



One million hectares low-carbon rice programme – Opportunities and challenges

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Rice sector plays a crucial role in stabilization of society and contributes into the Vietnam economic development, particularly, the rice production in Mekong Delta contributed 50% of total output as well as up to 90% of the country's rice export. However, besides the glory of the rice sector, the rice farmers are gaining the lowest income in the agricultural sector and the rice sector is contributing the largest greenhouse gas emission (approximately 50% of the agricultural carbon emission). Many limitations have been reducing the rice sector development. To create the new dynamic forces towards a rice sector of efficiency, sustainability and low emission, Prime Minister approved the Programme “Sustainable development of one million ha of high-quality and low-carbon rice together with green growth in Mekong Delta up to 2030”. The implementation of this Programme will create the opportunities to enhance the income of rice value chain's stakeholders as well as the reputation of Vietnam rice in the world market through the environment responsibility of rice production. However, the identification of suitable investment measures is the key for the Programme's success in order to ensure both economic and environmental purposes.

1. CURRENT SITUATION OF VIETNAM RICE SECTOR

Rice sector greatly contributes to the economic development and social stabilization of Vietnam. In recent years, Vietnam has produced 43 – 45 million tons grain, equivalent to 26 - 28 million tons rice annually. Vietnam rice export is among the leading exporters, at 5 – 7 million tons annually with the value of over 2 billion USD (Statistic data from 2016 – 2022).

Mekong Delta is the rice basket of Vietnam with the natural area of 4.092 million ha, of which 2.575 million ha for agricultural production, at about 62.9% of total land area. The rice output has been stabilized at 24-25 million tons, accounted for 50% and 90% of the country's rice production and export volume respectively.

Apart from the achievements, the rice sector still remained limitations which need to be overcome to ensure the future efficient and sustainable production. Some limitations have been identified as follow: (i) Rice farmers' income is rather low; (ii) Cultivation practices are not sustainable – using too much chemical fertilizers, pesticides and water, which lead to high production costs; (iii) Post harvest's losses are at high level; (iv) Rice quality is not homogeneous; (v) Rice production is small and scattered, the linkage between rice farmers

and cooperatives/enterprises is rather loose; (vi) High level of carbon emission.

The Minister of Agriculture and Rural Development Le Minh Hoan (2023) said that the income of rice farmers is the lowest in the agricultural sector. The Mekong Delta's farmers cultivated 2 – 3 rice crops per year with the yields of 5 – 7 tons per ha per crop. The rice grain was sold at 6,000 – 8,000 VND per kg. The rice farmers with land and without land normally gained income of 40% and 20-30% of selling price respectively. If a farmer household in Mekong Delta owned 1.24 ha (Statistics 2000), the household would gain the income of 40 – 60 million VND per year from cultivation of 3 crops. This income is hardly enough for living costs of a family of 4 persons. Therefore, if rice price and rice yields fall, the rice farmers in Mekong Delta easily get in debts and poverty.

The rice production costs are high due to over-using of inputs such as seeds, chemical fertilizers and pesticides. According to statistical data 2022, although Mekong Delta's farmers have reduced considerably the seeds for 10 years, the seed amounts are currently still at 100 – 150 kg per ha. The over use of seeds, chemical fertilizers and pesticides has not only increased the production costs but also polluted the environment. The postharvest loss was recorded at 10%, higher than that of 4.2% in Thailand (Dao The Anh, 2018).

The inhomogeneous quality is the important weakness of Vietnam rice in the world market. Some reasons were identified such as low seed quality, poor postharvest technology, etc. Although the number of farmers using certified seeds increased quickly up to 75% for the last 10 years, the certified seed quality was also not consistent due to limited market quality control. Rice drying and storage are also weaker in comparison with the regional rice exporting countries. The small and scatter rice areas are also one of the reasons for the inhomogeneous quality of Vietnam rice.

The number of rice farmers is large but



the scope of rice production is small, which leads to the poor linkage between farmers and enterprises due to the rice enterprises have to deal with many farmer households. This is the reason for high management costs and reduction of profits for the stakeholders in the rice value chain. There are many cooperatives established to link many small rice farmers to facilitate the larger production areas, which helps reducing management costs for the rice enterprises. However, the cooperatives' management qualification is still below the requirements.

Rice production is one of largest carbon emission in agriculture, approximately 50.31% the total emission (equivalent to 50 million tons of CO₂e annually) and 75% methane (CH₄) emission (BUR3, 2020). The rice field is permanently flooded leading to the organic matter is decomposed in the anaerobic condition to produce methane. Apart from that, overuse of nitrogen fertilizer also emitted more N₂O. For the climate change, 1 kg CH₄ is equal to 28 kg CO₂ and 1 kg N₂O equal to 256 kg CO₂ (IPCC, 2014). Beside that, the postharvest losses also imposed negative impact to climate change, accounting for more than 10% of the total emission in rice production cycle.

In conclusion, the Vietnam rice sector has gained many prominent achievements recently and has greatly contributed into the social stabilization and economic development. However, in the new situation of agriculture restructuring, rice sector has been coping with the limitations which need to be overcome in order to create the

new dynamics for the sustainable development. The Programme “Sustainable development of one million ha of high-quality and low-carbon rice together with green growth in Mekong Delta up to 2030” has been approved by the Prime Minister at the Decision 1490/QĐ-TTg dated 27 November 2023 to develop the Vietnam rice sector of high quality, sustainability and environmental friendliness.

2. CARBON REDUCTION AND GREEN GROWTH IN RICE SECTOR

The Programme's overall objective is to establish one million ha of high quality and low carbon rice through the re-organization of rice value chain system, application of sustainable cultural practices towards increasing value added, sustainable rice sector with enhanced production efficiency and rice farmer income, environmental protection, climate change adaptation, green house gas reduction and contributing into the Vietnam's commitments (NDC).

The Programme's specific objective is to achieve one million ha of high quality and low carbon rice in 2030, of which, the seeding reduced to below 70 kg per ha, the uses of chemical fertilizers and pesticides reduced by 30%, the water use reduced by 20%, 100% rice area applied at least one sustainable cultural practice such as 1M5R, SRP, AWD, etc. which is certified with cropping area codes. The production organization will be: (i) 100% rice areas of high quality and low carbon rice are linked with enterprises, cooperatives or farmer organizations for rice production and consumption; (ii) 70% rice areas applied synchronous mechanical machines; (iii) More than 1 million households apply sustainable cultural practice. In the aspect of environment protection and green growth: (i) Postharvest loss ratio is below 8%; (ii) 100% straw in the Programme's rice areas is removed from the field and recycled; (iii) Carbon emission is reduced by at least 10% in comparison with the

traditional practice. The added value increased by 40%, in which, the rice farmers' profit increased by 50%. The amount of exported high quality and low carbon rice accounts for at least 20% of the total rice export in the Programme's area.

The Programme will create the opportunity for Vietnam to develop a sustainable and environmental friendly rice sector as well as to enhance the rice farmers' income



▲ Sustainable development of one million ha of high-quality and low-carbon rice together with green growth in Mekong Delta up to 2030



and Vietnam rice added value. The total fund for the Programme is estimated at 650 million USD in 2 periods: (i) Period 1 needs 60 million USD to consolidate the 180,000 ha invested by VnSAT project; (ii) Period 2 needs 590 million USD to establish 820,000 ha of high quality and low carbon rice area.

One of the key factors for the Programme's success is the ability to enhance farmer income and enterprise profit in the rice value chain. To achieve this objective, the Programme's activities will focus on reduction of production costs and enhancing the added value of the market rice products.

The reduction of rice seeds down to below 70 kg per ha will help saving seeding costs for farmers. However, the seed quality and the quality control system must be enhanced in comparison with the current situation. The use of higher quality seeds with equal or lower costs is also a challenge for the current rice seed supply system. Apart from that, the reduction of 30% chemical fertilizers and pesticides is also a big challenge in terms of costs. Although the uses of chemical fertilizers and pesticides have been reduced considerably recently but it is undeniable that the costs for using organic fertilizers and pesticides are still very expensive for rice farmers.

The reorganization of farmers into the cooperatives will reduce greatly the costs of production inputs due to farmers could purchase wholesale agricultural inputs at lower prices. Furthermore, the participation into the cooperatives will facilitate farmers together investing the production and postharvest equipment by the more economical and efficient ways. The calculation of the Department of Crop Production (DoP) showed that the farmers participating into large field programme could reduce the production costs by 10–15% and increase output value by 20–25%.

One crucial target of the Programme is to reduce the carbon emission and support green growth in agricultural sector. The measure of 1M5R is applied including: Must use certified seeds, reduce seeds, fertilizers, pesticides, water and postharvest loss, which can all help reducing environmental pollution and carbon emission. However, the largest carbon emission in rice production is produced during the rice field flooded throughout the cropping season. Therefore, the practice of Alternative Wet and Dry (AWD) is the major measure for carbon emission reduction in rice. The AWD measure can only be applied in large rice fields with the modern irrigation systems to facilitate the flexible watering and drainage. The rice farmers in Mekong Delta could not have enough funds to invest into such modern irrigation systems, except with the supports from Government and Enterprises. On the other hand, the application of AWD does not help increasing significantly the rice yield or quality in comparison with the traditional practice. Therefore, the investment into the modern irrigation systems just for the carbon emission reduction is rather difficult for the rice

enterprises with limited finance capacity. Therefore, the investment into modern irrigation systems for AWD application of one million ha in Mekong Delta must depend on the supports of Government and international organizations.

The collection of straw for cattle feeding and mushroom growing, etc. is popular in Mekong Delta, which brings the additional income for rice farmers. However, the collection and treatment of rice stubble is rather difficult due to the stubble's low value and high collection costs. There are many technologies introduced to farmers for treatment of rice stubble in the field but the current application is still very limited.

Currently, there is a trend of using low carbon and environmental friendly products, which is creating the market advantages and value added for the certified low carbon products. Some countries are even considering the carbon taxes imposed into imported products. Therefore, the investment into environment protection products is the unavoidable trend for many sectors including the rice sector. However, the balance between the possible benefits such as carbon revenue, value added to rice brand name, carbon tax reduction, etc. and the investment costs for low carbon rice infrastructure should be carefully calculated to ensure the comprehensively economic, social and environmental efficiencies at the investment decision time.

3. CONCLUSION

The approval of Programme "Sustainable development of one million ha of high-quality and low-carbon rice together with green growth in Mekong Delta up to 2030" is the Government's accurate policy in order to create the new dynamic for the development of a Vietnam sustainable and environmental friendly rice sector. This is a big opportunity for Vietnam agriculture to re-organize the rice sector in the new world integration period, in which, the agricultural products towards green, clean, low carbon are the unavoidable trend. However, the identification of reasonable investment measures as well as smart calculation of investment efficiency are very crucial for the Programme's success in order to meet dual purposes of environment protection and enhance profits of the rice value chain stakeholders, particularly the rice farmer income ■