# RICE SUPPLY CHAINS IN INDONESIA: HOW DO THEY WORK?

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**Abstract**

The objective of this research is to identify how rice supply chains in Indonesia work. The nature of product, financial and information flows of rice supply chains in Indonesia are identified; and the relationships in the rice supply chains are explored. This research is guided by a social constructionist paradigm, thus it is primarily qualitative in nature. The research applies case study approach and inductive analysis. Findings across all cases indicate that contemporary rice supply chains are characterised by transactional and asymmetric dependence-based relationships. Although possible, collaborative supply chain management is difficult to implement especially in the absence of the government role to facilitate the development of more collaborative supply chains.

Keywords: *Rice, Supply chains, Supply Chain Management (SCM), Indonesia*

## Introduction

Rice consumption in Indonesia is among the highest in the world. It is consumed at approximately 130 kg per capita per annum (ICAS, 2007). Rice also plays a key role as a 'wage' food. More than 20 million households are engaged in rice production. Millions more are involved in post harvest, marketing and distribution activities (Sidik, 2004, Suparmoko, 2002). It is not surprising that there has been a long history of government intervention in the Indonesian rice economy.

Technically, serious government intervention in the rice sector in Indonesia has been undertaken since the late 1960s (Arifin and Krisnamurti, 2004). Nonetheless, partly in response to the donors demand to liberalise rice market, since the economic crisis of 1997-1998, the Indonesian rice sector has undergone a remarkable period of deregulation. Even though in recognising the negative impacts of full market liberalisation, the Indonesian Government has re-imposed a number of policy instruments that had traditionally been used in the past), various policy modifications were evident (Sidik 2004). Although such deregulation has been largely criticised on the basis that it may create a threat to national food security for not benefitting the rice farmer, it is also argued that a food security policy that is based on open market arrangements is both possible and

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desirable. It is possible because it can be achieved by deregulating the market and encouraging private food stock management, and it is desirable as it will promote the competitiveness of the rice industry in turn (Arifin et al., 2001).

In many developed countries, governments have utilised SCM widely, for example to identify factors that may restrain chain development and performance, and to conceptualise policy measures that might assist businesses to overcome barriers and achieve competitiveness (e.g. Gifford et al., 1998). In developing countries, however, supply chain development is often hampered due to a lack of governmental support. Woods (2004) argues that while SCM offers a conceptual approach to gain competitiveness, in the absence of proper assistance, it is likely that farmers in developing countries would face further and exaggerated cost-price squeeze due to displacement of their product from potential consumers.

This study aims to address whether and how SCM could enhance the competitive advantage of Indonesian rice supply chains. The nature of product, financial and information flows as well as the nature of relationships among chain members of rice supply chains in Indonesia are described and analysed. This study also analyses how consumer value is created and distributed.

**Methodology**

This research is essentially qualitative in nature. It is guided by the *social constructionist* paradigm (Berger and Luckmann, 1966, Easterby-Smith et al., 1991). Within this paradigm, understanding the nature of rice supply chains in a given situation will be sought from people's experiences. In consideration of the research questions to be answered, this study adopts a case study and inductive approach. The use of the case study approach allows this study to identify the unique characteristics of the individual supply chain case studies (Yin, 1994). The use of the inductive approach as the qualitative method mainstream, allows ideas and insights to emerge from the patterns within the data so as to provide answers to the research questions. With such qualitative approach, data collection is not constrained by predetermined categories of analysis, allowing for a level of depth and detail (Patton, 1990).

Three rice supply chains in Jember East Java were selected as case studies for this research. The selection of the three case studies was aimed to represent: (1) modern rice supply chains supplying high quality packaged rice to the private market; (2) traditional

rice supply chains supplying bulk rice to the private market; and (3) Bulog rice supply chains supplying rice to the Indonesian Food Logistics Agency (Bulog), a public company conducting domestic rice procurement for public purposes.

The main source of data is collected using semi-structured interviews, in which 21 to 24 participants from each rice supply chain case study or a total 68 respondents were interviewed in this study. This is complemented by a range of supporting data that are obtained from various sources using a combination of methods. The analysis of the data is conducted in two stages. The first stage is an individual case study analysis using induction approach on the basis of the theoretical perspective proposed in the literature review. The second stage is a cross case analysis to obtain more generic findings across the case studies. In this stage, marketing margin analysis is used to give a complete picture about how consumer value is created and distributed. Then, using the conceptual framework, the data set (empirical evidence) generated from the description and investigation of the individual RSCs, and the findings of the marketing margin analysis, the relationships between the variables are analysed to gain a better understanding as to how the competitiveness of firms in the rice supply chains in Indonesia has been developed. This understanding is subsequently utilised to identify the challenges that exist for applying SCM concepts to improve the performance of the rice industry in relation to food security policy.

## Results and Discussions

In this section, the rice supply chain cases (RSCs) are first described and assessed individually using theoretical perspectives of power dependence as well as value creation and competitive advantage. Then, the results of marketing margin analysis which demonstrate how consumer value distributed among participants are presented. It is subsequently followed by the results of a cross case analysis. Finally, based on the findings, challenges and prospects of implementing SCM to improve the competitive advantage of Indonesian rice supply chains are identified.

## Results

### Rice supply chain case studies

***The modern rice supply chain*** (MRSC) offers high quality packaged rice with differentiation through the use of a single rice variety (IR64), brands, and segmentation

based on quality. The packaged rice is processed by a few large rice millers, who market the rice to both the traditional markets and modern retailers.

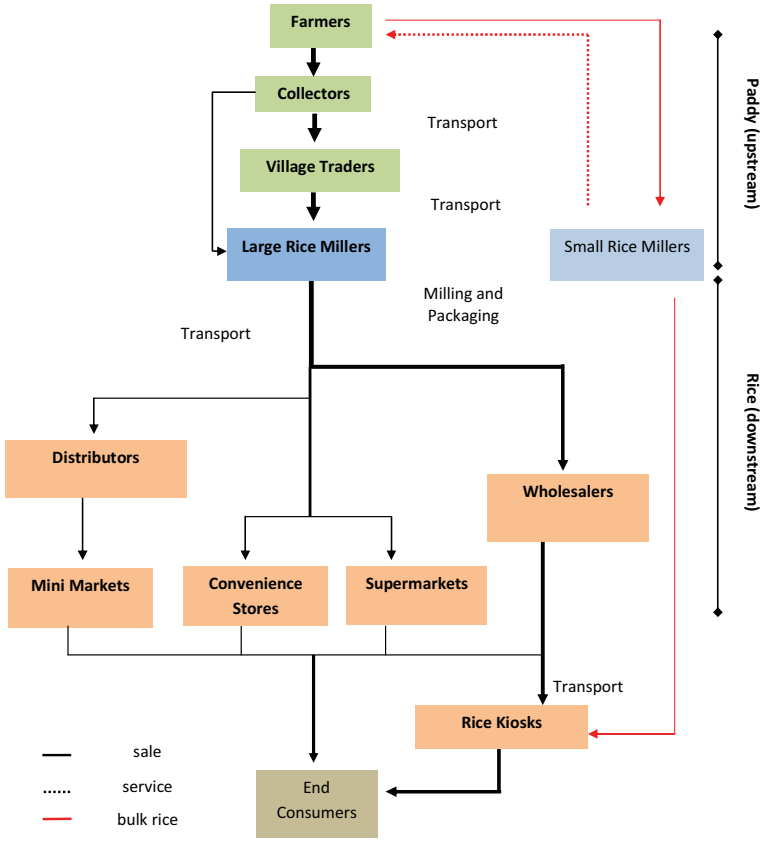


Figure 2 Product Flows of MRSC

Source: primary data from fieldwork, 2007

This case study has identified that in the interest of sustaining paddy supply according to their requirements, these few large rice millers have been very dominant in the upstream levels of the chain. The strong influence of the rice millers in the upstream levels is confirmed by farmers' adherence to the millers' requirements. In response to the miller's demand, farmers in MRSC grow rice crops in three (out of three) seasons each year, and all farmers grow the IR64 variety. As rice millers prefer to purchase wet paddy, farmers tend to sell their paddy immediately after harvest or prior to harvest as a standing crop.

The adherence of farmers to these guidelines is further exacerbated by farmers' high level of dependence on their collectors. Meanwhile, the collectors are also dependent on the village traders, and the village traders, in turn, are dependent on the rice millers. The provision of credit is a tool that is commonly used to tie exchange partners into

relationships. Further, the relatively low level of competition among the few large rice millers in the upstream levels has partially contributed to the establishment of dependence based relationships in the upstream part of the chain.

In the downstream levels of the chain, while all rice millers sell their high quality (branded) packaged rice to the traditional markets and local convenience stores, not all rice millers are able to sell to the supermarkets or minimarkets because, in some cases, they are unable to meet the requirements of these modern retailers. Strict terms of trade involving fees, along with limited shelf space in the supermarkets and minimarkets have created a situation in which only the most competitive rice millers are able to supply to these retailers.

Even though some of the relationships between immediate exchange partners in the downstream levels are long term, non-adversarial, and moving towards closer cooperation, collaborative value creation was not identified in their relationships. Meanwhile, it was observed that the supermarkets and minimarkets tend to act adversarially towards the rice millers through the enforcement of short term contracts that are subject to performance. This is because, with high competition due to large numbers of rice suppliers offering relatively similar products, these modern retailers can easily replace their rice suppliers with the new ones.

The analysis based on theoretical perspectives revealed that size imbalance has contributed to the development of dependence based relationships in both the upstream and downstream levels of MRSC, which allows the powerful parties to engage in adversarial behaviour. In addition, the evidence derived from MRSC also highlighted that the perceived availability of alternative buyers (or suppliers) contributed to their dependence on one other.

The findings from this case study suggest that the rice millers' requirements (i.e. to supply wet paddy and the IR64 variety only) have served to create disincentives for farmers. Thus, as an overall system, MRSC is undesirable when assessed from a sustainable competitive advantage perspective. By exploiting asymmetric dependence, this supply chain potentially contributes to creating negative impacts on both the effectiveness of government policy and the long term sustainability of rice production. For example, by requiring farmers to supply only IR-64 variety, farmers are literally discouraged to try a new variety introduced by government since they worry about the market of the new variety even though they know that the new variety may improve their farm productivity.

***The traditional rice supply chain*** (TRSC) offers bulk rice, in which rice is marketed as a pure commodity, solely to the traditional markets. The existence of a relatively large number of competing medium to large rice millers in TRSC creates more competition in the upstream part of the chain. In addition to this increased competition, in their production of bulk rice, the rice millers are also more flexible in terms of paddy requirements and they accept various paddy varieties, as either wet or dry paddy. Such flexibility along with more intensive competition among millers has created a very different exchange environment compared to that observed in MRSC.

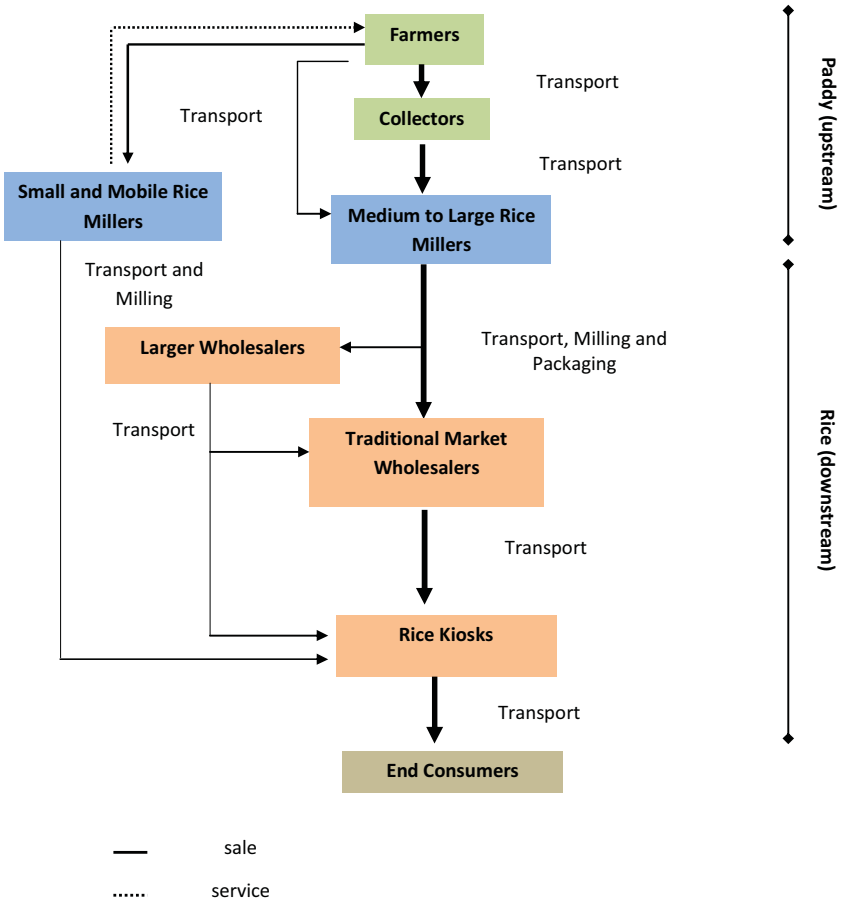


Figure 3. Product Flows of TRSC

Source: primary data from fieldwork, 2007

Farmers are generally more independent in TRSC. Although all farmers sell their paddy to collectors, they also have more marketing alternatives. For example, they may sell wet or dry paddy and thus have the opportunity to postpone the sale if the paddy price

at the farm gate is low. Many farmers also switch among several collectors to seek a better price. Consequently, most relationships in the upstream levels are transactional relationships. In such a flexible exchange environment, farmers in TRSC are more responsive towards new technology, and it was therefore unsurprising to find that crop productivity is higher in this supply chain than in the other RSCs. Farmers in TRSC also have a better tradition of maintaining a larger amount of their paddy stock.

Given the seasonal paddy production, with farmers growing rice crops in only two out of three seasons each year and planting a crop other than rice in the dry season, millers need to carry a relatively large amount of stock if they are to be able to supply rice throughout the year. Accordingly, only large rice millers with relatively large capital are usually able to supply the market continuously. While rice millers can always buy farmers' reserve, the price of paddy outside the harvesting season tend to be higher, this is beyond the capacity of most medium rice millers and thus they are rarely able to maintain supply when there is no paddy production in the villages.

Nevertheless, as rice is sold in bulk (without brand), product and delivery consistency is not required. Not surprisingly, in the downstream levels (traditional markets), most of the relationships between the exchange partners tend to be 'arms-length' and transactional. The downstream relationships are characterised by spot market negotiations where everybody tries to maximise their profits by negotiating on price. Given the nature of commodity production, adversarial relationships were generally sufficient as no specific attributes were being sought, and thus there was not enough incentive for firms to engage in collaborative relationships. However, given that farmers in TRSC have much greater opportunity to work independently through innovation and maximising their profit through stock management, as opposed to being directed by focal firms in the chain, it can be concluded that as a system, TRSC is more desirable than MRSC when examined from the sustainable competitive advantage perspective.

***The Bulog rice supply chain*** (BRSC) is a rice supply chain with a direct connection to the Bulog; a public company responsible for managing rice for food security purposes. In this supply chain, some of the large rice millers (contractors) and the UPGB (a Bulog milling firm) are engaged in public rice procurement contracts with the Bulog. Apart from supplying the Bulog however, the rice millers in this chain also supply rice to the private markets. This case study has identified that, despite the large rice millers' involvement in public procurement, and given that there are many competing medium to

large rice millers in the villages, the upstream relationships in BRSC are very similar to those in TRSC.

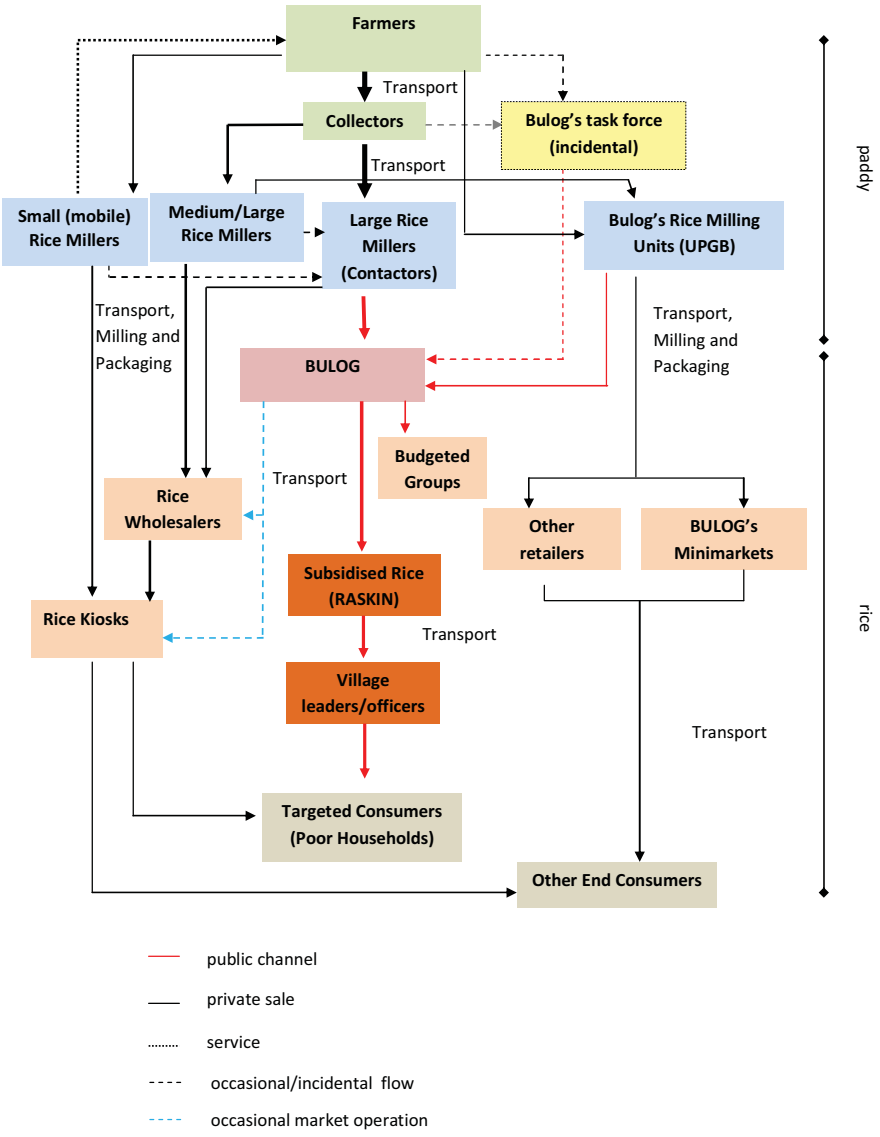


Figure 4 Product Flows of BRSC

Source: primary data from fieldwork, 2007

With the majority of rice marketed as bulk rice, and given the low to medium quality specifications for public rice procurement, the rice millers are flexible in terms of their paddy requirements. Consequently, farmers are more independent, and given the environment of intensive competition, farmers may switch among several collectors to seek a better price. The exchange relationships, apart from the small collector-miller

relationships and a few of the farmer-collector tied credit relationships, are generally transactional. In comparison to the farmers in TRSC, the farmers in BRSC were found to be less responsive to innovation. While most maintained a relatively large paddy stock from their dry season harvest, in the wet season harvesting they tended to sell their entire paddy immediately on farm. Despite in the involvement of the Bulog in this supply chain, farmers still occasionally received a price for their paddy below the Government Procurement Price (HPP).

As observed in TRSC, the majority of farmers in BRSC grow rice in two out of three seasons each year. In the upstream levels, the large rice millers carry a large stock in order to continuously supply rice throughout the year. In the downstream levels, the wholesalers in the traditional markets also maintain a large stock to anticipate seasonal variation in rice production. In the public channel, the Bulog manages public stock for their operational tasks (i.e. delivering rice to targeted and government groups, and for other food security purposes).

In the downstream levels of the private channels, similar to TRSC, most of the relationships between the exchange partners are transactional. Adversarial relationships are perceived as sufficient as there is not enough incentive for either, or both, parties to develop more collaborative relationships. In the downstream levels of the public channels, the relationships between the Bulog and the institutions responsible for further distribution of rice are formal and based on rigid regulations or standard operational procedures (SOPs).

Where commodity production is dominant, transactional relationships are also more dominant in both the upstream and downstream parts of the chain. The findings from BRSC also highlight that greater competition in the market contributes to reduced levels of perceived dependence. Nonetheless, because contracts with the Bulog identified product attributes that had to be met by the contractors, in these particular dyadic relationships, the large rice millers were subject to the clauses set out in the contracts. While these annual contracts being subject to performance, their relationships tended to be non-adversarial. Bulog does not engage in adversarial behaviour as the prices (HPP) thus its margins are set by regulation. The relationships between the UPGB and its private buyers were also non-adversarial.

From a sustainable competitive advantage perspective, although the current policy schemes have encouraged the private sector's participation in public rice procurement, and

in this situation, the Bulog has been able to procure sufficient public stocks and effectively distribute these stocks to targeted groups, the major drawback of the schemes is that they have been less effective in protecting farmers from receiving paddy prices below the HPP, especially during the peak harvesting season. In this regard, the private rice millers contracted by the Bulog have not played a sufficient role in stabilising farm gate price, as in the absence of accessible public procurement outlets, farmers tend to sell their paddy to collectors as they lack the capacity to sell directly to the millers.

**Marketing Margin Analysis: Value Distribution in The Chains**

The results of marketing margin analysis generally indicate that when calculated in terms of rice equivalent, farmers receive approximately 70 percent of the total gross marketing margins. This means that all other participants in the chain share only 30 percent of the total marketing margins. However, by selling paddy to the collectors, the actual price the farmers receive is the paddy price. Hence, the actual income that farmers receive is small. Further, as most farmers sell wet paddy to the collectors, they neither contribute to nor benefit from value adding opportunities beyond the farm gate. In all three case studies, the majority of the added value in rice production is created by the millers and retained by the millers. Rice millers generally receive higher net marketing margins compared to the other actors involved in rice marketing activities. Only in the supermarket and public channels, did rice millers gain less of a margin than their larger buyers (i.e. supermarkets and the Bulog).

With a higher value in the market, the production of high quality packaged rice in MRSC is generally more profitable compared to the production of bulk rice in TRSC. However, because the production of high quality packaged rice requires reliable delivery, only the large rice millers are capable of supplying it to this market.

In the supermarket channel (of MRSC), because the rice millers are required to pay fees, even though these contracts are still profitable, the profit margins the rice millers receive from supplying the supermarkets are lower compared to those from supplying the traditional markets. Consequently, only the most efficient of the large rice millers are capable of participating in the supermarket supply chains. However, this also indicates that farmers, particularly as they are involved in dependent relationships, can be further disadvantaged. This is because, to cope with the increasing pressure to reduce costs from

the downstream, the rice millers may exercise their power in the upstream by reducing the price at which they purchase from the farmer.

Meanwhile, because the public procurement price is set at the lower average market price, rice millers engaging in public procurement contracts with the Bulog in BRSC also receive relatively low net margins. However, by maintaining large annual contracts with the Bulog, the rice millers can maintain their throughput and the sustainability of their milling operations, despite these low margins. With limited margins, as these rice millers are private millers who maximise their profits, their focus is on reliably fulfilling the requirements (quantity, quality and time) of their contract, while procuring paddy at the lowest possible price. Not surprisingly, during the peak harvesting season, farmers can receive paddy prices that are below the HPP, despite being involved in the Bulog's supply chain.

**Discussion**

The empirical evidence from case studies clearly indicates that product differentiation in MRSC encourages the chain participants to move closer to their partners. However, as rice supply chains in general are characterised by power imbalance, collaborative supply chain relationships are difficult to establish. Instead, as already outlined in the responses to previous research questions, what evolves are mainly asymmetric dependence based (but not interdependent) relationships and adversarial contract relationships, which tend to disadvantage farmers and be counterproductive to food security. Thus, as a result of being indirectly directed by the rice millers through dependence based relationships, farmers in MRSC tend to be less innovative than they could be if they were not directed by the millers. On the other hand, as supermarkets use an adversarial supplier selection strategy, the rice millers who deal with supermarkets receive less profit than when they supply to the traditional markets. In this situation, the competitiveness of the supermarkets is achieved at the expense of the rice millers. This can create pressure on partners further upstream, especially farmers.

The findings from TRSC indicate that as rice is marketed as bulk rice, where specific attributes are not sought by consumers, transactional relationships are dominant in both the upstream and downstream parts of the chain. To some extent, the greater level of competition in the chain also contributes to firms' perceived independence. In these transactional relationships firms generally create value more independently, even though

they are exposed to greater uncertainty, as firms tend to behave adversarially to maximise their profits. In this situation, the competitiveness of individual firms is often subject to their limitations or bargaining power relative to their exchange partners. Consequently, despite the opportunity to be more independent, small farmers, who increasingly sell their paddy immediately after harvest, are potentially less competitive due to their low bargaining power compared to the collectors.

In BRSC, as rice is mostly delivered as bulk rice to the market in a highly competitive environment, transactional relationships are also dominant in both the upstream and downstream parts of the chain. Individual firms can also create value more independently. While given the Bulog's involvement in the chain, it might be expected that farmers would be more likely to derive the benefits of the farm gate price stabilisation scheme, as described above and as observed in the other chains, during the peak season, farmers in BRSC may still receive a price below the HPP. Because paddy procurement in this chain is contracted to private rice millers, they tend to maximise their profits by minimising their procurement costs. With transactional relationships being dominant, the rice millers may also behave adversarially in the upstream levels. Thus, farmers who sell paddy immediately at the time of harvest through the collectors are unable to access any benefit beyond the prevailing farm gate market prices at the time.

Overall, these findings imply that the government may not be able to simply rely on market mechanisms if the goal is to improve the competitiveness of the rice industry and enhance farmers' income. While the objectives of the current rice policies are to improve transparency and encourage the participation of the private sector in the rice trade, the government may also need to provide support so that, without distorting the market, the farm gate price stabilisation policy can more effectively benefit farmers. For example, this might be achieved through the re-establishment of more accessible government buying outlets. Further, the government might also encourage farmers to be involved in more collaborative relationships through horizontal and vertical coordination, which would improve their capability (or competence) in terms of their technical capacity and volume, bargaining power, access to economies of scale and thus, their competitiveness.

Furthermore, empirical evidence from MRSC suggests that firms tend to have closer relationships as the production of rice becomes more differentiated. However, as SCM practices are not implemented, farmers become increasingly dependent on the

collectors, lose their bargaining power and, and neither contribute to nor benefit from value adding activities beyond the farm gate.

Meanwhile, as rice becomes more differentiated and given the fact that firms tend to seek closer relationships with their partners, the concept of SCM actually can have greater application in these circumstances. O'Keefe (1997) argues that product differentiation creates an opportunity to expand the total amount of value shared among chain participants and thus, the possibility of implementing the concept of SCM through the establishment of more collaborative relationships with 'win-win' relationship outcomes. Such opportunities may become more common and with the rapid growth of supermarkets and the government's support for high quality rice exports, a rapid transformation from the production of bulk rice to the production of branded packaged rice with market segmentation is anticipated.

With the greater potential for 'win-win' solutions as noted by Mentzer (2001), SCM may enhance the competitive advantage of the Indonesian rice supply chains and thus contribute to improved food security in the country. SCM may also enhance farmers' income. This is because through collaborative relationships where each chain member can be involved in value creation, the amount of consumer value created tends to be expanded. This value can be shared more equitably among chain members, thus generates greater portion for each. Such a situation would be beneficial to food security as it improves farmers' income, creates incentives for farmers to grow rice and potentially leads to more stable or improved rice availability. Improving farmers' income could also enhance farmers' access to better quality food. Competitive advantage built upon collaborative SCM tends to be more sustainable and thus improves the stability of the rice supply.

More efficient product flow and logistics management as a result of more collaborative relationships among chain participants may contribute to better availability of rice due to reduction of losses. With regards to seasonal variation in domestic paddy production, better distribution and stock management can potentially improve people's access to rice. Improved value creation in the rice supply chains may stimulate complementary economic activities which potentially contribute to improved rural income, thus access to better food. In this situation, the stability of food security, which refers to minimising the possibility of food production and consumption falling below required levels, is potentially enhanced.

Even so, the implementation of SCM is not easy given the considerable challenges that are identified as: (1) a lack of perceived need to collaborate; (2) a large number of farmers with a lack of capacity and access; (3) the government focus on production and a lack of support beyond the farm gate; and (4) public company management traps in the Bulog's management. However, these challenges can potentially be overcome if the government recognises that support is needed for more collaborative supply chain relationships to evolve.

Given that rice tends to be less perishable and involves lower food safety risks, the use of collaborative SCM in rice production is considered less beneficial compared to other agri-food commodities such as fresh fruits and vegetables, milk or meat. Hence, it may be unrealistic to expect that collaborative rice supply chains will be initiated by the supermarkets. While rice SCM could be initiated by the processors, especially the large rice millers, empirical evidence from this study suggests that the rice millers tend to exercise their power to control supply rather than to work collaboratively with their partners, particularly the farmers. Collaborative rice supply chains, therefore, are less likely to occur spontaneously in the markets.

On the one hand, this is because, as outlined above, farmers generally do not have the capacity to enter collaborative relationships, and on the other hand, there is a lack of perceived need to collaborate, especially from the powerful parties' perspective. For instance, by exercising their power, the powerful parties can enjoy greater value while still directing their exchange partners in their own interests. This is a natural response as the supply chain is characterised by power imbalance. Nonetheless, to some extent, a lack of understanding of the benefits of SCM implementation may also have contributed to this type of relationship emerging. In this situation, the government might facilitate the dissemination of the benefits of being involved in collaborative relationships, support the uptake of SCM practices and promote horizontal and vertical coordination, in which farmers' involvement and equitable value sharing among participants is emphasised.

**Conclusions and Further Recommendations**

The evidence from the rice supply chain case studies show that:

- In all rice supply chains, consumer value is not shared equitably. Most consumer value in the chain is created and enjoyed by the rice millers. More importantly, as relationships are characterised by power imbalance, larger buyers downstream may

enjoy greater value than normal by exercising their power relative to their suppliers. In this situation, farmers tend to be disadvantaged as rice millers may exercise their power upstream to cope with increasing pressure from the downstream.

- As rice becomes more differentiated, the need for closer relationships is translated into the establishment of dependence based (but not interdependent) relationships, which tend to negatively contribute to food security. These dependence based relationships not only lower farmers' bargaining power but also limit their potential for innovation, as farmers focus on complying with the millers' requirements.
- The potential for supply chain management to enhance farmers' income through improved value creation and more equitable value sharing, especially in the production of more differentiated rice, can contribute to food security. This is because enhancing farmers' income not only motivates farmers to grow rice but also improves farmers' access to better food.

However, collaborative supply chain relationships in rice supply chains are rarely spontaneous. Therefore, it is recommended that the government facilitate this process. In doing so, the government could: (1) disseminate the benefits of collaborative SCM across the chains; (2) promote horizontal alignment among farmers and at the same time continuously improve farmers' capability and access both individually and in groups; (3) encourage rice chain participants to develop vertical coordination or more collaborative relationships to provide incentives for the development of collaborative SCM involving farmers; (4) allocate funding for research and facilitate the development of a centre of excellence on SCM for food security; and (5) ensure more equitable value sharing, especially for farmers, by enforcing competition policy and regulations.

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