD

4.4.1 An overview of the emergence of private RMs in the MRD

Historically, paddy production in the MRD usually exceeds the consumption at the farming household level, leading to a marketable paddy surplus. This induces some farmers to try to market their own surplus. Since it is often not efficient to market the individual surplus separately, the farmers collect a larger quantity of produce from other households before trading it. In many cases, those farmers who persistently succeed in trading paddy transform themselves into traders. Traders usually start by trading a relatively small volume of produce. As time passes, they may manage to handle a larger volume thanks to accumulated capital, more customers, and better market knowledge. When the conditions become ripe, traders specialise: some act as assemblers; some others become wholesalers, retailers, or rice millers.

Prior to *doi moi*, the Vietnamese government forbade private-sector activity. However, being unable to supply food to everybody, especially to those living in rural

⁶² Source: <http://www.buhlergroup.com>.

⁶³ Source: Vietnam Information Book, April 1999.

areas, the government allowed private RMs to mill rice for home consumption. During this period, private RMs did exist (see Subsection 7.3.1 of Chapter 7). These private RMs were of a very small size; the then prevailing rice-milling technology was backward; the maintenance and the repair of factories were accomplished by the owners themselves. The private RMs simply functioned as providers of milling services to households, mainly in rural areas, and received service charges in return. They were not engaged in trading for their own account because the government banned private trade (see Section 2.3 of Chapter 2).

Doi moi, which abolished the bans on private trade, returned land to farming households, and liberalised commodity prices, *etc.* gave farming households proper incentives to increase the production of paddy, among other products (see Chapter 2), thus raising the demand for milling services. At the same time, the international trade liberalisation that brought about opportunities for Vietnam's rice to be exported (see Chapter 2) pushed-up the demand for milled rice, which also required milling services. As a result of these factors, a substantial number of private RMs were established. Aggregate data concerning the number of establishments of private RMs over time since the start of *doi moi* are not officially recorded. Our survey, to be described in detail in Chapter 7, reveals that 162 out of 210 private RMs we surveyed (71.1 per cent) were established between 1989 and 1999, indicating that during this period the number of private RMs increased substantially.

In 1999 the MRD had 7,454 RMs of which 626 RMs (8.4 per cent) were state-owned; the remaining (91.6 per cent) were privately owned.⁶⁴ Table 4.1 provides further information about the rice-milling industry in Vietnam. This table divulges an overwhelming role of private RMs in this industry in terms of the amount of rice processed. In every year from 1995 to 2000, private RMs processed more than 90 per cent of the total amount of milled rice produced in Vietnam.

In sum, the surplus in paddy production provides the *raison d'être* for the rice-milling industry in the MRD to come to fore. Prior to *doi moi*, there were only few private RMs. The RMs mainly provided milling services to rural households and did not trade their output for their own account. Since the start of *doi moi*, a substantial number of private RMs have been established in response to the opportunities *doi moi* has created. Private RMs have since then occupied a prominent position in the rice-milling industry in the MRD.

⁶⁴ Source: Vietnam Economic Times, April 5th, 2000.

Table 4.1 Vietnam: shares of state-owned and private RMs in the rice-milling industry, 1995-2000*

Year	Total		State-owned RMs		Private RMs	
	Quantity (1,000 tons)	Per cent	Quantity (1,000 tons)	Per cent of total	Quantity (1,000 tons)	Per cent of total
1995	15,294	100	584	3.8	14,710	96.2
1997	18,800	100	529	2.8	18,271	97.2
1998	19,202	100	1,208	6.3	17,994	93.7
1999	21,802	100	1,150	5.3	20,652	94.7
2000	22,200	100	1,200	5.4	21,000	94.6

Source: Vietnam Statistical Yearbook 2000.

Note: * No information was available for 1996 and for the years before 1995.

4.4.2 *Uncertainty regarding future market developments facing private rice millers*

This subsection is devoted to defining uncertainty and arguing that the instability of the world rice market which influences the domestic rice market (see Chapter 2), accompanied by a lack of information, leads to private rice millers in the MRD being uncertain about the future developments of the markets in which they sell their output.

In this dissertation, we assume that the decision maker can subjectively assign probabilities to the distribution of the future values of the uncertainty variable in question.⁶⁵ The survey we conducted in 2000 (see Chapter 7) helps to confirm this assumption: the respondents were able to fill in the probability distribution formulated in the questionnaire. By assigning probabilities to the distribution of the future values of the uncertainty variable, the decision maker creates a subjective probability distribution that picks up the uncertainty facing him/her.⁶⁶

The information about the random variable that the decision-maker has can influence the subjective probability distribution since it helps (s)he to improve him/her judgement about the random variable. Anderson (2003) contends that information can influence a subjective probability distribution because (i) the dispersion of the subjective distribution may diminish as information is accumulated, (ii) information may shift the location of the subjective probability distribution, or information may lead to an adjustment of the subjective mean. The more (less) information about the random variable that the decision-maker has, the lower (higher) the degree of the uncertainty

⁶⁵ This is usually referred to as classical uncertainty.

⁶⁶ The subjective probability distribution of a discrete random variable is a list of probabilities associated with each of its possible values; the probabilities sum to unity and are formed based on an individual's personal judgement about how likely a particular value of the random variable is to occur.

facing him/her. To conclude, information accumulation may help to reduce the uncertainty about the random variable.

The instability of the world rice market (see Chapter 2) is likely to be the main factor that causes the uncertainty facing private rice millers in the MRD. This is because the instability makes it difficult for private rice millers to make good judgments of the trend of the future development of the market. The uncertainty caused by the instability of the world rice market appears to be exacerbated by the fact that private rice millers do not have sufficient market information. Despite *doi moi*, Vietnam still does not have a good mechanism that can provide private rice millers with key market information. As a matter of fact, there are few sources of up-to-date, high-quality information within Vietnam. This deficiency creates difficulties for private rice millers in terms of access to market information. They often have to obtain information through media (*e.g.*, newspapers, radio, or television) or through personal contacts. Media usually provide occasional information only, which may not be useful for making investment decisions. Personal contacts are established with friends and relatives living overseas or acquaintances made at trade fairs or during private trips; the information acquired in this way is often *ad hoc* and hence may be able to accommodate spot transactions.

In Vietnam, those private rice millers who are active in searching for information can contact public organisations like the Vietnam Chamber of Commerce and Industry and other trade associations to that end. At the same time, however, it is very likely that private rice millers may neither digest nor effectively use the statistical data and general information from these sources, even if they manage to acquire it, because of their low level of schooling, among other factors. Illustratively, the average number of years of schooling of 210 private rice millers we interviewed was approximately nine, equivalent to last year of secondary school; only 13 rice millers out of 210 (6.2 per cent) had a university degree.⁶⁷

Another source of information for private rice millers is state-owned food companies (SOFCs). Like other SOEs, SOFCs, which are important in the linkage between foreign and domestic rice markets, often have priority access to valuable information from their line ministries. Relevant information from governmental agencies (such as Vinafood 1 and Vinafood 2, see Subsection 2.4.2) is mainly directed to SOFCs. In addition, foreign buyers who come to Vietnam to find partners often end up at governmental agencies and will then be introduced to SOFCs. Yet, SOFCs may be unwilling to share the information they have obtained with private rice millers because doing so would expose themselves to competition threats from private rice millers, especially since private rice millers are also allowed to directly export rice nowa-

⁶⁷ The education system in Vietnam is structured as follows: (i) primary school: grades 1-5, (ii) secondary school: grades 6-9, (iii) high school: grades 10-12, and (iv) university: four to six years to get bachelor degree, two years to get master degree, and four years to get doctor degree.

days.

There are also other barriers that restrict access of private rice millers to market information that is available. One of the barriers concerns language. Poor capability in terms of using foreign languages appears to make private rice millers unable to understand the information that is not expressed in Vietnamese. Another barrier regards the cost of using information. Generally, information about foreign markets is often expensive, and only few private enterprises in Vietnam can afford buying it (Webster, 1999). Knight and Liesch (2002) confirm that resource constraints preclude small- and medium-sized enterprises from obtaining information about international markets. In particular, internet, an important source of information nowadays, seems to be unaffordable for private rice millers because of high service charges of 2 USD cents for each minute on line (Harvie, 2001).

As we have seen, private rice millers in the MRD are uncertain about the future development of the markets for their output. Whether or not private rice millers are affected by the uncertainty has not been obvious yet. The uncertainty may not matter if private rice millers can reduce the adverse effects of the fluctuations in the markets by holding rice in inventory, synchronising the purchase of paddy (input) and the selling of rice (output), adjusting paddy or rice price or both, and so on. Yet, it may not be feasible for private rice millers to do so for some reasons.

In principle, a private rice miller is supposed to be able to reduce the adverse effects of market fluctuations by holding rice in inventory because the inventory will enable the rice miller to sell the rice at favourable prices and to meet unexpected demand (or to avoid stock-outs). Unfortunately, milled rice is a kind of product that cannot be stored for long. Pest infestation due to insects, rodents, and birds are a real threat if milled rice is stored over a month.⁶⁸ If private rice millers store rice, they normally do not apply any pest control measures because of the harmful effects of the chemical pesticides. If infested milled rice is remilled (or whitened), around 10 per cent of the rice by weight will be lost. This problem sharply increases with larger volume of stocks and prolonged storages.⁶⁹ All this helps to explain that using inventory as a buffer stock to cope with market fluctuations may not be very practical for private rice millers in Vietnam.

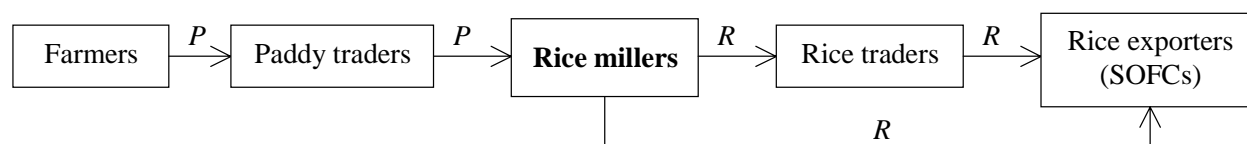
Adverse effects of market fluctuations can also be mitigated if rice millers are able to synchronise the purchase of input and the selling of output. Since the production of rice millers often takes time, the purchase of input usually has to take place before the selling of output. In order to make the synchronisation possible, rice millers have to know the time of the selling of output beforehand. This seems to be difficult because rice millers are not well informed about the output markets, as we have discussed earlier.

⁶⁸ Source: <http://www.fao.org>.

⁶⁹ Source: <http://www.fao.org>.

Another way for private rice millers to overcome the adverse effects of market fluctuations is to adjust input or output price or both. Private rice millers in the MRD may find it difficult to adjust the prices because they have weaker market powers as compared to their partners. The weak market powers of private rice millers can be explained by referring to their position in the rice-milling channel. Chart 4.2 presents a simplified rice-marketing channel in the MRD;⁷⁰ it only reveals important flows of paddy and rice with respect to the magnitude of the flows. This chart suggests that there are strong links between private rice millers and paddy traders as well as between private rice millers and rice traders and rice exporters (SOFCs). IFPRI (1996) finds that paddy traders are the main suppliers of private rice millers, and rice traders, together with SOFCs, are the principal customers of private rice millers.

Chart 4.2 A simplified rice-marketing channel in the MRD



Source: Adapted from IFPRI (1996), Minot and Goletti (2000).

Note: P stands for paddy and R for (milled) rice.

Paddy traders normally have contacts with a number of both farmers and rice millers because they are mobile conciliators between farmers and rice millers. This gives traders in-depth knowledge of cropping patterns and the production traditions of farmers as well as makes it easier and less costly for them to find suppliers (farmers) and customers (rice millers). In contrast, most private rice millers do not have this advantage, implying that they have to depend on paddy traders for input. As a result, rice millers may be captured by some paddy traders.⁷¹ If this is the case, it is understandable that rice millers may be less able to change the input price. To give an example, the owner of Rach Sung RM in Cantho province explicitly mentioned to us that he normally did not ask his suppliers to lower paddy prices when the market prices exhibit small drops because, according to him, doing this would bring him the risk of

⁷⁰ A comprehensive description of the rice-marketing channel in Vietnam can be found in Minot and Goletti (2000).

⁷¹ This is similar to the so-called “lock-in” mentioned in McMillan and Woodruff (1999). McMillan and Woodruff (1999) also argue that the customer is locked into the relationship because it would have high costs of search for other suppliers, among other reasons.

losing the suppliers.

As for rice markets, it may be difficult for those private rice millers who sell output directly to SOFCs to change the price they charge to SOFCs because (i) there are few SOFCs, (ii) SOFCs have dominated the rice export sector of Vietnam, and (iii) SOFCs have to follow the prices in the world rice market. Those private rice millers who sell output to rice trader are also in a weak position because, like paddy traders, thanks to their mobility rice traders often have contacts with a wide range of private rice millers, which enables them to have lower costs in finding partners.

In sum, insufficient market information makes it difficult for private rice millers in the MRD to form expectations about the development of the markets in which they sell their output, thereby exacerbating the uncertainty stemming from the instability of the world rice market. At the same time, private rice millers are less able to avoid the adverse effects of market fluctuations. Therefore, the uncertainty does matter for them while making investment decisions. Table 7.6 of Chapter 7 reveals that the private rice millers we surveyed consider unanticipated changes in the output market as important factors affecting their investment decisions. Yet, as we will discuss in Chapters 6 and 9, the effect of the uncertainty on investment of private rice millers in the MRD varies depending on the degree of uncertainty, the degree of irreversibility, the degree of competition, and size.

4.5 Conclusions

Basically, paddy grain is not suitable for eating. In order to make paddy grain edible, the husk and the bran should be removed. The removal of the husk and the bran is done by RMs using different techniques. In the MRD, the rice-milling industry, including both state-owned and private RMs, has developed on the basis of the excess supply of paddy and the trade liberalisation created by *doi moi*, among others. Despite *doi moi*, private RMs, which account for a substantial portion of rice produced in the MRD, have faced difficulties in terms of access to market information. The difficulties, together with the instability of the world rice market, results in the fact that private RMs are uncertain about the future development of the markets in which they sell their output. The uncertainty, in association with limited access to credit of private enterprises in Vietnam revealed in Chapter 3, is likely to make private rice millers in the MRD unwilling to adopt advanced rice-milling technology.