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Rice value chain in the Mekong Delta, Vietnam: solutions for rice value added improvement and sustainable development

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Abstract

Analysis of the rice value chain in the Mekong Delta, Vietnam, based on the integrated approaches of Kaplinsky and Morris (2000), Recklies (2001), GTZ ValueLinks (2007) and M4P (2007) along with direct interviews of 549 individual chain actors and 10 groups in the four provinces. Research objectives consist of (1) Rice in the world market, (2) Analysis of the present rice value chain including domestic and export rice value chains, (3) Chain economic analysis includes production cost, cost-added, value added, net value added (profit), chain income of each actor and the entire chain, (4) SWOT analysis as well as examination of the rice chain quality problems and (5) chain upgrading strategies of rice product for improving the chain's value added, profit, income, competitive advantage and rice chain sustainable development in the Mekong Delta in particular and in Vietnam in general.

Keyword: actor, added value, rice and value chain.

1. Introduction

1.1 Problem statement

Rice is Vietnam's staple food, accounting for some 78% of average energy intake. Besides fish and shrimp, rice also dominates Vietnam's food exports, with annual exports of four to more than six million tons, valued at USD 2 – 2.7 billion. Over the past decade there has been a steady decline in the planted area of rice. While productivity gains have compensated for these reduced plantings, there is evidently increased competition for land, water, labor and other resources between rice and other agricultural activities and between the latter and non-agricultural uses. Weather-related shocks - both drought and excessive flooding poses a continuous challenge for Vietnamese rice producers. The prospect of longer term changes in climate, water availability, and water quality is also a concern. Inefficiencies in the rice supply chain are also evident. The rice marketing system is highly fragmented with relatively weak vertical coordination**;** high levels of estimated quantitative and qualitative post-harvest losses**;** and relatively weak quality management. In particular, the Government actively manages rice supplies through production incentives (targeted access to extension, agricultural inputs and credit) and trade policy, including the periodic imposition of export restrictions.

The Government is currently revising its food security strategy and associated rice and trade policies in an effort to better harmonize the objectives of national food security, production incentives, consumer needs and the country's role as a major participant in international markets. The primary mechanisms proposed are (i) the maintenance of land set-aside for production; (ii) continued regulation of rice exports; (iii) accelerated transfer of technology for rice production and post-harvest management; and (iv) increased investment in infrastructure to protect critical rice producing areas, such as the Mekong Delta, from natural disasters and the expected impacts of climate change.

The Government recently announced its intention to maintain 3.8 million hectares for rice production, 3.2 million hectares of which shall be used for two crops per year (No.63/NQ-CP, Dec.2009) and more area up to 2020 in the face of accelerating non-agricultural land conversion**.** The Government also announced its intention to shift its approach away from quantitative restrictions on exports to a variable export tax system. However, the Government has not yet been able to determine what incentives it will use to induce farmers to continue to grow rice in the face of competing uses for resources and potentially higher income opportunities. The implications for distribution and economic trade-offs implicit in different policies have not been well understood.

The Mekong Delta (MD) is one of seven main economic regions in Vietnam with an area of 39,713 km^2 (about 12% of the nation), and 21.1% of the national population. The MD consists of

12 provinces and Cantho city. It is a national granary and the largest aquaculture of all of the country's fisheries. The MD's economy is mainly based on agriculture and fisheries (52.7% of the nation's production). In fact, for the period 2001 to 2012, the MD provided 51% - 57% of the annual production volume and more than 60% of the national exports in terms of value. In particular, the area of rice cultivation in Vietnam was approximately 7.5 million hectares and produced more than 38 million tons of paddy, of which, in terms of area and volume, between 50% and 55% came from the MD.

Our research objectives in the present study consist of (1) Rice in the world market, (2) Analysis of present rice value chain including domestic and export rice value chain, (3) Chain economic analysis includes production cost, cost-added, value added, net value added (profit), chain income of each actor and the entire chain, (4) SWOT analysis as well as an examination of the rice chain quality problems and (5) chain upgrading strategies of rice product for improving chain value added, profit, income, competitive advantage and rice chain sustainable development in the Mekong Delta particularly and in Vietnam generally.

1.2 Research methodology

The interdisciplinary nature of the research, investigating value chains and their links to rural livelihoods and sustainable development, requires an integrative research methodology. The overall 'network approach' used in the present research will establish a novel framework for understanding how customary rules, state legislation and market based standards can be supported by the effective management of value chains.

1.2.1 Value chain analysis

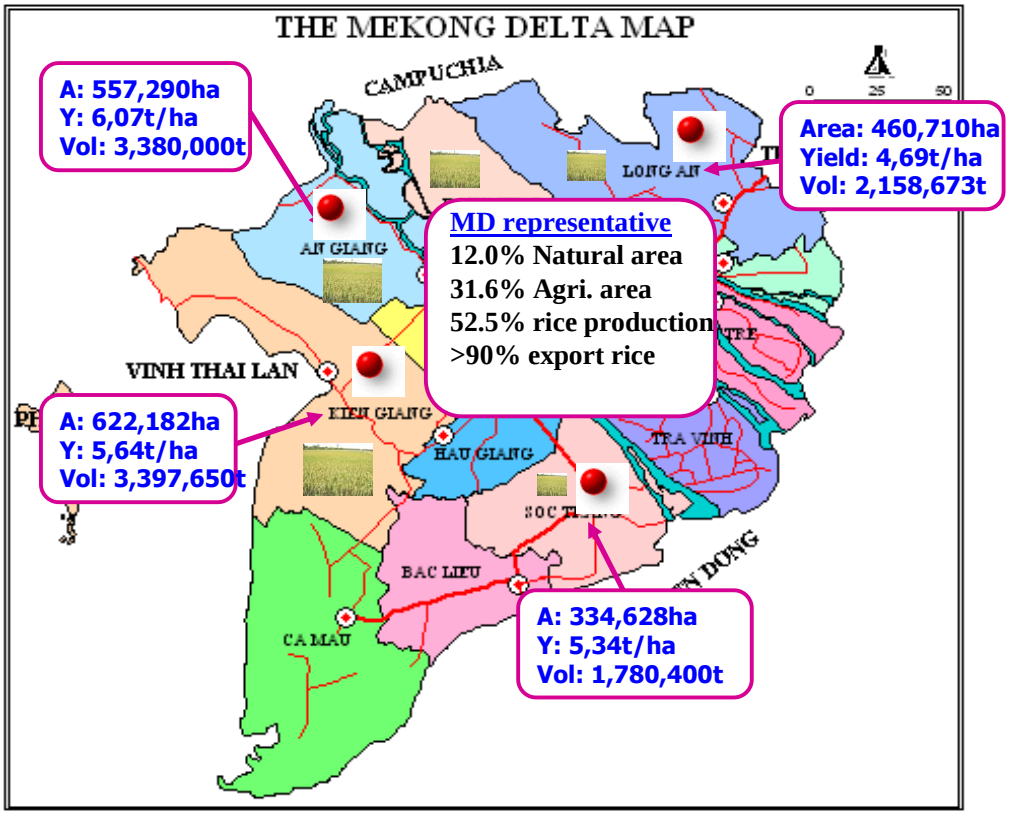
A 'value-chain' theory from Kaplinsky & Morris (2000) – 'A handbook for value chain research' is used and the approaches of Recklies (2001), GTZ ValueLinks (2007) and M4P (2008) (Better market for the Poor) are applied.

- Chain Actors and their functions are determined. Actors, their functions and input, control, output, risks and mechanisms for each actor will be identified. Chain map and upgrading solutions are suggested.
- The material and financial flows are calculated for actor accounts and consolidated with accounts of the chain. In addition, there is a chain economic analysis which emphasizes the value-added.
- Policy analysis focusing on policies/regulations and development solutions for sustainable development of rice.
- SWOT analysis of each chain actor for chain upgrading measures.

1.2.2 Research sites

The MD has 3,869,757 hectares (ha) of rice area (A), 20,524,802 tons of rice production volume and average rice yield 5.3 tons/ha (Y); of which five provinces (Kien Giang, An Giang, Dong Thap, Long An and Soc Trang) have the largest area, yield and production by volume (Vol) of rice (Figure 1). Therefore, four of them are chosen as research sites: An Giang, Kien Giang, Soc Trang and Long An. Together they represent 51% of rice area (1,974,810 ha) and 52% rice production by volume (10,716,723 tons) in the MD. In addition, these provinces are representative of the rice production in their respective geographical locations of the North, West and East of the MD where rice production conditions and customs are different.

Figure 1: The largest rice production provinces in the MD



1.2.3 Sample size and structure

Total sample size consists of 564 observations and 10 groups. Table 1 shows the sample structure in detail.

Table 1: Sample structure by rice stakeholders

Stakeholder	Description	No. of observation
1. Input supplier	1a. Input material unit	16
	1b. Seed unit	8
2. Farmer		161
3. Focus group discussion	8 districts 2 villages	10 groups
4. Trader	4a. Paddy trader/agent 4b. Semi-rice trader	14/2 7
5. Paddy Miller (first stage)		16
6. Rice miller (second stage)	Rice gate market in MD	18
7. Wholesaler/retailer	7a. Inside the MD 7b. Outside the MD	57 33
8. Company		47
9. Key important panel	9a. Districts/villages 9b. Rice experts	45 17
10. Consumer out MD	10a. Outside the MD 10b. Inside the MD	82 26
11. Logistics		15
Total	**564 + 10 groups**	

Data collections

Several complementary approaches will be used for this work. These will include:

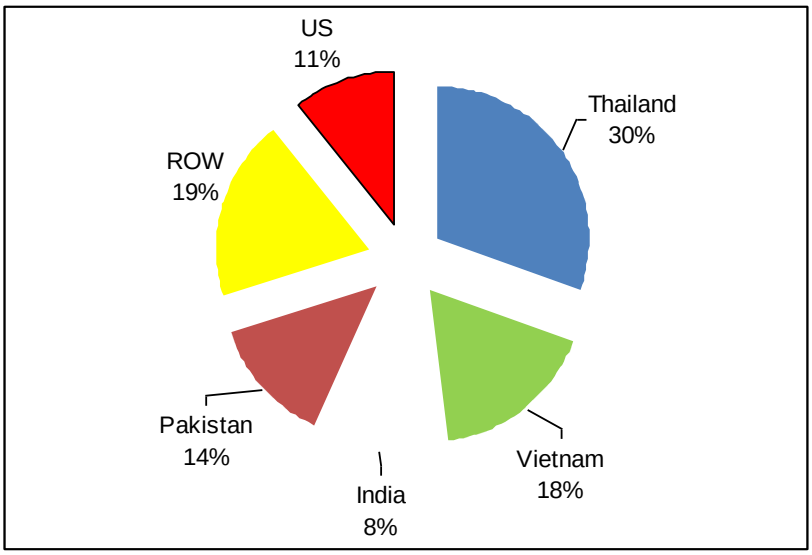
- Field and mail surveys and interviews with representative actors of farmers, traders, and millers, companies, wholesalers, retailers, users;
- Interviews with rice facilitators and experts;
- Statistical analysis of the price of rice and the cost of marketing;
- Case studies of selected supply chains involving closer vertical coordination between exporters and farmer groups, highlighting roles, relationships, incentives, and lessons gained thus far from implementation experience;
- Review of selected government interventions to facilitate investments in rice drying, storage and/or milling;
- Review of existing literature/documentation pertaining to post-harvest losses and consultations with experts working to address problems in this field; and
- A synthesis of analyses pertaining to rice trade policies and their impact on trade and farmer welfare.

2. Market structure of rice export trade

2.1 Vietnam's rice in the international market

Rice exports from Viet Nam are often cited as the success story of agricultural policy reforms. After many years of being a net importer of food, Vietnam exported 1.4 million tons in the first time in 1989. After 20 years, the position of Vietnam among major rice exporters seems to have consolidated with an average of more than two million tons of rice exports. This indicator increased from 4 to 6 million tons over the last five years. In the world market, Vietnam ranks the second after Thailand (Figure 2).

Figure 2: The world rice market share in 2008

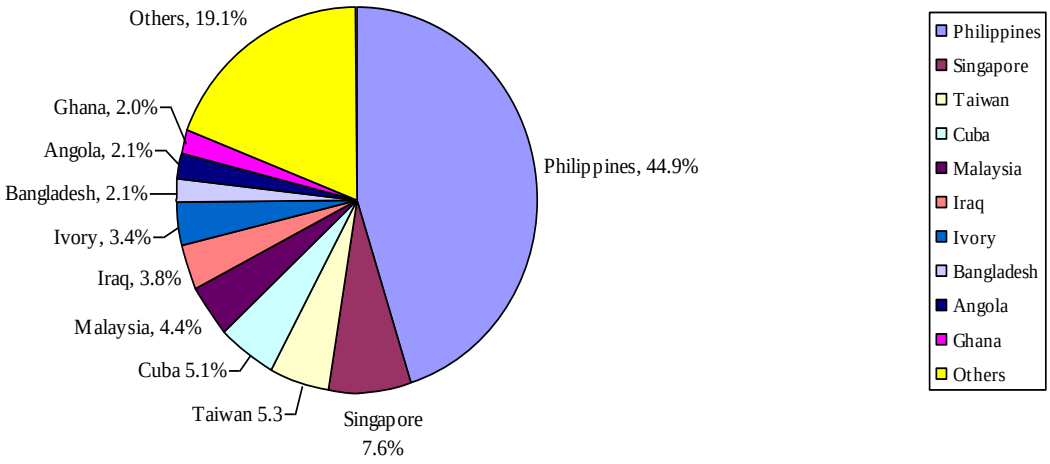


Source: VFA, 2010.

2.2 Major export markets

Vietnamese rice is not only exported to traditional markets such as the Philippines, Cuba or Iraq. It is also exported to new markets such as Singapore and Africa. Figure 3 shows the 10 leading export markets of Vietnamese rice in the first seven months of 2010.

Figure 3: Ten leading markets of Vietnamese rice in 2010



Source: VFA, 2010

2.3 Competitors

According to statistics issued by the United Nations Food and Agriculture Organization (FAO), about 147.5 million hectares of land throughout the world are used for rice cultivation and 90% of these areas belong to Asian countries. Asian countries also produce about 92% of the world's rice production. Global rice production increased approximately from 200 million tons in 1960 to over 600 million tons by 2007. The major producers and exporters are China (31%), India (20%), Thailand (26%), Vietnam (15%) and America (11%). Meanwhile three key rice importers are the Philippines (>40%), Indonesia (14%), Bangladesh (4%) and Brazil (3%).

3. Rice value chain analysis in the Mekong Delta

3.1 Volume, functions and channels

Vietnam produced 39.08 million tons of paddy per year, then deducted 9.8% of paddy post-harvest loss, 4,2% of paddy for seed (average 150kg of paddy per hectare plus 10% of paddy storage, total 165 kg per hectare) and 3.13% of paddy for husbandry. Therefore, paddy volume to mill was about 32.93 million tons (# 21.73 million tons of rice). From this volume of rice was deducted 9.83% (MDI, 2010) including losses of milling, at wholesaler/retailer and transportation stage. The remaining volume of rice (19.59 million tons) was distributed. This volume does not include at least 600,000 tons/year of rice that was illegally imported from Cambodia and Thailand.

Total rice production in the MD was about 13.54 million tons. After deducting regional demand and losses, the amount of commercial rice for this region was 7.74 million tons, 90% of which was exported (Table 2).

Table 2: Rice production, consumption and trade from the MD (Million Tons)

Indicator	In paddy	%	In rice
1. Production volume (Q)	20.52		13.54
2. Post-harvest losses on field	2.01	9.8	1.33
3. Volume after PH losses (Q1)	18.51		12.22
4. Demand in the MD	5.09		3.36
- Consumption: 135kg rice/capita*17,213mil. - Seed: 165kg paddy*3,870 mil. ha - Husbandry: 3.13%*Q1 paddy - Industrial consumption: 2%*Q1 rice	3.51 0.64 0.58 0.36		2.32 0.42 0.38 0.24
5. Losses after milling: - Paddy milling: 2.47% - Rice milling: 4% - Wholesaler/retailer: 1% - Transportation loss: 2.36% *(Surveyed data)*	1.69	9.83	1.12
6. Commercial rice in the MD	11.73		7.74

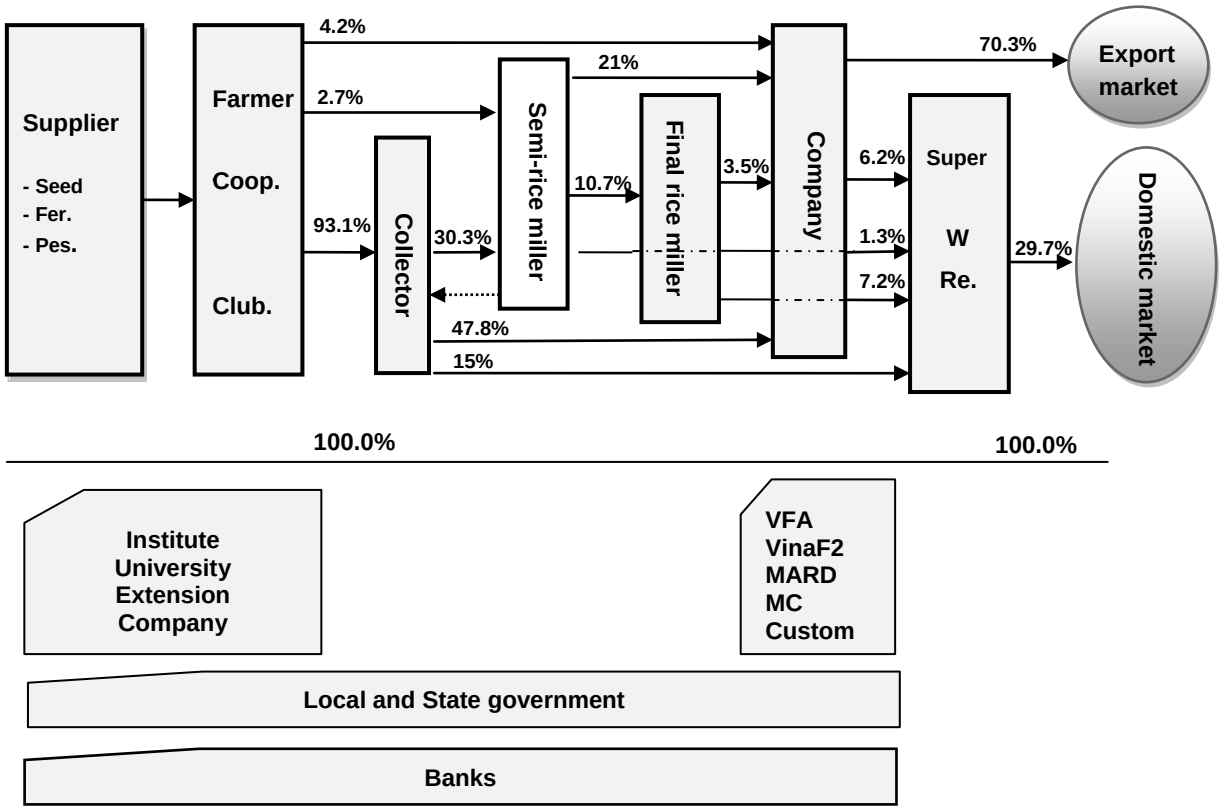
The market channels both within and without Vietnam as well as functions and actors within the chains, were remarkably similar (Figure 4). Distinct functions were found including a general group of input suppliers (seed, fertilizer and pesticide supplies); farmers (individual, clubs and cooperatives); traders such as collectors, wholesalers and retailers; millers and companies who are responsible for processing paddy into rice products and trading them to the markets. In the MD, there are about 1.46 million rice farmers, more than 3,000 paddy millers located in the provinces and one rice gate market with 230 rice millers and about 216 rice export companies with their paddy and rice millers inside.

93.1% of the total MD commercial rice production is transferred to collectors who collect from individual farmers; then, 47.8% of this trade is distributed to companies directly; 30.3% to rice millers and 15% to retailers. The remaining 6.9% of the rice from farmers (belonging to clubs and cooperatives) is directly sold to the companies (4.2%) and to rice millers (2.7%).

The rice export chain is more streamlined and dominated by the companies. The channels include (1) a vertically integrated international chain that extends directly from rice producers to companies and export markets (low percentage); however, there is a tendency towards vertical integration by companies in order to maintain greater control over farming practices (proved by case studies); (2) a channel with three agents (semi and final rice millers and companies); and (3) a four actors' channel (collectors, semi and final rice millers and companies). The export trade makes up approximately 70.3% of the total amount of commercial rice surveyed and extends to well established markets such as Africa, Asia, EU and Middle East.

The domestic flow of rice accounts for 29.7% of the total commercial rice with the same actors to the export chain including domestic wholesaler/retailer (collectors 15%, final rice millers 7.2%, companies 6.2% and semi-rice millers 1.3%). Particularly, 7.2% (# 1.1 million tons) of rice from final rice millers (the largest rice gate market in the MD) are distributed to three major markets: super-markets, wholesalers and retailers in provincial cities (inside and outside the MD); major urban centre such as Ho Chi Minh City; and North Vietnam with rates of 32%, 18% and 50%, respectively. The domestic chain is also a secondary market for rice products that are not meeting the quality, taste requirements and safety of the export markets. Quality and taste failures mainly consist of mixed varieties, seed degeneracy, damp and mould rice and rice parasite (worm); while safety failures mainly include problems with antibiotic or probiotic contamination and mixture (grit, hairs..).

Figure 4: Rice value chain map in the Mekong Delta



Rice chain facilitators

There are a large number of state, private and social organizations that facilitate both domestic and international rice trade. These organizations can support production techniques, finance and market promotions. There have been considerable efforts to improve variety and quality by institutes, universities and seed centers; through financial support(s) from state and private banks; through technical processes from extension centers and input companies; and market

information, international trade, quality requirements and standards, and trade documents and policies from VFA, VinaFood2, MARD, MC, local governments and customs (Figure 4).

3.2 Economic analysis of the rice chains

There are some issues that need to be discussed before conducting an economic analysis of the rice chain. Firstly, the price of rice (not the price of paddy) is used in the entire chain from farmer to user. Secondly, the selling price of the previous actor (*e.g.* the farmer in Figure 4) is the buying price or the average buying price of following actor (*e.g*. collector). Finally, the farmer's input costs consist of seed, fertilizer and pesticide; and the farmer's additional costs include such costs as labor, facilities, irrigation,… (Table 3 & 4).

Table 3: Production cost structure of rice farmer

No.	Item	VND/kg[2]	%
1	Seed, fertilizer and pesticide	1,548	42.4
2	Rent labor	752	20.6
3	Family labor	350	9.6
4	Depreciation (52) + small facilities (50)	102	2.8
5	Travel (buying inputs, facilities rent…)	60	1.6
6	Agent* (20) + Parties (sowing and harvest)	120	3.3
7	Irrigation	90	2.5
8	Interest to Input suppliers	102	2.8
9	Interest to the bank	526	14.4
Paddy production cost (PC)		3,650	100.0
Production cost by rice price (PC**1.2)		4,380	

Source: Survey results (MDI, 2010)
(*) Agent between farmer and collector
*(**) rice price = 1.2 paddy price (1/(0.66+1/2*34%) = 1/0.83 = 1.2)*

[2] 16,500VND/USD in 2009, but ca. 21,000 VND/USD in 2013.

Table 4: Added value of rice by market channels

Unit: VND/kg

Actor / Analysis	Farmer (F)	Collector (C)	Paddy miller (PM)	Rice miller (RM)	Wholesaler (W)	Retailer (R)	Total
Channel 1: Domestic rice chain (F-C-PM-RM-Co-W/R-User)							
1. Selling price	4,887	5,184	6,100	6,943	8,822	9,454	
2. Input cost	1,858	4,887	5,184	6,100		6,943	
3. Added cost	2,522	258	788	793		1,879	
4. Total cost	4,380	5,145	5,972	6,893	8,095	8,822	
5. Net added value	507	39	128	50	727	632	2,083
6. % NAV	24.4	1.9*	6.1	2.4	34.9	30.3	100.0
Channel 2: Export rice chain (F-C-PM-RM-Co-Export)					**Exporter**		
1. Selling price	4,887	6,281	6,163	6,943	8,142		
2. Input cost	1,858	4,887	5,530	6,100	6,581		
3. Added cost	2,522	1,114	447	793	1,139***		
4. Total cost	4,380	6,001	5,977	6,893	7,720		
5. Net added value	507	280	186	50	422		1,445
6. % NAV	35.1	19.4**	12.9	3.4	29.2		100.0

(*) buy paddy sell paddy; (**) buy paddy sell semi-rice

(***) Without 5% domestic turnover tax but adding VND80 per kg for transfer cost from the MD to Saigon port.

Where the farmer sells paddy to the company directly, the farmer has higher profits. The results of Table 5 show the margin per year of chain actors in both domestic and export rice value chains. A farmer only received USD 300 of margin per year, the lowest rate in the chain. In the domestic value chain, the wholesaler has the largest margin (USD 52,900 per year). The exporter is in the same position in the export value chain (USD 2.5 million per year). Other actors such as the paddy miller and the transporter also achieved a high margin (from USD 25-55,000 per year).

Table 5: Margin analysis of rice value chain in the MD

Actor	Total Cost (VND/kg)	Price Received (VND/Kg)	Unit Margin (VND/Kg)	Average Quantity Per Actor Per Year (tons)	Per Actor Margin (millions VND)	Per Actor Margin ($'000)
Domestic rice value chain						
Farmer	4,380	4,887	507	8.4	4.3	0.3
Collector	5,145	5,184	39	1,700	66.3	4.0
Paddy Miller	5,972	6,100	128	4,948	633.3	38.4
Miller	6,893	6,943	50	1,300	65.0	3.9
Transporter	120	240	120	3,528	423.4	25.6
Wholesaler	8,095	8,822	727	1,200	872.4	52.9
Retailer	8,822	9,454	632	240	151.7	9.2
Export rice value chain						
Farmer	4,380	4,887	507	8.4	4.3	0.3
Collector	6,001	6,281	280	1,700	476.0	28.8
Paddy Miller	5,977	6,163	186	4,948	920.3	55.8
Miller**	6,893	6,943	50	74,400	3,720.0	225.5
Transporter***	121	150	29	8,550	248.0	15.0
Exporter	7,720	8,142	422	100,000	42,200.0	2,557.5

Exchange rate: 16,500VND/USD in 2009

(*) by truck; (**) only miller: average 9.300 tons/month X 8 months = 74,400 tons, (***) by ferry.

4. SWOT analysis of the rice value chain in the MD

Based on the results of the interviews 549 chain actors and experts along with 10 group discussions, the SWOT analysis of the rice industry is shown at Table 6.

Table 6: SWOT analysis of the rice value chain in the MD

Strengths: • Competitive advantages of production resources: rice field areas, experience and labor • Good weather conditions for rice production • Support of Gov. in terms of: - Technical information and bank loan for rice quality improvement - Infrastructure investment for transportation improvement - Rice trade mark development • Other supports from institutions/university for seed and rice quality to meet the market needs.	***Opportunities:*** • Trend of rice consumption to high quality in domestic and export • Still large demand for low and medium rice quality of export markets
Weaknesses: • Small scale production • Many rice agents in the rice chain • High input price and uncontrolled quality • Irrigation system incompletely: water problem and use of technology • Lack of awareness for seed choice to grow • Unstable and low rice quality • Unbalance of rice segments • Rice policies priority to export company benefits than rice farmer • Uncontrolled export rice price among State and private companies	***Threats:*** • High competition with new entrance, rice quality and price in both domestic and export • Land objective changing to other plants in some areas • Climate changes

5. Strategies for upgrading the rice value chain

5.1 Strategy for cost reduction

- Using techniques from 'Three REDUCTIONS and Three GAINS' (decrease in the amount of seed, pesticides and Urea fertilizer for increasing rice yield, quality and efficiency) or 'One MUST and Six REDUCTIONS' programs ("must" use of certified seed and "should" decrease the amount of seed, pesticides and fertilizer, water, post-harvest losses and gas emission) in rice production.
- Developing horizontal linkages (farmer-farmer) and vertical linkage (farmer-company) for reducing marketing and 'agent' costs.

5.2 Strategy for quality improvement

- Planning and improving the national seed programs for the export rice target by research of consumer needs and by forecasting the market demand for rice.
- Developing local seed programs for domestic consumption through research of tasks and domestic market structure of rice.
- Applying international and national quality standards in rice production to meet VietGAP and Global GAP standards.

5.3 Strategy for technological investment

- Enhancing post-harvest technology such as combined harvesters, quality dryers and community storages.
- Investing technology in milling to rural areas to develop models of vertical cooperation for rice production and distribution in localities.
- Building up grain storage silos for rice drying and storage.

5.4 Policy improvement and development

- Policy development in relation to developing market information system and forecasting market demand for rice, as well as to planning production on the basis of market demand.
- Developing macro-managing policy to input suppliers in terms of price and product quality.
- Developing market and export policies for (1) increasing the export value, and (2) balancing the benefits among all chain actors.
- Policy development for reorganizing the rice market channels and actors to increase the chain value added, especially producers.
- Policies for developing cooperation and association in the rice chain for encouraging the establishment of potential export companies with combined technologies of rice drying, milling and processing.

- Policy of reinvestment in rice production by collecting a dollar per ton of export rice.
- Adjustment of the policy on food security by reducing the rice areas to meet the market demand for rice.
- Developing policy of environmental protection for rice safety by tax charge.

6. Conclusion

Vietnam is one of two leading countries in terms of the volume of rice exports. However, there is a rice surplus in four out of the six rice-producing regions of Vietnam. The North East, the South and the Central Highlands still have a rice deficit. The MD is the region with the highest surplus of rice where rice production, price stability and rice exports can be guaranteed (more than 90% of total rice is exported from the MD). As a result, rice production in the MD impacts the export price of rice in Vietnam and in the world market.

Although the volume of rice exported has increased over the last ten years, producers still face difficulties and challenges due to imbalances in the supply and demand of rice; lack of market information; and unsuitable policies for rice production and export.

Post-harvest losses include loss of paddy in the fields (9.8%) and loss of rice after milling (9.83%). Although there are many policies from the Government to invest in technologies for reducing these loss rates, the percentage of the rice areas that use these technologies is still limited for different reasons such as lack of capital, loan conditions, yield conditions and farmer's experience.

There are many agents (9 actors) in the rice value chain that result in high costs, low quality and weak supply chain management. In fact, value added of rice is low and distributed to many agents. The producers have the lowest income in the chain.

Rice chain logistics (production facilities, warehouse, technology for rice production, drying and milling, transportation means) are weak and in short supply. As a result, there are risks to rice chain actors such as post-harvest losses, low quality of the rice by lacking drying machines and warehouses, losses due to rice worms, mice,… mixed rice by weak management. These problems of the rice chain logistics and the risks to the rice chain actors present difficult challenges.

In order to develop the rice industry sustainably, many strategies are suggested such as (1) cost reduction to get at a competitive production cost, (2) rice quality improvement, (3) technology investment and (4) policy development and improvement to support better rice chain sustainability. In addition, there is a tendency to establish vertical cooperation between rice

cooperatives and companies that lead to good results in rice quality, price, efficiency and rice effectiveness.

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