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The Potential of the Rice Value Chain in the Mekong Delta to Develop High Value Export Markets

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ABSTRACT

This study aims at analyzing the current status of the rice value chain in the Mekong Delta focusing on export channels. The study assessed primary data collected from respondents related to the chain in the year 2020. Research results show that about 35% of rice in the region is used for export, of which most of the rice exported belongs to the high quality segment. Although improvements achieved recently, the regional rice value chain still faces many limitations. The study proposes solutions to strengthen the rice value chain and increase the volume of high quality rice exported into more demanding high income markets.

Keywords: *high quality; Mekong Delta; rice; segment; value chain.*

1 Introduction

As a key rice production area for food security and export in Vietnam, the Mekong Delta (MD) has made much improvement towards improving rice quality for export in recent years. The changes are in line with the latest national export policies in the context that the world's import demand is expected to be stable in the coming decades, especially for high quality rice, accounting for 15-18 % of the total rice imports (OECD/FAO, 2019; USDA, 2021; Giraud, 2013).

The rice industry in the MD is aiming at profound further restructuring with a number of measures such as upgrading the value chain (VC) through product standardization, increasing the scale of contract farming, and especially focusing on the exporting segments of the specialty, fragrant rice and the white and long grain, high quality instead of the chalky grain, medium quality previously (MARD, 2016; MARD, 2021; Government 2018c). At the same time, the government is also undertaking efforts such as building a rice brand (Government, 2018b), applying a liberalization policy for rice export (Government, 2018a), and attempting to enter new import markets requiring high quality (Government, 2020).

The above policy changes have made quite a dramatic change in the structure of rice export, whereby the proportion of the specialty, fragrant rice and the white and long grain, high quality rice exported is larger leading to higher averaged FOB (Freight on Board) price compared to the years before the policy reform. However, because the existing rice VC involves many VC actors, including millions of smallholder farmers, that need to be improved, upgrading the MD's rice VC may need comprehensive and time-consuming measures. This study hence aims at analyzing the recent shifts in rice production and export of Vietnam in general and of the MD in particular, followed by analyses and evaluations of the rice VC by market segments. This study also addresses the limitations of the rice sector and recommendations for upgrading the rice VC. The study is based on core findings of a collaborative research project funded by GIZ in early 2021.

2 Methodology

Rice is produced in most of the provinces in the MD due to favorable conditions, especially in the middle provinces characterized by a freshwater based ecology and intensive cultivation. The study selected six provinces in the middle of the MD region, namely (1) An Giang, (2) Dong Thap, (3) Can Tho, (4) Hau Giang, (5) Soc Trang and (6) Kien Giang as shown in Figure 1.

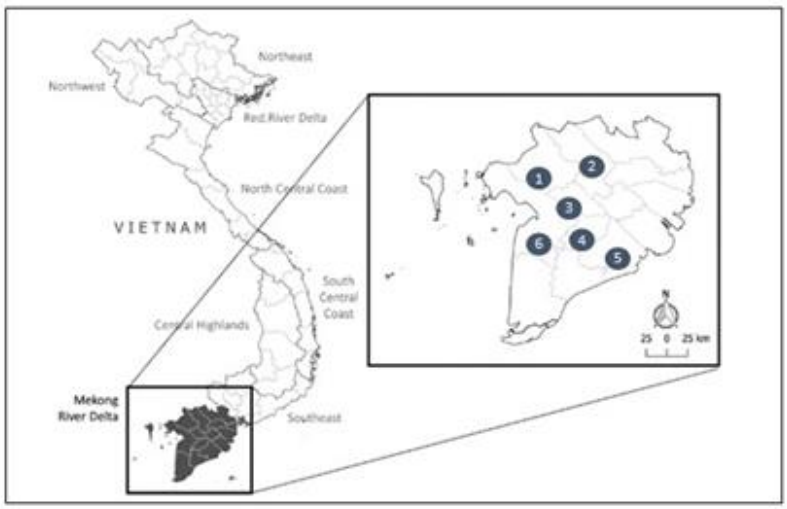

Figure 1. Relative locations of study sites in the MD, Vietnam.

These target provinces provide a large part of the rice produced in the MD, accounting for 65 % of the planted area and 67 % of the production in the MD (GSO, 2021). The study applied both qualitative and quantitative approaches to analyze the VC economics and propose VC upgrading measures. The authors firstly selected VC actors based on stratification for 4 rice varieties representing 4 market segments (e.g. ST24 for specialty rice, OM5451 for high quality long grain rice, IR50404 for the medium quality segment, and CK92 for sticky & japonica rice). Secondly, about 30 farmers were selected for each of the four rice varieties. Other actors in the chain such as seed and agro-input dealers, cooperatives, collectors, wholesalers, retailers, processing and exporting companies were selected with the snow-ball method based on referrals of the interviewed agents (Noy, 2008; Kirchherr and Charles, 2018). This is a very popular

method applied to qualitative studies including VCs of agricultural products. Altogether, a total of 214 actors along the main rice VC and supportive agencies were selected for collecting related information as seen in Table 1.

Table 1.
The number of respondents in the survey by 2020.

Value actors interviewed	Number
Seed suppliers, agro-input dealers	25
Farmers	121
Cooperatives	16
Collectors, wholesalers, retailers	24
Processing and exporting companies	14
Others	19
TOTAL	214

Four rice varieties representing for the four target segments were selected for the study, including (i) ST24 for the first segment of specialty and fragrant rice; (ii) OM5451 for the second segment of white and long grain with high quality rice; (iii) IR50404 for the third segment of chalky grain with medium quality rice, and (iv) CK92 for the fourth segment of sticky rice. The later three rice varieties accounted for a large proportion of the planted area and output in each segment, while ST24 was chosen because it was named the worlds' best rice in 2019, and is being marketed worldwide recently particularly in high income countries (Table 2). The collected data of the rice chain were for the crop year 2019 - 2020.

Table 2.
Representative rice varieties by quality segment in the MD in 2020.

Segment	Area (1,000 ha)	(%)	Representative variety		
			Variety	Area (1,000 ha)	(%)
(1) Specialty, fragrant rice	1,604	41.0	ST24	111	6.9
(2) White and long grain, high quality	990	25.3	OM5451	851	86.0
(3) Chalky grain, medium quality	426	10.0	IR50404	349	81.9
(4) Sticky and Japonica	612	15.6	CK92	483	78.9
Total	3,915	100.0		1,794	45.8

Source: AgroMonitor, 2021

Actors directly involved in the VC such as farmers, seed and agro-input dealers, collectors, wholesalers, retailers, processing and exporting companies were interviewed to collect data on VC economics. These actors also provided further information about the advantages and limitations of their production and business. Indirect actors participating in the chain such as representatives of agricultural agencies, trade promotion, cooperatives, agricultural extension services, etc., provided critical information about the rice industry. This information served for the SWOT analysis later in this article.

The study applied the *ValueLinks* approach where a VC is defined as an economic system which includes all enterprises cooperating to serve a particular market (Springer-Heinze, 2018). Importantly, the VC approach is also a policy tool to help upgrading chain strategies towards sustainable development. In this context, the following formula of the GIZ's ValueLinks methodology is applied for the economic analysis of different rice varieties and market segments:

- Value generated by the VC or by stage of the VC equals to the product price multiplied by the volume of output sold.
- Value added (VA) captured in one stage of the VC includes wages, interests and rents, depreciation of fixed cost, direct taxes and profits. The value added is used to pay claims of the factors of production such as capital, labour, land and tax.
- Intermediate costs include raw materials, semi-finished or traded products from the previous VC level. These are transferred to operators at the previous stage in the VC.
- Other inputs and services include inputs, equipment, energies, water, and operational services. These are to transfer to external suppliers during the VC.

To calculate the values for each variety, one ton of milled rice is used as the unit, where the rice-to-paddy conversion ratio is calculated as 0,645 based on the government regulations (GSO, 2020). The applied exchange rate between VND

and USD was taken from the Vietnam Customs as of December 2020 similar to the time of research; according to which the Official Exchange Rate (OER) of VND/USD was 23.040[1].

In addition to the above quantitative data collection methods, this study also reviewed secondary data on policies of restructuring the rice industry and actual shifts in area, output and rice export value over the past 10 years to provide an overview of the transformation processes of the rice industry towards focusing on the export of quality rice. The findings of this secondary data analysis are part of chapter 3.

3 Results

3.1 The MD's rice export transition

Vietnam has exported rice since 1989 after the successful Renovation (Doanh, 1991) and became one of the top three rice exporting countries in the world together with India and Thailand. In the last two decades (2000 - 2020), the annual export of Vietnam's rice was about 6 million tons (FAO-AMIS, 2021) at low prices. According to the statistics of the Vietnam Food Association (VFA) in the period 1989-2017, up to 66.7 % of the total rice volume was exported to Asian countries, mainly China, the Philippines and other Asian markets with relatively low market prices; followed by African countries (18.9 %), and other markets with an average price of $340,91/ton (VFA, 2021), which was considerably lower than the export price in Thailand (Nielsen, 2003) as cited in Ba et al., (2019). With a national export strategy focusing rather on quantity than quality for many years, the rice VC development has caused many socio-economic and environmental limitations e.g. unimproved farmers' livelihoods, increased land used rotation, and environmental pollution in the key rice-producing regions of MD (Brown *et al.,* 2018; Tran *et al.,* 2018; Tin, 2017; Phong and Tam, 2015).

Recent changes have gradually improved such limitations and focused more on sustainable development via an umbrella policy like Resolution No. 120 (Government, 2017c) as well as other sector policies for restructuring Vietnam's rice industry (MARD, 2016; MARD, 2021), rice brand development (Prime Minister, 2015), and rice export (Prime Minister, 2017; Government, 2018a). These all have practically impacted on the MD's rice export.

Table 3 shows that Vietnam exported 6.39 million tons of milled rice per annum with an average FOB price of $454/ton during the period 2011 - 2020. When comparing this whole period, both quantity and value of exports decreased while the compound annual growth rate (CAGR) of the FOB price was 0.13 %. Contrarily, in the period 2016 - 2020, once the rice-restructuring policies were enacted, the CAGR were 6.33 % for the export volume and 10.03 % for the export value. The FOB price was also higher at $463/ton compared to $445/ton in the period 2011 - 2015. The growth rate of rice prices in the period 2016-2020 in Vietnam was higher that than the growth rate of the word market price with a CAGR of 3.49 % for the rice price in Vietnam compared to a CAGR of 2.10 of the world market price. While the average market price of rice from Vietnam increased from $445/ton in the period 2011-2015 to $463/ton in the period 2016 - 2020 the world's rice price has decreased in the same period. However, the average price of Vietnam's rice was still lower than the average rice price in the world. This also shows that Vietnam's rice has made positive changes compared to other rice exporting countries in the world.

The spectacular increase in the FOB export price of Vietnam's rice during the period 2016-2020 was due to an increase in the proportion of the first and second segments associated with a decrease in the third segment (Figure 2a). The first segment of rice exports increased from 1.393 million tons in 2017 to 2.738 million tons in 2020 with an average increase of 25 % per year. The second segment increased from 0.577 million tons in 2017 to 1.353 million tons in 2020 with an annual average increase of 33 %, while the third segment declined during the same period. Rice prices by segment also fluctuated in the last three years (Figure 2b). The first segment decreased from 2018 to 2019 but increased again in 2020. The situation was similar in the second and third segments. However, in the fourth segment, the sticky rice price was always increasing. In general, in the last three years, the rice price in the first segment was still the highest, followed by the fourth segment of sticky rice and the remaining two segments; of which the lowest price was the third segment of medium quality rice. That is why Vietnam has changed its export strategy to reduce the volume of this medium quality segment.

[1] https://www.customs.gov.vn/Lists/ExchangeRate/Default.aspx

Table 3.
Trends of Vietnam's rice export against the world's trade for the last 10 years.

Year	Vietnam export (Million ton)[1]	Value exported ($ Billion)[1]	FOB Price ($/ton)[1]	World trade (Million ton)[2]	World price ($/ton)[2]
2011	7.13	3.52	494	24.41	631
2012	7.72	3.45	447	24.10[3]	626
2013	6.68	2.89	433	25.72	628
2014	6.32	2.79	441	26.45	585
2015	6.57	2.68	408	23.25	511
2016	4.89	2.13	435	20.67	502
2017	5.77	2.54	440	24.37	499
2018	6.11	3.06	501	26.03	583
2019	6.43	2.81	437	24.16	547
2020	6.25	3.12	499	24.47	545
Avg (2011-15)	6.88	3.07	445	24.79	596
CAGR (%)	-2.02	-6.59	-4.66	-1.21	-5.13
Avg (2016-20)	5.89	2.73	463	23.94	535
CAGR (%)	6.33	10.03	3.49	4.31	2.10
Avg (2011-20)	6.39	2.90	454	24.36	566
CAGR (%)	-1.45	-1.33	0.13	0.03	-1.60

Source: (1): VFA data for the period of 2011 – 2017; AgroMonitor and Vietnam Custom for the period of 2018 – 2020; (2) Data of ITC Trade Map, www.trademap.org, as per March 04, 2021.

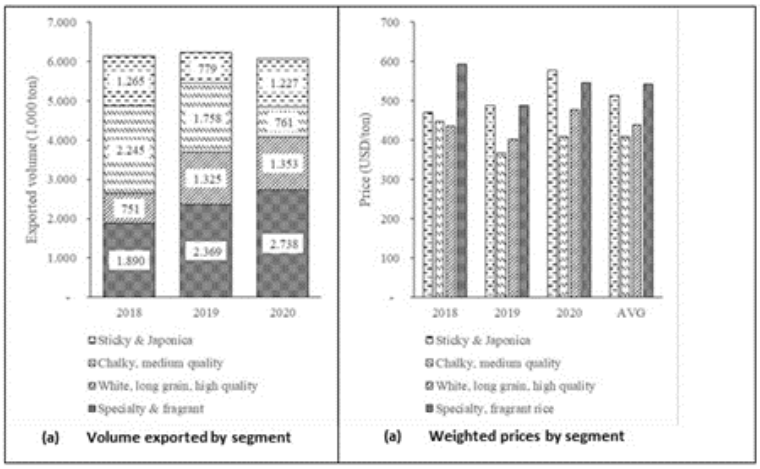

Figure 2. Rice exported by the period 2018-2020 (Source: Agromonitor, 2021).

The Government's change in the export liberalization (Government, 2018a) has a certain influence on transaction modes as well as import markets for different segments. In Figure 3a, the first segment of specialty and fragrant rice shows that in the past three years (2018-2020) there were about 234 transactions made, but each transaction had a very small volume of rice with an average of 2.36 thousand tons; and most of them were concentrated at 0.50 thousand tons (42 %). This shows that export companies have made good use of opportunities to export rice even though each transaction was quite small in volume. In 2020, the top import countries in this segment were the Philippines, Ghana, and Ivory Coast. At the same time, there were new destinations in European and American countries coming up such as Italia, Norway, Germany, USA and Brazil, but the volume per transaction ranged about few thousand tons only. This proves that Vietnam's specialty rice has begun to penetrate difficult high value markets.

Meanwhile in the second segment (Figure 3b), the volume per transaction was larger, averaging 6,64 thousand tons, mostly in the range of one thousand ton per transaction (21 %). A rise of this segment was exported to the traditional markets such as the Philippines, Malaysia, Cuba, Ghana, Ivory Coast, Iraq, and Singapore. For the third segment (Figure 3c), it was much different. The volume of each transaction was relatively large, averaging 11.81 thousand tons and

concentrated at 30.5 thousand tons. This segment was also exported to the traditional markets such as Malaysia, the Philippines, Cuba, Ivory Coast, Syrian Arab, and Ghana. The fourth segment (Figure 3d) had a relatively large average volume of 6,64 thousand tons. China was the largest importer of sticky rice, followed by the Philippines, Malaysia, Laos, Indonesia, Taiwan, and Cambodia. In summary, thanks to the free trade, many small volume transactions and new markets have been discovered and exploited, especially for the first segment with high quality and good taste for consumers in more demanding high income countries. In other words, export companies have been more active and beneficial in the high quality specialty rice segments. At the same time, they have a positive influence on developing further the VCs for these segments, especially with regard to raw material areas based on contract farming systems.

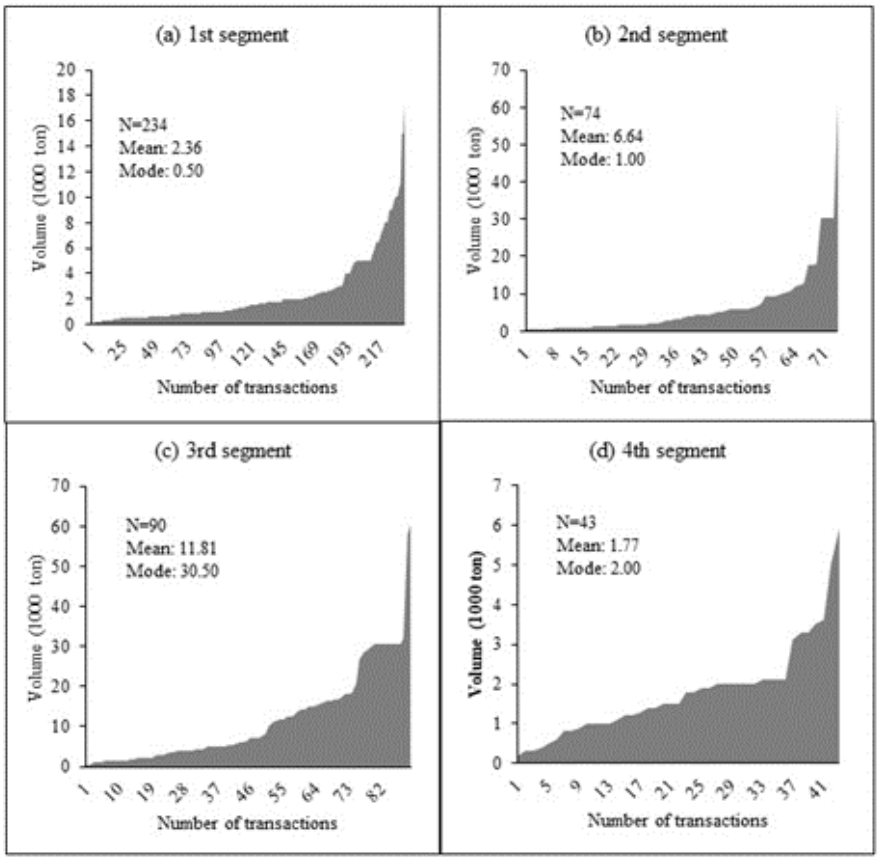

Figure 3. A volume per transaction by quality segment in the period 2018 – 2020 (Source: Agromonitor, 2021).

3.2 VC analysis

3.2.1 VC map

The structure of the rice VC in the MD is illustrated best with a VC map that shows the markets at the top, the main VC functions at the left side, and the VC operators performing these functions in the middle. The proportion of rice flows at the stages from regional collectors to milling and polishing companies (MPCs), milling/polishing and exporting companies (MPECs) as well as to wholesalers/retailers in the VC map is shown. In addition, the most important types of service providers and the governmental institutions regulating and promoting the VC are presented at the right side (Figure 4).

The two main markets of the rice VC in the MD are the domestic and international market. According to the Ministry of Agriculture and Rural Development (MARD), the MD produced 55 % of the total national paddy production of 44.80 million tons, which was equivalent to 24.6 million tons of paddy. Applying a milling rate of 0.645 (GSO, 2020), this resulted in 15.6 million tons of milled rice. It is estimated that about 90% of Vietnam's rice exports totaling 6.25 million tons in 2020 came from the MD (MARD, 2016; MARD, 2021). This means that about 5.63 million tons of milled rice originating from the MD were exported (35 % of the production in the MD) and about 10.27 million tons of milled rice were distributed in the domestic market (65 % of the production in MD). It is noticeable that the proportion of 35 % of rice exported found in this research is much lower than that of around 70 % in previous studies (Ba *et al.,* 2019; Loc and Son, 2011). The reason for the export rate of rice is only 35% because this study divided the rice export volume of 5.63

million tons out of the total 15.9 million tons of rice produced from MD, while other authors such as Loc and Son (2011) divided the export volume of rice of about 5.5 million tons by the total commercial rice (7.74 million tons) after deducting the amount of rice consumed internally by MD. On the other hand, these authors use relatively old data of perhaps 2009 in the aforementioned calculations. In addition, the study by Ba et al was published in 2019 but has been referenced from Nielsen (2003).

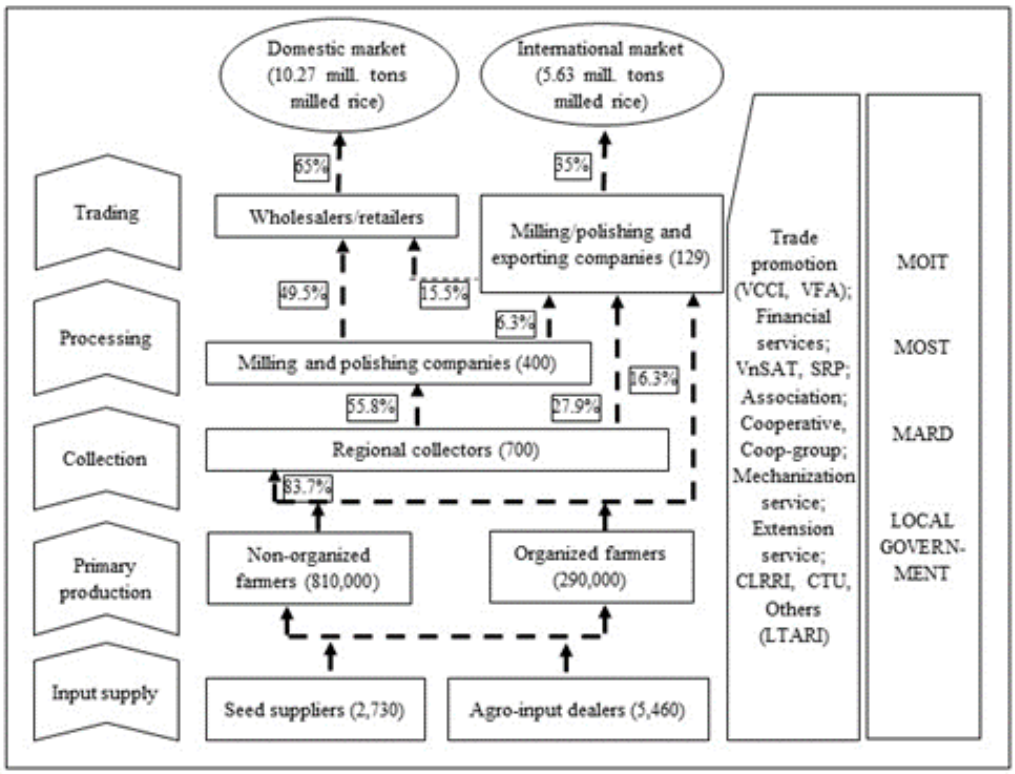

Figure 4**:** Rice VC map of the MD in Vietnam (Source: Primary data and author calculation, 2021).

The rice VC comprises five main functions, including input supply, primary production, collection, processing, and trading. Input supply mainly refers to the supply of VC specific inputs such as seeds, fertilizer, chemicals, tools, equipment, etc. Primary production is the farming level, and collection stands for the intermediate trade with paddy. Processing includes the milling and polishing steps, while the trading function refers to both the domestic trade and export. At the input supply stage, there is an estimated number of 2,730 seed suppliers and 5,460 agro-input dealers in the MD (about three seed suppliers and six agro-input dealers serving for a commune).

According to the General Statistical Office (2018), 1.14 million of rice farming households were counted in the MD. Thereof, 290,000 households are considered to be so-called organized rice farming households which means that they belong to cooperative groups and cooperatives. It is estimated that about 60% of the total 145,000 cooperative members and 339,000 cooperative group members counted in 2019 (DCRD, 2021) were rice farming households. The vast majority of farmers, e.g. about 810,000 households, were not associated with cooperative groups and cooperatives. According to the survey results, after harvesting, both non-organized and organized rice farmers mostly sell the paddy to collectors (83.7 %), while only 16.3 % of the paddy is sold directly to milling/polishing and exporting companies. However, the percentage of this rice sold directly to the companies in form of contract farming is much lower. Comparing organized and non-organized farmers, non-organized farmers only sell 3 % of their paddy directly to milling/polishing and exporting companies through supply contracts, while organized farmers sell up to 24 % of their paddy directly to the milling/polishing and exporting companies under contract farming.

At the collection stage, there are about 700 so-called regional collectors, e.g. larger collectors with their own supply networks at the local level. The collectors supply the paddy to the different processors and exporters, but also sell milled and polished rice directly to wholesalers and retailers based on service provision agreements with rice milling and polishing companies.

At the processing level, two main business models are found. First, there are about 400 milling and polishing companies (MPCs) performing milling and polishing functions only. Second, there are 129 milling/polishing and exporting companies (MPECs) following an integrated business model using their own milling and polishing facilities, processing

additional supply from other millers/polishers and performing own major export functions (MOIT, 2020). Such MPECs focus mostly on their export function but also supply part of their produce to the domestic market (making up for 15.5% of their sales volume in the survey).

At the trading level, a countless number of domestic wholesalers and retailers supply the domestic market, receiving some part of their produce also from the MPECs that are mainly selling to the international market. The traders cover the four market segments mentioned as i) specialty and fragrant rice, comprising paddy varieties such as ST24, ST25, RVT, Jasmine 85, Dai Thom 8; ii) white and long grain rice, including paddy varieties like OM5451; iii) medium quality rice like IR50404; and iv) sticky rice and Japonica.

At the service provision level, there are quite a number of public and private organizations supporting the VC operators in terms of scientific research, agricultural extension, lobbying and advocacy, as well as with operational, financial and commercial services. The most important research institutes active in the rice VC in MD are the Cuu Long Delta Rice Research Institute (CLRRI), Can Tho University (CTU), and the Loc Troi Agricultural Research Institute. Besides public agricultural extension services, cooperatives, and cooperative groups as well as other providers of machinery services for land preparation, spraying, harvesting, drying, and storing play a key role in supporting farmers. Other important service providers are for example associations such as the Farmers' Union, projects like VnSAT and BRIA II, financial services providers such as banks, industry organizations such as the Vietnam Food Association (VFA), the Vietnam Chamber of Commerce and Industry (VCCI) as well as providers of trade promotion services.

At the policy level, the main stakeholders of the political environment are the Ministry of Industry and Trade (MOIT), the Ministry of Agriculture and Rural Development (MARD), the Ministry of Science and Technology (MOST), and the local Government.

All four market segments share the same VC model as well as they receive similar support policies and services. There are only a few differences in the proportions of area and volume of rice produced and consumed under contract farming among the four segments. The first and second segments of high-quality rice seem to have higher rates of contract farming than these of the third and fourth segments of medium quality rice and sticky rice; however, there are no official statistics on these claims.

3.2.2 Actors in the VC

(i) Seed suppliers

The companies supplying seeds to the farmers buy pure seeds from large seed companies and seed centers in the province such as Ho Quang Company, Loc Troi Group, An Giang Seed Company, seed centers in An Giang, Soc Trang, etc., multiply these seeds and sell the seeds at the local level. Besides these big suppliers performing both breeding and trading functions, most of the local seed suppliers are small shops, serving the rice growers within the hamlet or 1-2 communes. They multiply either certificated seeds themselves or rent cooperative groups and cooperatives facilities to multiply seeds. For sticky rice (CK92), seeds are often selected from the own harvest and re-planted locally. Seed suppliers produce and trade many different paddy varieties according to market needs. The demand can be estimated according to the areas growing different varieties at shown in Table 2.

(ii) Agro-input dealers

Agricultural inputs are being sold directly at grass roots level, mainly via a large number of input supply shops, due to an improved rural transport infrastructure and an extensive network of local input providers. There are approximately six agro-input shops per commune, so that farmers have easy access to agro-inputs. Usually they prefer to buy agro-inputs from shop owners with whom they are personally related, besides other benefits in terms of distance and payments. Payments for agricultural inputs (except for seeds) are mainly made to the agro-input shops only at harvesting time. In recent years, a new form of agro-input provision has emerged in contract farming arrangements and in systems of standardized rice cultivation. In these cases, agro-inputs are either supplied by the rice trading companies (e.g. Loc Troi Group) or farmers are referred to specific agro-input dealers within commune.

The survey suggests that all agro-input dealers accept to sell inputs to rice farmers without immediate payment. Rice farmers usually can choose whether they want to pay in cash directly at purchase at lower price, or to pay later at harvesting time at higher price. Usually, a discount of 3 – 5 % is granted to the farmers when they pay in cash immediately compared to when they pay in cash after harvesting. According to the interviewed dealers, only less than 40 % of rice farmers choose to pay directly at purchase, as the majority of farmers either lack capital or are just used to paying after harvesting. According to the survey, most purchases between agro-input dealers and rice farmers are based on personal acquaintance as well as verbal agreement without any formal sales contract. In some cases, this leads to increased and bad debts.

(iii) Farmers

In the survey, among the sample of 121 rice farmers interviewed in the six provinces, the average area of rice farming per household was 2.4 ha, with moderate differences among the four segments. Most of the surveyed households apply the cultivation model of three rice crops per year, with the exception of ST24, which is usually grown in two crops per year in Soc Trang province or one crop per year in the rotational rice-shrimp system in the coastal area of Kien Giang. The main characteristics of the surveyed farm households are shown in Table 4. The average age of the head of the farm household is approximately 54 years with an average family size of 4.5 persons and an average family labor involved in rice production of less than 2 persons.

Table 4.
Main profile of rice farm households by segment.

	1st Specialty (n=29)	2nd White, long grain (n=34)	3rd Chalky, medium (n=28)	4th Sticky (n=30)	Total (n=121)
Age of head (year)	56.3	53.9	54.0	51.2	53.9
Household size (person)	4.5	4.7	4.6	4.1	4.5
Labour (person)	1.7	1.6	1.8	1.6	1.7
Rice land (ha)	2.6	2.1	1.7	2.9	2.4
Rice system (crop/year)	1-2	3	3	3	1 - 3

Source: Primary data, 2021

(iv) Collectors

There are a number of about 700 regional collectors in the MD. The survey data suggest that a regional collector can supply 10,000 - 40,000 tons of paddy per season, especially in the Winter-Spring season. Such regional collectors are usually composed of a team of 3 - 4 persons working together. Under each regional collector, there are usually a number of smaller collectors, so-called local collectors.

As indicated above, according to the survey, 83.7 % of the paddy produced is sold via collectors, while only 16.3 % are sold by farmers directly to the milling/polishing and exporting companies. Almost all of them buy paddy directly from individual rice farmers, but 20 % of the collectors interviewed also buy paddy through cooperative groups' representatives. The activity of paddy buying and selling between collectors and farmers takes place in the fields without any formal written contract; however, the collectors have to deposit money in advance for rice farmers or cooperative groups' representatives and will pay the rest immediately when collecting the product.

When buying paddy from the farmers, the collectors consider the ripeness, moisture, unfilled grain, impurities, and the paddy variety, in order to calculate the price. The collectors assess these factors mainly without any specific measurement tools. The survey results indicate that most rice farmers meet the product quality requirements stipulated by the buyers, such as humidity (22 %), impurities (97 %), ripeness (82 %), and plant stability (90 %). Pesticide residues are taken into account only for farmers that work under contract farming arrangements. About 87 % of rice farmers receive direct cash payments when selling paddy to the buyers. Most of collectors then use boats to transport the rice from the fields to the drying or milling stations.

(v) Processors

As indicated above, two kinds of processors are present in the rice VC, these being milling and polishing companies (MPC) and milling, polishing and exporting companies (MPEC). These two types of processors perform the same functions in terms of milling and polishing, while the fundamental difference is that the MPECs assume an additional export function in the integrated model. The majority of the milling and polishing companies that do not perform any export function (MPC) are medium-sized companies with an annual output of 20,000 - 50,000 tons/year and a turnover of about 200-550 billion VND/year. Such MPCs mostly either perform only the milling function or perform both milling and polishing functions.

The survey results show that most of the integrated milling/polishing and exporting companies (MPEC) have a larger business scale with an annual output of 80,000-180,000 tons/year, of which 70 – 80 % are exported and about 15.5 % (20 - 30 %) are sold on the domestic market. These larger exporters have a turnover of about 860-1,900 billion VND, while medium-scale milling/polishing and exporting companies generate an annual output of 30,000 - 60,000 tons/year and an annual turnover of about 300 - 600 billion VND. Small scale milling/polishing and exporting companies achieve an annual output of 10,000 tons/year and an annual turnover of 120 billion VND/year.

According to MOIT (2021), there were 129 rice exporting companies in MD. These companies, in general, perform the functions of milling/polishing and exporting rice to about 150 markets, accounting for over 90 % of the country's rice exports.

(vi) Domestic wholesalers/retailers

Wholesalers and retailers supplying the domestic market buy the rice either from MPCs and MPECs or directly from the collectors. In the latter case, the collectors will hire drying, milling and polishing facilities to produce milled rice by themselves.

The survey results indicate that about half of the wholesalers/retailers (55.6 %) take their buying decisions only based on the prices in the different market segments, while not requiring any particular rice quality standard from the seller, except for the type of rice. However, the other half of the wholesalers/retailers tend to apply purchasing criteria like impurities, unfilled grain, and certification of food safety and hygiene standards issued by governmental agencies.

(vii) Other supportive institutions

As shown in Figure 5, there are a variety of organizations that have a role to support or promote the VC such as MARD, MOIT, MOST and others. MARD regulates and promotes agricultural and rural development and is responsible for the provision of public services on agriculture (Government, 2008) in which rice is an important subsector. In the rice VC, MARD provides funds for infrastructure development, research, technology development, and human resource training. It encourages farmers to maintain their rice land and plays an important role in managing input quality, organizing rice cultivation, developing farming infrastructures and enhancing product quality.

MOIT is responsible for industry and trade, including all industrial branches and clusters, domestic trade, export promotion, market management, e-commerce, commercial services, international economic integration, competition and trade remedies, and public services in fields under the Ministry's responsibility (Government, 2017b). In the rice sector, the ministry implements programs to enhance agricultural mechanization and processing, and launches regulations for rice quality standards. It issues licenses and export permits for rice exporters and actively promotes rice exports looking out for import enterprises and support possibilities to access international markets for local rice traders.

MOST promotes science and technology, including scientific research, technological innovation, management of standards, metrology and quality control, intellectual property rights, and other related fields (Government, 2017a). In the rice sector, MOST has particularly supported research projects and the application of intellectual property rights for new rice varieties, has funded research on new rice-based products, and supported the environmental adaptation of the rice VC.

In addition to the macro agencies related to the above supports, the rice VC also has the indirect impacts of other organizations and institutions from the region to the localities such as the Research Institutes and Universities providing new science and technology such as Can Tho University, Cuu Long Rice Research Institute, agricultural insurance, mechanical services, finance, and others.

A change in rice export policy through Decree 107 (Government, 2018a) has affected the role of the Vietnam Food Association (VFA) from the past three years. VFA has changed from functions of regulation, direct control to currently focusing on export support, trade promotion, and no longer being the focal point to register export as before. This gives businesses as the MPECs opportunity to freely search for markets and export directly, which is in turn beneficial to increase the value of rice exports.

3.2.3 Economic analysis of the VC

Figure 4 shows the VC map for the rice industry in the MD, in which the amount of rice for export accounts for 35 % of the region's total production. For the export channel, it can be divided into two main market channels as below.

First, the market channel 1 includes the following three actors: Rice farmer → Collector → MPEC. The market channel is commonly used for the three varieties OM5451, IR50404 and CK92.

Second, the market channel 2 includes only two actors: Rice farmer → MPEC. It is commonly found for the variety ST24 as a direct supply relationship connecting rice farmers with MPECs. This, because ST24 is a specialty and fragrant rice, whose cultivation process often requires particular care. Additionally, the process of collection and transport from the field to the factory must be really quick; otherwise, the quality of rice is reduced. Therefore, ST24 is often cultivated in the form of contract farming to meet better the strict quality requirements.

According to the information collected from the VC actors, the economic performances of the four rice varieties representing for the four market segments are summarized as shown in Figure 5. First of all, for ST24, it shows that the reealized export value (FOB price) is the highest with $750/ton for the specialty and fragrant rice exported to more demanding high value markets as mentioned in the previous part of this article (Figure 5a).

At the same time, the farmers receive a relatively high farmgate price of $493/ton due to the contract farming. The total value added (VA) created is very high for ST24 with $538/ton, of which farmers receive $347/ton, accounting for 64 % of the total VA and MPECs receiving $191/ton, accounting for 36 % of the total VA. The total VA of ST24 is almost twice or more than the VA realized with the other varieties.

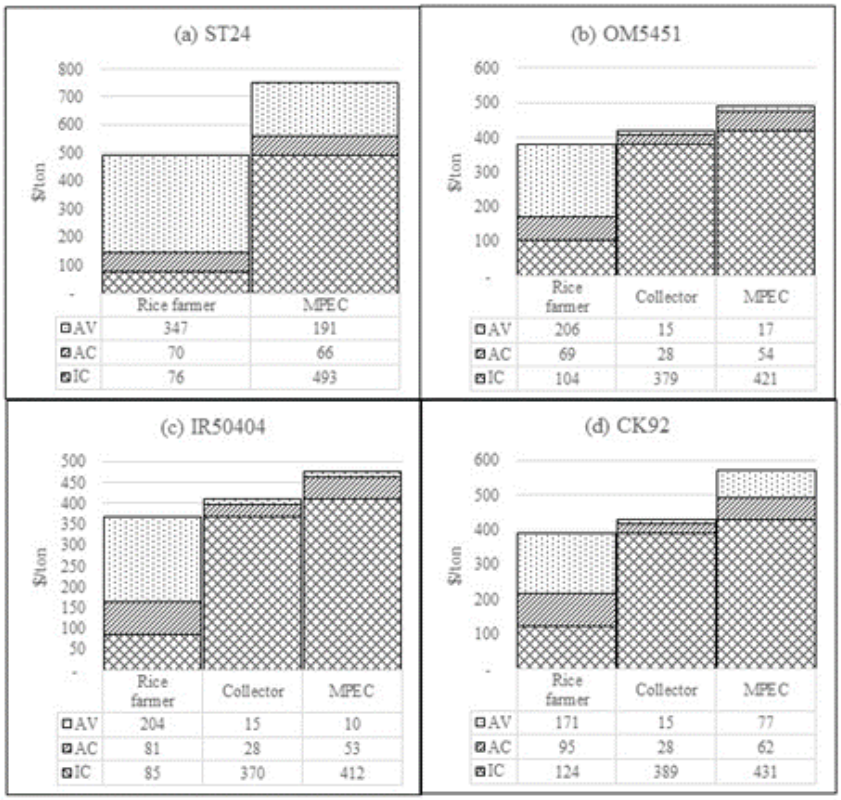

Figure 5. VC economic analysis by variety in the 2019-2020 season (Source: Primary data, 2021).
(AV: added value, AC: added cost, IC: intermediate cost)

The economic performance of the other varieties CK92, OM5451 and IR50404 are also presented in Figure 5d, Figure 5b, Figure 5cwith a total VA of $262/ton, $238/ton, and $229/ton respectively. Farmers receive the highest VA from ST24, followed by OM5451, IR50404 and finally CK92. MPECs also receive the highest VA from ST24 with $191/ton, followed by CK92 with $77/ton, OM5451 with $17/ton, and finally IR50404 with $10/ton. These data show that MPECs will tend to focus on exporting ST24 more than on exporting other varieties due to the relatively high VA potential.

3.3 Strategic consideration for VC upgrading

3.3.1 SWOT analysis

Although the MD is a key rice production area for export since long time with many improvements made up to now, its rice industry still faces many limitations and weaknesses which do not allow the VC actors to make full use of the rice industry opportunities and potential in the new socio-economic context of Vietnam getting increasingly integrated into the world economy.

The main information obtained in the in-depth interviews with 19 VC stakeholders and experts in the provincial agencies and the 14 MPEC enterprises is summarized in Table 5.

Table 5.
SWOT analysis for the MD's rice sector serving for export.

Strengths	**Opportunities**
1. Farmers have rich farming experience and are willing to adapt to farming standardization dealing with newly high international market demands; 2. Supportive systems have well-served for the rice sector reform (e.g. extension services, seeds and input supplies, services of mechanization in farming and post-harvest); 3. Marketing channels for export have been created and strengthened for further export of high-quality rice.	1. State and sector policies have promoted the rice sector reform, more liberal and active participation of MPECs in exporting markets, and encouraging contract farming; 2. Plenty international markets for rice-based products have newly opened under free trading agreements signed between Vietnam and others;
Weaknesses	**Threats**
1. The number of organized rice farmers standardized rice production is still low, leading to high production cost and an overuse of fertilizer and pesticides. 2. Poor capacities of rice cooperatives with weak functions in the VC and less developed contract farming models between cooperatives/specialized production areas and MPEC companies for stable export quality; 3. Limited use of trademarks and certification schemes for high quality rice.	1. Tough competition with other exporters of high quality rice such as Thailand, India, Pakistan and even new exporters like Cambodia and Myanmar; 2. There are severe abnormal weather events and saline water intrusion due to climate change and see level rise in the MD. 3. The labour force in rice farming and other stages in the VC is getting old while there is a lack of feasible solutions to attract young people as well as young women who are ready to build up livelihood opportunities.

Source: Primary data, 2021

3.2.2 Strategy and solutions for rice VC upgrading

Based on the judgements of VC experts in Table 5 and the previous analyses, some suggestions to upgrade the rice VC in the MD can be made.

(1) Capacity building of cooperatives already active in contract farming with MPECs should be intensified and new cooperatives should be motivated to participate in contract farming schemes as contract farming is crucial for quality management and improved competitiveness on high value markets.

(2) Rice brands for specialty rice varieties with high quality should be developed and strengthened, thereby serving as a basis to set up large specialized raw material supply areas.

(3) Young farmers and women should be attracted by promising rice-based farming models, and agri-business start-ups should be promoted in rural areas.

(4) Training in cooperative management for leaders of cooperatives, especially for young management staff, should be intensified to allow for more effective administration of cooperatives.

(5) Support of MPECs allowing them to develop further their role in high value markets based on the new trade agreements that Vietnam has signed should be continuously enlarged and significantly supported by related sectorial institutions and the government.

4 Discussion and conclusion

This study has usefully updated the current status of MD's rice VC after Vietnam had a program to restructure the rice industry. This study also has a newer approach than previous studies, which is a market segmentation approach. This helps us clearly see the advantage of the high-quality rice segment compared to the medium-quality rice segment.

The rice industry of Vietnam in general and of the MD in particular has undergone many transitions in export towards high value market segments. ST24, as an example of the specialty rice market segment creates the highest total VA as well as the highest VA allocated for each of the VC actors compared to the rice varieties of other market segments. CK92 belonging to the sticky rice segment comes up with the second highest total, but the VA attributable to farmers is not so high as expected due to high intermediate cost in production. OM5451 still has an advantage due to its rather high total VA. The last one with lowest VA is IR50404 that represents the chalky and medium quality market segment.

The rice VC has improved, but there are still many limitations, most of which are non-organized farmers, small land, little contract farming and lack of product standardization. However, there are many opportunities to penetrate more demanding and high value markets after Vietnam has signed the new generation of free trade agreements, e.g. Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTTP), EU-Vietnam Free Trade Agreement (EVFTA), UK-Vietnam Trade Agreement (UKFTA), etc.

One point that should be emphasized is that Vietnam will continue to be a major rice exporter in the world due to its oversupply as well as its competitive advantage. Vietnam still has a lot of potential to increase the value of the rice industry in the coming time, assuming the measures to improve this sector are effective. The policy implications of the research are to promote contract farming and standardized production to ensure the increasing quality requirements of the international market. It should be continued to restructure rice production more towards export of in the specialty and high-quality segments.

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