**Technical report**

# VALUE CHAIN ANALYSIS AND BRAND STRATEGY DEVELOPMENT OF TAN HUNG LARGE FIELD COOPERATION GROUP'S RICE STRAW COMPOST FERTILIZER IN THOT NOT DISTRICT, CAN THO CITY


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**ACRONYMS**

| | |
|---|---|
| AH | Agricultural household |
| AMD | The project “Securing the food systems of Asian Mega-Deltas for climate and livelihood resilience” |
| CG | Cooperation group |
| DARD | Department of Agriculture and Rural Development |
| DCP | Department of Cultivation and Plant Protection |
| FD | Fertilizer distributor |
| MARD | Ministry of Agriculture and Rural Development |
| MRD/MD | Mekong river delta |
| OF | Organic fertilizer |
| OFP | Organic fertilizer product |
| RH | Rice household |
| RSCF | Rice straw compost fertilizer |
| RSCFVC | Rice straw compost fertilizer value chain |
| SC | Straw collector |
| SMH | Straw mushroom household |
| THCG | Tan Hung cooperation group |
| VA | Value-added |
| VC | Value chain |
| WP | Workpackage |

**Abstract**

The study was carried out in Thot Not and Co Do district, Can Tho city; Tam Nong and Lai Vung, Dong Thap province; Tran De and Nga Nam districts, Soc Trang province, representing 3 regions: midstream, upstream and downstream of the Mekong River in Vietnam. Through a focus group discussion with 37 oficials of the plant protection and cultivation sub-departments and stations of 3 surveyed provinces before conducting formal research to collect initial information for research design. During the formal study, the research team conducted a survey on 74 RHs, 15 SMHs, 18 AHs, 10 straw collectors/rollers, 07 members of THCG, and 09 experts in agricultural industry. To satisfy the 03 objectives of the study, the research team used the main analytical tools such as: market analysis of inputs and outputs of RSCF products; value chain analysis, problem- solution tree analysis, SWOT matrix analysis. Research results show that the source of straw materials that can be used to produce RSCF at present and in the future is still very large. In addition, to upgrade the RSCF product value chain for THCG, as well as to replicate this model in the Mekong Delta, the study proposed five strategies. One of the strategies emphasized among these 5 strategies is to develop a brand name for RSCF product. And, to implement this strategy, the research team proposed an action plan with 7 specific activities.

**Acknowledgement**

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# 1. INTRODUCTION

## 1.1. BACKGROUND

This study was implemented with the partially financial supports of the projects: i) Securing the food systems of Asian Mega-Deltas for climate and livelihood resilience (AMD), ii) GIZ-funded Promotion of rice straw innovations (PINstraw), and MKCF-funded Rice straw biocircular economy for improved biodiversity and sustainability (RiceEco).

Within the framework of this study, we focused on the following 03 project activities: i) Conduct market study and value chain analysis for developing agribusiness models; focused on rice straw mechanization service providers, ii) Support to develop branding for the business model, and iii) Conduct one multi-stakeholder workshop (DARDs of 13 provinces in MRD, mobilized by DCP) to compile and verify data on cropping systems, agrifood value chains, and business models.

## 1.2. OBJECTIVE

The overall objective of this study is to support Tan Hung Large Field Cooperation Group (hereinafter referred to as THCG) in Tan Hung ward, Thot Not district, Can Tho city to develop a business model of rice straw compost fertilizer (RSCF).

To achieve this objective, the following specific objectives are set:

i) The current situation and prospects of the input and output market of RSCF products, along with the government's policies related to the development of RSCF products is identified;

ii) A strategy to upgrade THCG’s RSCF value chain is developed; and

iii) A brand development strategy for THCG's RSCF product is suggested.

# 2. SCOPE AND METHODS OF THE STUDY

## 2.1. SCOPE

This study was carried out in 6 months, from July 2022 in 03 localities, including: Can Tho city, Dong Thap province and Soc Trang province. The reason for selecting these three provinces is because they represent 03 areas: midstream, upstream and downstream of Mekong River in Vietnam, respectively. There, we surveyed 2 districts in each province, including: Thot Not and Co Do districts in Can Tho city; Tam Nong and Lai Vung districts in Dong Thap province; and Tran De and Nga Nam districts in Soc Trang province.

Regarding the scope of the study content, we mainly focus on the RSCF value chain, where we focus on investigating the actors that provide straw mushroom residue, fresh straw rolls, THCG, fertilizer dealers/shops (hereinafter referred to as FD) and households producing rice, fruit trees, vegetables, ornamental flowers (hereinafter referred to as AH).

## 2.2. METHOD

### 2.2.1. Method of data collection

To conduct this study, we collected both primary and secondary information. In which, secondary information is collected from previously available reports (scientific studies, conferences/workshops) and Government's available policies related to the research issue. For primary information, we collected from actors participating in RSCF value chain as well as from experts in the agricultural industry[1] through face-to-face interviews, using structered questionnaires (from Annex 2.1 to 2.6) and semi-structured questionnaires prepared before (from Annex 2.7 to 2.8). The sample structure is presented in the below table.

Table 2.1. The sample structure

| Respondent | Quantity (number of person) |
|---|---|
| Rice households (RHs) | 74 |
| Straw mushroom households (SMHs) | 15 |
| Agricultural households (AHs)[2] | 18 |
| Straw collectors/rollers | 10 |
| Member of THCG | 07 |
| Experts in agricultural industry | 09 |
| Staffs of DARDs in 3 provinces (Soc Trang, Can Tho and Dong Thap)[3] | 37 |

### 2.2.2. Method of data analysis

In this study, besides using the tools of descriptive statistical analysis such as mean[4] and relative percentages[5] also used the three main analytical tools as follows: problem-solution tree analysis, value chain analyis and SWOT analysis.

#### 2.2.2.1. Problem-solution tree analysis

Problem/solution tree analysis is a tool which helps to understand complex challenges, and to find appropriate solutions by mapping out the cause and effect of each particular issue in detail.

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[1] The participants were purposively selected according to criteria such as selecting 02 districts in each province with large rice production area and straw mushroom production; ensuring that in the sample structure, there must also be rice producing households that sell straw and burn straw after harvesting, likewise, straw mushroom growers must have households that sell straw mushroom residues to agricultural households and fertilizer production facilities

[2] farmers growing rice, fruit tree, crops and ornamental flowers (hereinafter referred to as AH)

[3] Persons participating in the workshop in order to get initial information aiming to design the study. The list of participants is accompaned in Annex 2.9

[4] Mean that reflects the central tendency

[5] Relative frequency which is the frequency divided by the total number of answers

What is a problem/solution tree? A problem tree provides an overview of the known causes and effects of an identified problem. The analysis is structured so that cause and effect are laid out visually, showing linkages between different factors. Causes form the roots of the tree, the core problem is the trunk, and the consequences are the branches of the tree.

A solution tree outlines the initiatives, actions and projects which develop as logical solutions from the initial problem tree.

### 2.2.2.2. Value chain analysis

There are many different approaches to analyzing VC: commodity chain analysis, Porter (1985), global value chain, and Valuelinks VC of GTZ (2007). In this study, we applied GTZ's valuelinks VC approach.

According to GTZ (2007), the value chain is also understood as a series of businesses or operators performing functions or stages: production, processing, trading, and distributing a particular product. Thus, in the value chain, there are "stages" in the chain. The stages can be described in detail by "activities" to show each stage's work clearly. Actors in the value chain perform functions in the chain, such as suppliers of inputs production, production farmers, freight traders. In addition to actors, the value chain also has the organization's support for the value chain. The mission of the organization's support is to help grow the chain by facilitating upgrades value chain. According to this approach, the value chain analysis will focus on two main contents: financial, economic analysis, and strategic analysis of the chain. The financial and economic analysis focuses on benefits analysis and distribution of benefits among actors in the chain. Meanwhile, strategy analysis concentrates on the relationships between actors and the strategies specific to each actor in the chain. The analysis results will be the basis for influencing the chain to upgrade the value of that product chain. Therefore, this approach will be suitable for small-value agricultural products. The chain links are formed on a small scale, such as at the local or regional scale, to target development and poverty reduction. Therefore, many authors have analyzed the value chain of agricultural products according to the approach of GTZ (2007) (Doan et al., 2015; Nguyen, H. T. T. & Mai, 2017; Nguyen, N. Q., 2015; S. P. Nguyen & Le, 2013a, 2013b; Tran et al., 2012; L. T. T. Vo & Nguyen, 2011; L. T. T. Vo et al., 2015). Based on GTZ's approach, the Asian Development Bank has introduced a practical handbook for value chain analysis titled "Making Markets Work Better for the Poor-M4P) (M4P, 2008). This approach is consistent with the value chain that has a high proportion of the poor at all stages of the chain, and the goal of pro-poor growth is achieved when the chain creates more jobs and higher incomes for the poor. This approach is appreciated by researchers for its suitability for agricultural products, especially those related to the poor. Therefore, the approach of M4P (2008) is also applied by researchers in value chain analysis of agricultural products (H. T. T. Nguyen & Mai, 2017; S. P. Nguyen & Le, 2013a, 2013b; S. P. Nguyen & Nguyen, 2014; Perez & Viana, 2012; Tran et al., 2012; L. T. T. Vo & Nguyen, 2011; L. T. T. Vo et al., 2015)

The tools used for the VC analysis in this study include: description of value chain map, description of market functions of actors participating in VC, chain economic analysis, advantage and disadvantage analysis of VC, market analysis. And, to upgrade a value chain, according to this approach, there are 04 strategies, including: product development or quality strategy, cost reduction / market penetration or market development strategy, investment and/or job creation strategy (mainly for market penetration), and value redistribution strategy.

#### 2.2.2.3. SWOT analysis

Definition of SWOT analysis

A SWOT analysis is a compilation of your company's strengths, weaknesses, opportunities and threats. The primary objective of a SWOT analysis is to help organizations develop a full awareness of all the factors involved in making a business decision.

Perform a SWOT analysis before you commit to any sort of company action, whether you are exploring new initiatives, revamping internal policies, considering opportunities to pivot or altering a plan midway through its execution.

Use your SWOT analysis to discover recommendations and strategies, with a focus on leveraging strengths and opportunities to overcome weaknesses and threats.

A SWOT (strengths, weaknesses, opportunities and threats) analysis is a planning process that helps your company overcome challenges and determine what new leads to pursue.

The primary objective of a SWOT analysis is to help organizations develop a full awareness of all the factors involved in making a business decision. This method was created in the 1960s by Albert Humphrey of the Stanford Research Institute, during a study conducted to identify why corporate planning consistently failed. Since its creation, SWOT has become one of the most useful tools for business owners to start and grow their companies.

Characteristics of a SWOT analysis

A SWOT analysis focuses on the four elements of the acronym, allowing companies to identify the forces influencing a strategy, action or initiative. Knowing these positive and negative elements can help companies more effectively communicate what parts of a plan need to be recognized.

When drafting a SWOT analysis, individuals typically create a table split into four columns to list each impacting element side by side for comparison. Strengths and weaknesses won't typically match listed opportunities and threats verbatim, although they should correlate, since they are ultimately tied together.

Internal factors

Strengths (S) and weaknesses (W) refer to internal factors, which are the resources and experience readily available to you.

These are some commonly considered internal factors:

Financial resources (funding, sources of income and investment opportunities)

Physical resources (location, facilities and equipment)

Human resources (employees, volunteers and target audiences)

Access to natural resources, trademarks, patents and copyrights

Current processes (employee programs, department hierarchies and software systems)

External factors

External forces influence and affect every company, organization and individual. Whether these factors are connected directly or indirectly to an opportunity (O) or threat (T), it is important to note and document each one.

External factors are typically things you or your company do not control, such as the following:

Market trends (new products, technology advancements and shifts in audience needs)

Economic trends (local, national and international financial trends)

Funding (donations, legislature and other sources)

Demographics

Relationships with suppliers and partners

Political, environmental and economic regulations

Develop strategies by combining internal and external factors in order to generate 4 groups of strategies, including offensive, adoptive, adjust and defensive strategies. In which the offensive strategy is created by combining external advantages (opportunities) and internal advantages (strengths); the adoptive strategy is developed by combining external disadvantages (threats) and internal advantages (Strengths); the adjustment strategy is established by combining internal disadvantages (weaknesses) and external advantages (opportunities); and the defensive strategy is generated by combining internal disadvantages and external disadvantages.

## 3. MARKET ANALYSIS OF ORGANIC FERTILIZER PRODUCT IN THE MEKONG DELTA

Market of organic fertilizer product (OFP) in MD, including input and output markets, is presented in the straw supply chain map (Figure 4.1). In this analysis content, we assess opportunities and threats for OFP business model in generall, and RSCF business model in particular through analyzing input and output markets as well as policy mechanisms related to the situation of OFP production and consumption in MD.

## 3.1. INPUT MARKET

RSCF, which is one kind of OF, is processed from the main source of rice straw. According to Ministry of Agriculture and Rural Development (MARD) (2000), the amount of straw generated in the country is about 43 million tons. Meanwhile, the actual amount of straw used for various purposes[6] is only 56%. This shows that the source of straw material to use for the production of RSCF still has a huge space. In addition, this also shows that there are 02 possible reasons leading to the scarcity of this raw material, which is the increase in the amount of fresh straw used for the livestock industry and the increase in the number of RH treating straw by copper burning. However, according to experts in the agricultural industry, the level of competition for straw materials of the RSCF industry with the livestock industry is not worth worrying, at least in the short term, because of the following two reasons: i) the variety of substitutes for straw as fibrous fodder for livestock, and ii) the low growth rate of the nation's livestock industry in recent years. Particularly for the risk caused by the treatment of straw in the form of copper burning will certainly be minimized from the policies of advocacy, propaganda and economic encouragement of the state and local, plus RHs' improved environmental awareness. In other words, the amount of straw used to produce RSCF and mushrooms will tend to increase in the future.

According to the interviewed experts, the rice straw trading market in MD tends to develop well. Also, according to a report by MARD, in the winter-spring crop of 2021 in Dong Thap province, the selling price of straw is about 55,000-75,000 VND per 1,000 $m^2$, equivalent to 400 VND/kg, the price of straw next to the inter-commune road is 15,000 VND/roll, equivalent to 1,250 VND/kg. But if transported far, the selling price of straw at the establishment used for cattle raising, mushroom making, gardening... is about 25,000 VND/roll, equivalent to 2,083 VND/kg. Thus, in addition to income from rice, the RHs can also collect an average of 550,000 VND/ha of straw if sold. In addition, according to experts in the agricultural industry, once the straw market develops, it will create more motivation for the processing plants to make the most of straw to serve the industries producing value-added products from straw, including straw mushroom production and RSCF procession.

## 3.2. OUTPUT MARKET

According to many recent reports of central ministries and branches, the market demand for OFs in general, including straw, is full of potential. Specifically, according to data from the Plant Protection Department, Vietnam uses an average of over 10 million tons of industrial fertilizers annually. In 2020, the amount of industrially produced fertilizers used was 10.23 million tons (7.6 million tons of inorganic fertilizers account for over 75% of the total, and 2.63 million tons of OFs,

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[6] used as raw fodder for cows, manure for livestock, biological padding for livestock, mushroom straw, OF, root mulch for crops

respectively, accounting for 25%). In addition, there are about 17 million tons of OFs produced by farmers themselves for use from available by-products from cultivation, animal husbandry, and agricultural product processing (Department of Crop Production, 2022). These figures show that the demand for OFs in general, including RSCF in Vietnam is not small, so the RSCF industry has a lot of potential for development.

According to information from the Department of Agricultural Product Processing and Market Development (2022), the demand for OFs in Vietnam in general and in MD in particular is increasing rapidly. In order to develop Vietnam's clean agriculture by 2030, the Government advocates to increase the rational use of OFs in agricultural production to both ensure food security and improve quality. quantity of agricultural products, and at the same time gradually restore the ecosystem affected by the overuse of chemical fertilizers. The use of by-products after agricultural product processing such as rice straw, rice husk, cassava shells, cassava residues, sludge and kiln ash... to produce organic fertilizers helps to improve soil fertility and increase crop yields. This is considered a right direction in the future. Currently, the demand for OF in Vietnam is very high, about 13 million tons/year, while the production capacity of factories is very low, only about 500 thousand tons/year. On the other hand, the main source of raw materials for the production of OFs today is peat, which is declining in both quality and quantity. The current source of peat in Vietnam mainly has an organic matter content of only 12 - 15%, while the standards set by MARD for mineral and micro OFs are increasing, so the production of OFs from peat face many difficulties. To produce 13 million tons of OF containing 15 - 22% organic matter, 2 - 3 million tons of pure organic matter are needed. Therefore, if the volume of by-products generated after processing agricultural products is fully utilized to produce OFs, the domestic production of 13 million tons of OF can be achieved. From this information, it can be seen that the current supply capacity of OF factories/facilities is not enough to meet AHs' demand. Not to mention that the source of straw material can be used to create OF to replace the peat material, which tends to decrease in both quality and quantity.

## 3.3. ASSESRSCFENT OF AHs' ORGANIC FERTILIZER USING DEMAND

**For RHs**: through a survey of 74 RHs, it was found that the percentage of RHs, who have used OFs in general and RSCF in particular is very low, only 14% of households have used OFs and micro-OFs for rice are mainly industrial OFs in the form of pellets. RHs said that the reason why they have not used OFs is because: i) using OF does not give high yield, ii/ OF has a slow effect; iii) the price of OF is still relatively high, iv) it is difficult to buy in the locality because it is not popular, v) most importantly, RHs have the habit of using inorganic fertilizers, and vi) RHs have not seen any model using OFs effectively to believe and follow. Among the RHs that have been using OFs, when asked if they will continue to use OFs in the future, only 60% of the households said that they would continue to use OFs. There are two reasons leading to this situation: i) the price of OF is still relatively high, and ii) there is not enough hired labor to fertilize due to the large amount of fertilizer used. However, up to 23% of 64 RHs currently not using OFs said that they intend to use it in the future for the following reasons: i) reducing the cost of using inorganic fertilizers – which tends to increase high and continuous growth, ii) good for the land and the health of the users, and iii) mobilized and encouraged by local government and agricultural sector officials. In general, the awareness of using OFs of RHs in the study is really not high, but there are still better signs of the awareness of using OFs in the future. In other words, RHs have signs of good change in using OF, although the demand is not very high.

**For other AHs** (producing fruit trees, crops and ornamental flowers): they evaluated the effectiveness of using OFs in general and RSCF as follows: i) slow to see results on fruit trees, but found very good and fast results for crops and ornamental plants; ii) acceptable price. Besides, they also evaluated that i) the product's packaging and labels are clear and informative, although they are not very eye-catching; ii) easy to find and buy; iii) there are also a number of products for which no information on provenance and nutritional composition is available; iv) good sales service; and v) limited product promotion activities.

**For AHs using RSCF supplied by THCG in the study**: they have the following evaluations (mainly for crops and fruit trees): i) using RSCF brings high productivity; ii) Using RSCF helps to limit pests; iii) using RSCF helps crops to develop many branches and leaves that are thick and dark green; iv) using RSCF to make the soil fertile; v) acceptable price; vi) It's easy to find and buy products, but there are still no widespread promotional activities; vii) packaging, labels with all necessary information; and viii) the number of fertilizing times is less than in the case of using chemical fertilizers, so not only can the cost of fertilizers be reduced but also the time of fertilizer application is saved. In the typical case of chili growing, a member of the THCG member said that the 75-day chili crop requires 5 times of chemical fertilizer application, but after switching to using RSCF to replace chemical fertilizers, chili growers only fertilize 3 times/crop.

## 3.4. POLICY INSTITUTION

In recent years, the State of Vietnam has issued many policies to encourage agricultural students to use OFs, including RSCF, to replace the use of inorganic fertilizers, aiming to develop the circular economy and beyond the green economy. Some policies related to this are mentioned below

i) Decree No. 84/2019/ND-CP dated November 14, 2019 of the Government "Regulations on fertilizer management". According to Clause 2, Article 3 of this Decree, RSCF in the study is classified as OF. This Decree emphasizes the improvement of application and efficient use of fertilizers in general, including programs and policies to support the development of OFs. Based on the content of this Decree, in Clause 1, Article 26, DARDs are responsible for submitting to the People's Committee of the provinces on policies to support the production, trade and use of fertilizers in the area under its management.;

ii) In addition, the incentive for OFs is also reflected in the Law on Cultivation 2018 as well as Decree No. 109/2018/ND-CP of the Government on the development of organic agriculture to encourage the application of OF with many specific policies as mentioned in Articles 16 and 17, Chapter VI of this Decree. In addition, the Decree also emphasizes regulations on production, certification, labeling, logos, traceability, trading, and state inspection of organic agricultural products in the fields of cultivation, livestock, forestry and aquaculture. Subjects of application of this Decree include: enterprises, cooperatives, cooperative groups, farms, households or groups of households producing and trading organic agricultural products; organizations and individuals that have activities related to the production and trading of organic agricultural products in the territory of Vietnam.

iii) On that basis, the Plant Protection Department has advised MARD to develop plans, guidelines and policies to develop OFs from 2017. Typically, Directive 117/CT-BNN-BVTV enhances the development and use of OFs to develop OFs with the stated goal of increasing the rate and quantity of OFPs allowed circulation increased to 25% compared to the rate of less than 10% as before; increase the number of factories and the production capacity of OFs by 1.5 times; increase the amount of OF use by 2-2.5 times.

In summary, with the policies mentioned above, there are many opportunities to increase the supply of OF, as well as opportunities to stimulate the demand for OF use by agricultural households.

## 4. ANALYSIS OF RICE STRAW COMPOST FERTILIZER VALUE CHAIN IN THE MEKONG DELTA

Straw is one of the by-products of the rice industry. According to the report of the agricultural sector, the rice production in the region is about 24 million tons of grain rice and the corresponding amount of straw is about 20 million tons. In which, the amount of straw accounts for about 60-65%, equivalent to 120-130 million tons. According to the perspective and trend of agricultural development in the world in general and Vietnam in particular, has been and will be towards a circular economy, and further a green economy, this by-product will be an important resource in the orientation of developing a sustainable agriculture - integrating economic, social and environmental development. However, for many years, the utilization of this resource has not been paid enough attention by RHs to effectively use this resource. To promote the full use of this resource, the International Rice Institute (IRRI) and a group of experts from Tien Giang University, Ho Chi Minh City University of Agriculture and Forestry, with the support of the DARDs of Can Tho city, Dong Thap province and Soc Trang province has implemented a model of RSCF production for a group of farmers in Tan Hung Ward, Thot Not District, Can Tho City, and according to the plan. In the coming years, this model will be replicated in some other provinces in MD.

In order to have a basis for effectively replicating the model with the goal of sustainable development in localities in MD, it is necessary to study the rice straw compost fertilizer value chain (RSCFVC). The expected result from the analysis of RSCFVC is a proposed strategy to upgrade the RSCFVC (presented in Section 4.5). To obtain this strategy, the first step in the analysis is a description of the VC map of RSCF (Section 4.1), followed by a description of the market function of the actors involved in the RSCFVC (Section 4.2), then the content of the chain economic analysis (Section 4.3). Also in the content of developing a chain upgrade strategy, another fundamental content is to identify and analyze the difficulties and advantages (internal and external) of the actors participating in the chain (Section 4.4). in the process of business development and branding for products.

## 4.1. DESCRIPTION OF RSCF VALUE CHAIN MAP

VC map is an indispensable tool in VC analysis of a product/chain in general. The VC map depicts the path of the product – namely the distribution channels from the use of inputs to the consumption of the output products. There, it describes on that path, what stages the product goes through, and what actors are involved in each of those stages, with the proportion of output passing through each distribution channel. From this concept, the RSCFVC map in this study is shown in Figure 4.1.

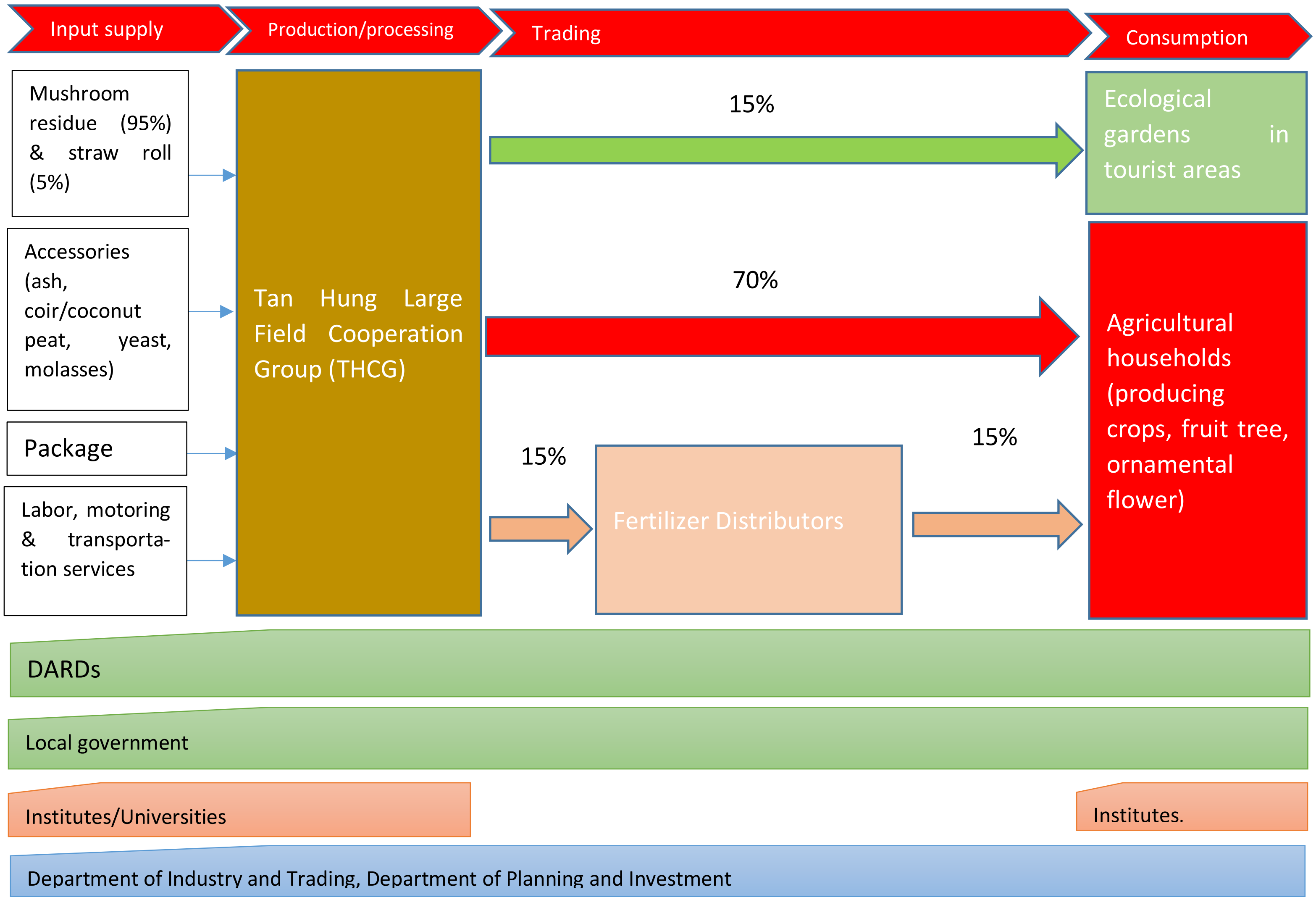



Figure 4.1. RSCFVC map in MD

Figure 4.1 indicates that because this is a new business model, the distribution channel system is still very simple, with only 03 channels, including:

- **Channel 1**: THCG ➔ AHs, occupying 70% of total RSCF quantity;

- **Channel 2**: THCG ➔ FDs ➔ HSXNN, accounting for 15% of the total; and

- **Channel 3**: THCG ➔ Ecological gardens in tourist areas, occupying 15% of the total.

In all these three channels, the intermediate costs (raw materials, accessories, packaging, family labor) are the same between the two methods of using rolled straw and straw residues; The only difference is in the additional cost (hire an outside tractor service to turn the straw) because the composting time is shorter in the case of using straw residue (40 days) than in the case of using rolled straw (60 days) (Tables 4.1 and 4.2). Also, in all three of these channels, THCG sets the selling price as the ex-factory selling price (shipping costs from THCG to the buyer will be charged to the buyer). In the end, the loss in case of using rolled straw is nearly 43 million VND/18 tons of RSCF (equivalent to nearly 2.4 million VND/ton) (Table 4.1).

Table 4.1. Financial efficiency of RSCF production (in case of using rolled straw, land scale of 400 $m^2$ with a production cycle of 60 days, not including depreciation cost, costs of family labor and management)

| No | Item | Unit | Quantity | Price unit (VND) | Total value (VND) |
|---|---|---|---|---|---|
| **I** | **Revenue** | **Kg** | **18,000** | **3,500** | **63,000,000** |
| **II** | **Cost** | | | | **105,260,000** |
| | Straw | Roll | 2,600 | 25,000 | 65,000,000 |
| | Coco peat and coir | Bag | 200 | 35,000 | 7,000,000 |
| | Cow dung | Bag | 200 | 35,000 | 7,000,000 |
| | Tro | Bag | 57 | 20,000 | 1,140,000 |
| | Probiotics (20 liter/bin) | Bin | 1 | 1,000,000 | 1,000,000 |
| | Molasses (20 liter/bin) | Bin | 1 | 450,000 | 450,000 |
| | Package and sewing | Bag | 900 | 4,300 | 3,870,000 |
| | Tractor rental | Hour | 6 | 500,000 | 3,000,000 |
| | Rent labor | Man-day | 56 | 300,000 | 16,800,000 |
| **III** | **Profit** | | | | **(42,260,000)** |

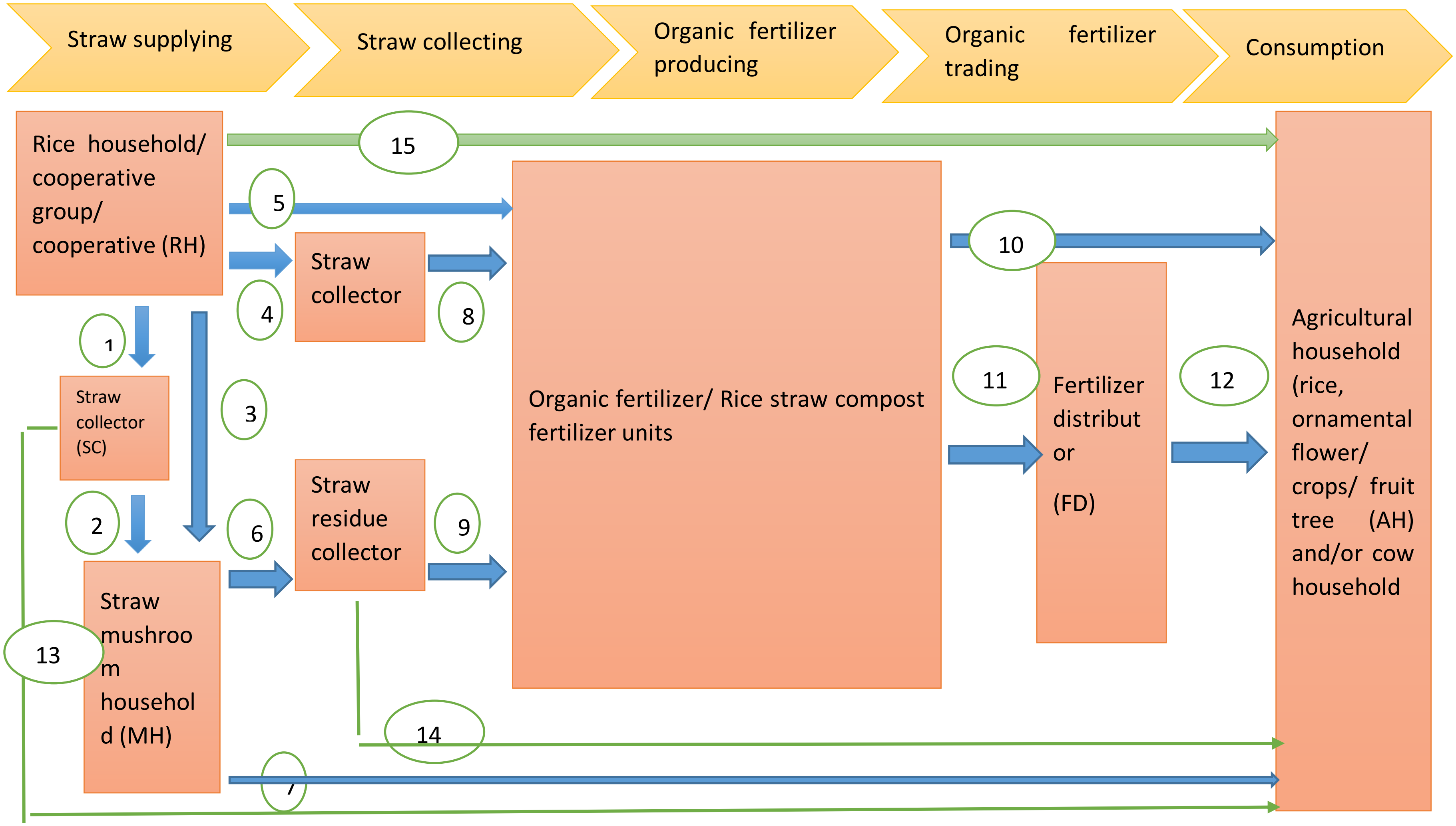
In all these three channels, the supply of rolled straw and straw residue is mainly supplied from SCs and SMHs within Thot Not district. According to THCG, straw residue is currently the main source of input materials for THCG, because using this material can cut input costs compared to using rolled straw (According to THCG, to produce 1 ton of RSCF, the unit must use about 145 straw rolls at a cost of 25,000 VND/roll; Meanwhile, if using straw residue, the amount of straw used is equivalent to 111 straw rolls, with a unit price of 5,000 VND/roll). In this case, the profit on 18 tons of RSCF is nearly 14 million VND (Equivalent to 763 thousand VND/ton) (Table 4.2).

Table 4.2. Financial efficiency of RSCF production (in case of using straw residue, land scale of 400 $m^2$ with a production cycle of 40 days, not including depreciation cost, costs of family labor and management)

| No | Item | Unit | Quantity | Price unit (VND) | Total value (VND) |
|---|---|---|---|---|---|
| **I** | **Revenue** | **Kg** | **18,000** | **3,500** | **63,000,000** |
| **II** | **Cost** | | | | **49,260,000** |
| | Straw | Roll | 2,000 | 5,000 | 10,000,000 |
| | Coco peat and coir | Bag | 200 | 35,000 | 7,000,000 |
| | Cow dung | Bag | 200 | 35,000 | 7,000,000 |
| | Tro | Bag | 57 | 20,000 | 1,140,000 |
| | Probiotics (20 liter/bin) | Bin | 1 | 1,000,000 | 1,000,000 |
| | Molasses (20 liter/bin) | Bin | 1 | 450,000 | 450,000 |
| | Package and sewing | Bag | 900 | 4,300 | 3,870,000 |
| | Tractor rental | Hour | 4 | 500,000 | 2,000,000 |
| | Rent labor | Man-day | 56 | 300,000 | 16,800,000 |
| **III** | **Profit** | | | | **13,740,000** |

From the accounting results in Tables 4.1 and 4.2, it can be seen that cutting production costs becomes essential for the sustainable development of this business model, through increasing mechanization and production of RSCF in the form of pellets to save labor costs, as well as to increase AHs' convenience. According to THCG, in the first time, the unit used rolled straw, but later, because it was not cost effective, the unit temporarily did not use this source, instead, only used straw residue.

Through the survey, it was found that the THCG mainly sells RSCF to local agricultural producers because the supply is limited. The unit have only interacted and sold one eco-garden point (Institutional customer) in Binh Thuy district, Ninh Kieu district, Can Tho city. In addition, THCG also distributes indirectly to AHs through fertilizer distributors also located in the locality. According to THCG, in the future, when production becomes stable and supply increases, the unit will expand the market to more institutional customers, as well as open a direct distribution store located in the area.




*Notes: Gree line: straw does not enter the straw manue value chain. On the contrary; blue line enters the RSCF value chain*

Figure 4.2 Straw supply chain map in MD

The survey results also show that, besides THCG participating in this value chain, there are also fertilizer (including chemical and organic fertilizers) distributors (FDs) participating in the trading stage. Currently, THCG distributes RSCF to 02 distributors located in the district. According to THCG, the reason why only 02 distributors have been selected in the distribution channel is because THCG's supply capacity is still limited, and because the company's products have just entered the product introduction stage. Thus, THCG’s main goal is to only focus on promoting products through the media. In addition, in the consumption stage, THCG has also used a direct distribution channel to small AHs in the district (crops, fruit trees, rice, ornamental flowers), ecological gardens in Binh Thuy district, Can Tho city, and has a potential customer (with interaction) who is a fruit tree production cooperative in Vinh Long city, Vinh Long province.

The VC map in Figure 4.2 also shows that the Sub-Department of Cultivation & Plant Protection in the provinces in the study area is the unit that supports/promotes the chain regularly and has the widest support coverage for the actors involved in the chain. the Sub-Department of Cultivation & Plant Protection mainly support the chain in the technical stage of rice and mushroom production for RHs and SMHs. Next is the local government, mainly providing legal support to THCGs and FDs, as well as mobilizing and propagating RHs, SMHs and AHs to participate in the model. In addition, although not very often, institutes and universities are also the ones that support/promote chain actors. Specifically, Can Tho university supports RHs, SMHs and AHs through technical training courses on rice cultivation, ornamental plants, fruit trees and crops, as well as consulting on market research and developing branding strategy for THCG; technology transfer of mushroom production; Tien Giang University, Nong Lam University, Ho Chi Minh City and IRRI Rice Institute support THCG in transferring RSCF processing technology, building product brand and business plan for THCG. Finally, other departments such as the Department of Planning and Investment, the Department of Industry and Trade and the Department of Science and Technology are also supporting/facilitating agencies for THCGs, FDs and AHs in business registration and promotion. In addition, these departments also help the above actors to access scientific and technical advances in the operation process.

## 4.2. MARKET FUNCTION OF ACTORS PARTICIPATING IN RICE STRAW COMPOST VALUE CHAIN

From the description of the RSCF value chian map in Section 4.1 above, it can be seen that there are six main actors involved in the RSCFVC in MD, including: RHs, SCs, SMHs, THCG, FDs, and AHs.

### 4.2.1. Rice households (RHs)

The surveyed RHs have an average number of plots/household of nearly 02 plots. The average area per household is 1.63 ha. The smallest plot is 0.13 hectares and the largest is 6.5 hectares. This data shows that the characteristics of rice production in the study area are still fragmented, making it difficult for mechanization in the collection of straw materials. The survey results also show that the average number of rice crops in a year is 2.5 crops, mainly focusing on the winter-spring rice crop (accounting for 100% of the surveyed households). This situation of rice production shows an abundant supply of straw materials for the production of RSCF and mushrooms.

The average rice yield/ha/year in the region is 68.3 quintals/ha. Thus, the average amount of rice straw harvested/ha is around 7 tons, equivalent to nearly 5 tons of straw/ha. The average selling price of rice/kg in the year is 5.9 thousand VND. So the average income/ha from commercial rice is 40.27 million VND. Thus, if the straw material is used to process RSCF, the RHs will have an additional income of nearly 400 thousand VND/ha if sold to SCs, and 530 thousand VND/ha if sold to THCG. Both of these cases generate additional VA from rice production, and thus create another source of income for RHs compared to the case of burning rice straw in the field. Not to mention, in the future, if Vietnam can penetrate into the market of selling carbon certificates[7], then the opportunity income of RHs will be many times higher than the current level, as well as not to mention the increased value of human life welfare, including RHs, from the perspective of social benefits.

The survey results show that only 51% of RHs use straw to sell to THCGs and or to SMHs. This, on the one hand, shows that RHs' environmental awareness and economic thinking in business of RHs in the study area are still limited. However, if viewed from a positive perspective, there is still room to contribute to RHs' increasing, as well as opportunities to increase THCG's business size in the region.

The survey results also showed that all RHs participating in RSCFVC sold straw in the form of fresh straw. The reason that RHs choose this form of sale is because it is simple and does not depend on the straw rolling service. This is also another opportunity for THCG to diversify services in operations to both increase income and take initiative in the source of fresh straw materials in order to increase the scale of RSCF in the long term.

The survey of 74 RHs showed that only 38 households (corresponding to 51% of the RHs participating in value chain) sold to THCGs and SMHs. The rest sold straw to SCs to sell to cattle raising households inside and outside the province. This presents certain challenges for THCGs due to the competition for straw with the cattle industry and the reduced supply of straw mushroom residue.

The survey results show that not all RHs participate in this RSCFVC for many different reasons such as: unable to hire straw rolling service, small rice production area, unable to find straw buyers, selling straw to cow raising households, or selling straw to SCs who buy straw to sell to cow raising households, rice straw burning aiming to both reduce cost and return nutrients to the soil, and so on… Therefore, not all RHs are the source of straw inputs for THCGs, or for SMHs and SCs. For RHs participating in value chain (being individual RHs, cooperative groups or cooperatives), after harvesting rice, they sell straw directly to THCG in 02 forms: i) RHs hires straw rolling service and then sells these straw rolls to THCG. RHs will pay these service providers based

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[7] Sales value of CO2 emissions quota

on the acreage of rice, or on the number of straw rolls, and sell them to THCG, or ii) THCG will be responsible for hiring the straw rolling service. Similarly, in the case of RHs selling fresh straw directly to SMHs, it also implements the same 02 forms as when selling to THCGs. The form of payment applied in the case of RHs selling straw to THCG, as well as to SMHs, is cash. Through the survey, the RHs also said that, in order to sell straw, there are usually brokers in the locality for the straw rolling service providers/traders. These people will act as a bridge between the straw rolling providers and the RHs, and often act on behalf of the straw rolling providers/traders to set the prices for the straw to RHs. In general, RHs are usually not the ones with market power in setting the price of straw.

#### 4.2.2. Straw collectors (SCs)

The survey results of 09 SCs who buy straw in Can Tho city, Dong Thap and Soc Trang provinces show that SCs' activities participating in the chain are quite diverse. Specifically, they buy straw from RHs through local brokers. After negotiating the price with the brokers, the brokers will lead SCs to the fields to buy. At that time, SCs will do the rolling of straw from the field themselves (if they have a straw rolling machine) or will hire straw rolling service providers to harvest the straw. Then, they will sell the straw rolls to other SCs or store them to sell to THCGs, SMHs, AHs and other cattle farmers. This straw purchasing activity was carried out by SCs eight years ago (since 2014), but has grown in popularity from 2019 up to now.

According to the survey, only about 20% of SCs use all family labor to perform this collection function (mainly in the management stage). The rest almost have to hire additional workers (at least about 60% of the total labor demand). The scale of investment capital for this activity of SCs depends on market function of each SC. Specifically, for SCs who simply perform the collection function and then immediately resell to other traders according to orders, or collect in small quantities, then resell to AHs around the village, or for traders who have available means of transport and/or warehouses (buy back and sell gradually), the average investment capital is at least about 200 million VND/trader. Particularly for SCs who have straw rolling machines, the average investment capital per SC is about 700 million VND (at least 350 million VND and up to 1.3 billion VND at most). Also from the survey results show that nearly 70% of SCs do not need to borrow capital to operate. The number of SCs who need to borrow is concentrated on those who have invested in straw rolling machines, and the loan level is in the range of 50% of the total capital need, mainly to buy the machine. For SCs with straw rolling machines, the revenue and profit achieved are focused on buying straw from the RHs, then rolling the straw and selling it to other SCs and other users (accounting for about 80%). And, revenue from providing straw rolling service accounts for about 20% of total revenue and profit.

Straw collection time depends on the material area, focusing on after the rice harvest, most often after the Winter-Spring crop (from December to April of the lunar calendar). Straw procurement is mainly through local brokers and years of acquaintance with RHs. Particularly in the activities of selling straw, it is mainly based on acquaintances and buyers, who go to SCs to order. SCs are also less active in finding customers to sell because the demand for straw in recent years tends to increase. The selling price of straw is based on the market price, but the actor having much more market power in setting the price favors the SCs who buy fresh straw and sell the rolled straw. Trading in straw (including buying fresh straw and rolled straw) between SCs and RHs, other SCs and the users of rolled straw is not through any economic contract.

The operating capacity of SCs depends on the investment scale, ranging from the lowest level of 150 ha and the highest level of 700 ha/year, or the lowest from 1 thousand staw rolls and the highest to 30,000 rolls/year (1 straw rolling machine can run 5 ha/day to get 700 straw rolls) rolls).

### 4.2.3. Straw mushroom households (SMHs)

Through a survey of 15 SMHs in 03 localities: Can Tho city, Dong Thap and Soc Trang provinces, it shows that, Most of the SMHs lease land to produce mushrooms (accounting for 90% of surveyed households). The average number of mushroom crops per year is 7-12 crops depending on the situation of the land lease. In addition, SMHs' average number of years of experience is 11 years. This result shows that the source of straw mushroom residue used to make RSCF can be supplied regularly throughout the year, so THCGs can be processed all year round.

In addition, the survey results also show that the SMHs make the most of family labor in production, but in some highly seasonal stages requiring a short time, the proportion of hired labor in the total labor demand for the production process is 80% (such as the stages of stacking and composting straw and turning manure). This shows that the pressure on the demand for hired labor is quite large. This is seen as a challenge for the SMHs, especially in the context of increasingly scarce rural labor. This challenge also leads to another challenge for THCGs because the cost of straw residue is likely to increase, and the amount of straw residue is also likely to become scarce as the advantage of straw mushroom production is increasingly reduced due to higher costs.

Straw mushrooms are produced all year round, but depending on the locality (district), the seasonal schedule will change. This information is very important for farmers to develop production plans, or to plan raw materials to avoid a broken RSCF supply chain On average, to load 1,000 $m^2$ of straw mushrooms, SMHs need 333 straw rolls. This amount of straw corresponds to 2.22 ha of rice area. Thus, if the area for growing straw mushrooms is increased to 1 ha, it will be possible to use the amount of straw corresponding to 22.2 ha of rice, and will provide THCGs with straw residue that can produce 30 tons of RSCF.

The survey results also show that the SMHs mainly buy straw rolls from the SCs/straw granaries and especially the SMHs like to order straw according to rice varieties because in their experience not all rice varieties can bring into production and high yield of straw mushrooms. It is further known that SMHs achieves an average revenue of 19.4 million VND per 1,000 m2 of mushroom growing area per crop from the sale of straw mushrooms, and 3.9 million VND from the sale of straw residues. Meanwhile, the total cost of each crop is about 12.2 million VND, so the profit is 11.1 million VND/1,000 m$^2$/crop. The SMHs also added that the straw residue can be sold to ornamental plants for about 70,000 VND/bag, while some households will sell to THCG for about 4,000 - 5,000 VND/roll.

### 4.2.4. Tan Hung Large Field Cooperation Group (THCG)

Through the interviews of THCG showed that there are two sources for THCG, including: (i) buying rolled straw from SCs (10% of total materials), and ii) buying straw residue from local SMHs (90%). The reason why THCG buys more straw residue than rolled straw is because of its low cost and shortened RSCF production cycle.

THCG also said that RSCF is produced from the following main materials: straw residue/rolled straw, cow dug, coco peat, rice husk ash, and solutions of other microbial preparation. Also from the survey results, it is recognized that the yield is difference between each batch, mainly due to incubation technique, weather (sunny/rainy), and quality of microbial products used in the mixing stage.

Currently, THCG produces 09 batches/year and provides about 150 tons of RSCF per year. THCG said that it intends to expand its scale up to 2,000 m$^2$, then the production capacity can reach 700-800 tons/year.

While waiting for the results of the analysis of the product's composition from specialized agencies with the support of the Project, THCG believes that the quality of organic RSCF is evaluated based on (sensory) factors such as: no clumping, no mildew, no bad smell. It is also known that due to the new trial production, currently, THCG has only one packaged product line (2.5 kg/bag and 20kg/bag).



Figure 4.3: RSCF (20kg/bag and 2.5kg/bag) products of THCG

Through discussions with members of THCG, it is known that the products of the first production batch have been provided to neighboring localities for trial use on key crops such as rice, fruit trees (longan, durian, custard apple). At the same time, the product is also sold indirectly through 02 local fertilizer agents. THCG also contacted to sell to 01 fruit tree cooperative in Vinh Long city, Vinh Long province. Through the survey, it is recognized that the selling price of the product at the production facility is 3,500 VND/kg.

In summary, the initial production and consumption results show a positive signal that prompts THCG to think about product development strategies (diversification of products in terms of categories and packaging) and marketing strategies to reach customers. In addition, the target customer group is quite diverse.

### 4.2.5. Fertilizer distributor (FD)

Through the interviews of FDs in the study area shows that there are many types of organic fertilizers consumed on the market today and they are divided into two main groups: (i) traditional organic fertilizers, including: manure, vermicompost, compost processed from straw and garbage, and (ii) industrial organic fertilizers, including: biological, microbiological, mineral. The most popular currently distributed by surveyed FDs are industrial organic fertilizers (treated, packaged, labeled) and supplied from domestic fertilizer manufacturers. Some illustrations of organic fertilizer products are presented in Annex 4.1, 4.2, and 4.3.

According to information from the FDs, the plants that use the traditional group of organic fertilizers include crops, ornamental flowers. Customers buying these organic fertilizer products are mainly urban households, they usually buy 5-20kg/time. Meanwhile, the industrial organic fertilizer product lines are consumed by customers who are agricultural producers and they usually buy in large quantities (100-200 kg/time of purchase). Thus, for the group of customers who are agricultural producers, the product should be packed 20-25kg/bag; For customer groups who are urban households, products should be packed less, ranging from 2 to 5, 10kg/bag.

However, at present, the organic (treated) RSCF products are hardly even distributed by the distributors, compared to other organic fertilizer product lines; This may be due to the small number of wildlife species inside and outside the MD. This is considered a positive signal for local THCG, as one of the pioneers in producing and penetrating the organic RSCF market in the MD.

In terms of business methods, FDs said that often enterprises producing agricultural products in general and organic fertilizers in particular actively contact distributors to introduce and sell products. Because the amount of organic fertilizer consumed is quite small compared to chemical fertilizer, FDs often pays the producer immediately upon receipt of the product. The pricing of the product will depend on the reputation of the fertilizer manufacturer. In case the product does not have a price listed by the manufacturer, FDs will decide the retail price. On the contrary, if the product has a listed price, the manufacturer will give the distributor a discount of 25-35% on the listed price.

### 4.2.6. Agricultural households (including fruit tree, ornamental flower, crops) (AHs)

Through a survey of 18 customers who buy organic and microbiological fertilizers at FDs in the survey area to fertilize fruit trees, ornamental flowers and vegetables, it was found that they often use organic and microbiological fertilizers with following brands: Greenta, Con Luoi, Con bo sua, and Que Lan. They also added that the average amount of organic and microbiological fertilizers they used was 309 kg/ha. Most of them buy from FDs selling fertilizers, the rest they buy from cooperatives or compost themselves for use. The average buying price is 11.7 thousand VND/kg. In addition, the survey results show that 90% of these households think thbuying fertilizer is not difficult. The payment method is the same as when buying inorganic fertilizer (usually owed by FDs until the end of the payment season), and the FDs deliver the fertilizer to AHs' places, if there is a need from buyer side.

## 4.3. CHAIN ECONOMIC ANALYSIS

Currently, RSCF is still quite new in the market, most of which are produced in small quantities. And most THCGs have incomplete technical processes. The results presented in section 2.1 show that the current RSCFVC consists of 3 main channels: 1/ THCG => AHs; 2/ THCG => FDs => AHs; and 3/ THCG => Ecological gardens in tourist areas. The interview results also show that these channels are concentrated in a limited area and have not been linked or supplied with other regions. The chain economics of the channels are shown in the following Table 4.3.1.

Table 4.3.1. Value added according to each channel (calculated per 1 ton of RSCF)

| **Channel 1 and 3** | **THCG** | | **TOTAL** |
|---|---|---|---|
| Selling price (revenue) (VND) | 3,500,000 | | |
| Immediate cost (IC) (VND) | 1,692,222 | | |
| Additional cost (AC) (VND) | 1,044,444 | | |
| Value added (VA) (VND) | 763,334 | | 763,334 |
| % VA | 100 | | 100 |
| % VA/revenue | 22 | | |
| **Channel 2** | **THCG** | **FDs** | **TOTAL** |
| Selling price (revenue) (VND) | 3,500,000 | 4,500,000 | |
| Immediate cost (IC) (VND) | 1,692,222 | 3,500,000 | |
| Additional cost (AC) (VND) | 1,044,444 | 300,000 | |
| Value added (VA) (VND) | 763,334 | 700,000 | 1,463,334 |
| % VA | 52 | 48 | 100 |
| % VA/revenue | 22 | 16 | |

Channels 1 and 3 are aimed at 2 different customers, but at the present time, the THCG still sets the same selling price for these customers, so the VA created in These 2 channels are exactly the same. In these two channels, the THCG will generate a VA of about 763,000 VND per ton of RSCF sold, achieving a revenue ratio of 22% per tonne of RSCF. According to THCG, in the short term, because the unit is penetrating the market, it should sell directly to individual and institutional customers with the goal of promoting products. However, in the long term, the unit will expand its market share in channel 2 – distributing RSCF through FDs, before reaching AHs. Meanwhile, for the direct channels, it will focus on selling RSCF to institutional customers (agricultural cooperative groups and cooperatives).

The survey results show that currently in Channel 2, THCG also has a selling price of VND 3,500,000/ton to FDs (equal to the selling price to other buyers). Thus, THCG also generates a VA of 763,000 VND per ton of RSCF. FDs then sell to individual customers at a price of VND 4,500,000, with an intermediary cost of VND 3,500,000 and additional costs of about VND 300,000 per ton of RSCF, thus generating a VA of about 700,000 VND/ton of RSCF.

The results presented in Table 2.3.1 show that the distribution of VA for THCG is 52% and for FD is 48%. It can be seen that because the RSCF value chain has just been formed, the actors involved in the chain are few and the business activities between the formal actors are still quite simple. And, the payment method is only in cash. It is expected that in the near future, to be able to operate more effectively, THCG needs to improve its operations and business mechaniRSCFs, as well as techniques and production processes to reduce production costs and expand distribution channels for better market penetration.

## 4.4. ANALYSIS OF ACTORS'S ADVANTAGES AND DISADVANTAGES IN THE RSCF VALUE CHAIN IN THE MEKONG DELTA

Through the interviews of the actors involved in the RSCFVC in can Tho city, Dong Thap and Soc Trang provinces, as well as through in-depth interviews with scientists and leaders of departments related to the RSCF industry, and local authorities in the above 3 localities, in addition, from referencing available information in scientific conferences, the research team identified a number of advantages and disadvantages (internal and external) to the development of RSCFVC in MD. These will be described in Sections 4.4.1 to 4.4.4.

### 4.4.1. Internal advantage (Strength, denoted by S)

($S_1$): In the long term, RSCF helps to improve the nutrition of arable land, as well as contribute to reducing production costs, increasing yield per hectare, reducing disease, and thus increasing profits for production households cultivating crops in general;

($S_2$): Cultivation of rice and straw mushroom has been a traditional occupation in many localities in the study area;

($S_3$): The system of FDs is dense in the localities, so it is very convenient in the stage of product distribution;

($S_4$): THCG members have consensus and enthusiaRSCF in starting a business, as well as experience in the field of agricultural production;

($S_5$): THCG members have good relationships with RHs, SMHs, FDs and AHs in the region as well as input suppliers;

($S_6$): THCG is close to the rice and mushroom production area.

### 4.4.2. External advantage (Opportunity, denoted by O)

($O_1$): THCG has received support from the Project "Ensuring Food Systems of the Asian Deltas for Livelihood and Climate Restoration" by IRRI Rice Institute in terms of technology transfer, sample analysis, and machinery and equipment support, designation of label packaging;

($O_2$): Actors participating in the chain receive support from local authorities, relevant departments in production and business activities (rice, mushroom, organic fertilizer, organic fertilizer business);

($O_3$): Vietnam is likely to benefit from participating in the market for selling carbon certificates;

($O_4$): THCG has access to the National Target Program, specifically the State OCOP product development program;

($O_5$): Prices of inorganic fertilizers tend to increase continuously;

($O_6$): The economic development trend towards circular economy and green economy worldwide in general, and in Vietnam as well as in MD in particular is being developed more and more deeply, creating opportunities for the cctors participating in RSCFVC having access to many supporting policies from international and domestic organizations;

($O_7$): There are many policies to support technical, financial, and physical facilities of the central and local governments for RHs, SMHs, agricultural mechanization service providers, and facilitate the increase in raw input materials for RSCF;

($O_8$): There are many institutes and universities operating in MD, IRRI, and non-governmental organizations that have been and will have programs to support technical, business knowledge and production organization for RHs, SMHs, THCG, and AHs;

($O_9$): The free trade agreement between Vietnam and countries with an increase in importing Vietnamese agricultural products such as EVFTA, CPTPP, etc will create opportunities for Vietnam's agricultural exports, but with stricter production standards, including limiting the use of inorganic fertilizers, and instead increasing the use of organic fertilizers, this is also an opportunity for RSCFVC to grow in the future;

### 4.4.3. Internal disadvantage (Weakness - W)

($W_1$): THCG is limited in product development capacity (RSCF processing technique, design of labels, packaging, branding, product diversification, e-commerce application);

($W_2$): RHs' environmental protection awareness is still limited because a large number of RHs still treat rice straw in the way of burning, thus limiting the source of straw material for THCGs;

($W_3$): Habits and practices of using organic fertilizers of AHs are still limited;

($W_4$): THCG in the study does not have a strong brand name and THCG's business management and market access capabilities are limited;

($W_5$): THCG's facilities for production and consumption of RSCF are limited;

($W_6$): Due to THCG's small production scale of THCG, the RSCF supply is limited, leading to an unexpanded distribution channel, and therefore limited market share and revenue;

($W_7$): THCG still operates in the form of a community group, has not yet developed into a cooperative group or cooperative, so it will be limited in accessing state and local support policies, as well as in the future when expanding its scale. production, the unit will face difficulties in selling products to institutional customers.

### 4.4.4. External disadvantage (Threat - T)

($T_1$): In the market, there are currently many organic fertilizer brands introduced and distributed at distributors, so it will more or less create a challenge in entering the market for THCG;

($T_2$): The State's agricultural restructuring program in the direction of reducing inefficient rice production areas to other crops and livestock will reduce the supply of straw materials in the RSCFVC;

($T_3$): The war between Russia and Ukraine will increase the cost of fuel and transportation, thereby increasing the cost of products, and thus affecting the competitiveness of products, as well as the purchasing power of AHs;

($T_4$): The Covid-19 epidemic has not shown signs of a complete end and there are many complicated developments, so it is still possible that all agricultural sectors in general, and the organic fertilizer production industry in particular will not avoid the risk of supply chain disruption in the future. Therefore, this is considered a potential challenge for RSCFVC;

($T_5$): RSCFVC is likely to be competed for fresh straw raw materials with the cattle industry; and

($T_6$): The effects of climate change (erratic weather, saline intrusion, prolonged drought, etc.) will definitely decrease rice yield, and thus reduce the input of straw material in the RSCFVC.

## 4.5. PROPOSED STRATEGIES FOR UPGRADE RSCF VALUE CHAIN

Based on 06 strengths (S), 07 weaknesses (W), 09 opportunities (O), and 06 threats (T) identified in Section 2.4, through the use of the SWOT matrix analysis tool, the consulting group proposes the following five strategies to upgrade the RSCFVC in the study area (Appendix 4.5.1).

i) Develop a brand development strategy for THCG's THCG

Theoretically, this is a product improvement/innovation strategy where the focus is on improving specific characteristics of the product – product branding. This strategy is proposed based on taking advantage of opportunities such as: the support of IRRI on technology transfer of RSCF processing, design and initial investment in labels and product packaging, machinery and equipment ($O_1$); the support of local authorities and relevant departments in production techniques, production organization ($O_2$); National Target Program – One Commune One Product program ($O_4$); development trend of circular economy and green economy in the world and in the country ($O_6$); technical support and business and market knowledge of Institutes and Universities ($O_8$); and increasing trend of economic integration ($O_9$) in order to overcome the limitations of product development capacity ($W_1$), THCG's business management capacity and its brand of RSCF is still weak due to its new entry into the market ($W_4$). This strategy which belongs to adjustment stratey group, is proposed aiming to the following three objectives: Building trust from customers; creating competitive advantages in the market; and improving THCG's sales.

ii) Promote investment in product promotion activities

This strategy belongs to the group of defensive strategies. In theory of value chain upgrading, this is an investment strategy. This strategy is proposed to both overcome the following weaknesses of the actors involved in RSCFVC: RHs treat rice straw by burning ($W_2$); RHs' habits of using organic fertilizers in general and RSCFs in particular are not popular ($W_3$); THCG's THCG brand is still weak because it has just entered the market ($W_4$); THCG has not yet formed a cooperative group or cooperative ($W_7$) , and to limit the consequences of competition from competing brands of organic products currently being distributed in the market ($T_1$). The goal of this strategy is to make it easier for AHs to identify THCG's product brands, and thus contribute to enhancing THCG's product brand, especially in the context that THCG's product is new one entering the market.

iii) Invest to improve THCG's production, business and market capacity

Similar to Strategy (ii) above, this is another investment strategy to upgrade RSCFVC. However, the goal of this strategy is mainly to improve production and business efficiency and the quality of THCG's human resources. Therefore, if the Strategy "Promoting investment in product promotion activities" is based on the combination of weaknesses and challenges of actors participating in the VC, which is defensive, this strategy is based on taking advantage of opportunities such as: the support of IRRI ($O_1$), Local Government and relevant Departments ($O_2$), prospects to participate in the carbon certificate market ($O_3$), continuously increasing inorganic fertilizer prices ($O_5$), many supportive policies in technology, finance, facilities for RHs, SMHs, straw rolling service suppliers ($O_7$), and the support of Institutes and Universities ($O_8$) in order to overcome weaknesses of RSCFVC, such as: THCG's weak product development capacity ($W_1$), THCG's limited facilities ($W_5$), THCG's small production scale ($W_6$), plus THCG has not yet formed cooperatives/cooperatives to have more opportunities to access state support policies ($W_7$), and THCG's limited business management ($W_4$). This strategy belongs to adjustment strategy group.

iv) Build vertical linkages between THCG and fertilizer distributors and agricultural househols (including individual and institutional customers) inside and outside the locality

Theoretically, improving the distribution channel is one of the four strategies to upgrade VC. This strategy is one of the contents of this strategy – Vertical linking in VC. This is an ofensive strategy, as it takes advantage of the available strengths of the chain such as: The system of fertilizer distributors in the area is dense ($S_3$), members of THCG have a high consensus and enthusiaRSCF in starting a business ($S_4$), THCG has a good relationship with FDs and AHs in the area ($S_5$), to take advantage take advantage of opportunities such as: support from IRRI ($O_1$), Government and relevant local departments ($O_2$), having access to National Target Program – OCOP Program ($O_4$), development trend of circular economy and green economy ($O_6$), the support of Institutes and Universities in the Mekong Delta region ($O_8$), and increased international economic integration ($O_9$). The goal of this strategy is to improve competitiveness, expand distribution channels, and thus help THCG improve efficiency in production and trading of THCG.

v) Cut production costs through expanding vertical linkages with suppliers of input materials (RHs, SMHs, coco peat, cow dung)

Cutting production costs, in theory of VC, is one of 04 strategies to upgrade the VC that are adaptive/coping in the short term as well as in the long term to changes from the external business environment that any producer generally is uncontrollable. In other words, this strategy aims at avoiding risks through adaptating/countering activities to external challenges, so it can be considered an adaptive strategy. This strategy is proposed based on taking advantage of the available strengths of the chain such as: rice and mushroom production are traditional occupations in the region, so the amount of input materials (fresh straw and straw residue) is not a great pressure on the RSCF industry ($S_2$) and RSCF processing location is located close to the raw material area, so the transportation cost of raw materials is less expensive ($S_6$), the members of THCG have a high consensus and enthusiaRSCF in starting a business ($S_4$), as well as having a good relationship with the RHs, SMHs, the suppliers of coco peat, cow dung ($S_5$) in order to overcome the consequences derived from all six threats as mentioned in Section 4.4.4, including: competition with many organic fertilizer brands introduced and distributed at distributors ($T_1$), decreased straw supply due to State's agricultural restructuring program ($T_2$), increased production costs and AH's decreased purchasing power due to the war between Russia and Ukraine ($T_3$), will increase the cost of fuel and transportation, thereby increasing the cost of products, and thus affecting the competitiveness of products, as well as the purchasing power of AHs; straw supply chain disruption in the future due to the prolongation of the Covid-19 epidemic ($T_4$) competition in straw material source with the cattle industry ($T_5$), and the decreased straw supply due to the effects of climate change ($T_6$). In summary, the goal of this strategy is to increase competitive capacity for THCG in the case study.

In summary, the above 05 strategies are proposed based on the analysis and combination of strengths, weaknesses, opportunities and challenges of the actors involved in RSCFVC. These strategies, if implemented, will contribute to improving VA, and therefore profit (net VA) for the entire chain. Within the framework of this study, the consulting team will continue to deepen the implementation of Strategy (i) "Develop a brand development strategy for THCG's RSCF product"

## 5. STRATEGY FOR BRANDING DEVELOPMENT OF TAN HUNG LARGE FIELD COOPERATION GROUP'S RICE STRAW COMPOST FERTILIZER

### 5.1. BRAND POSITIONING FOR TAN HUNG LARGE FIELD COOPERATION GROUP'S RICE STRAW COMPOST FERTILIZER

According to many researchers and business men, in fact, there are 9 brand positioning methods which include: (i) positioning based on quality; (ii) positioning based on value; (iii) positioning based on features; (iv) positioning based relationships; (v) positioning based on desire; (vi) positioning based on problem/solution; (vii) positioning based on opponents; (viii) positioning based on emotion; and (ix) positioning based on product's usage.

Because THCG's target customers in the study are agricultural producers (cultivation of rice, crops, ornamental flowers, fruit trees) who all have a need to use RSCF to improve soil nutrition for improving crop productivity, product quality and cutting production costs in a sustainable way, as well as for responding to market consumption trends, in the context of awareness and practice of using organic fertilizers in general is still limited, the method of brand positioning selected for THCG's products in the study is the ix$^{th}$ method – Brand positioning based on the product's usage.

In this positioning way, THCG will focus on introducing and promoting products along with expanding production scale to cut production unit price of RSCF. To pursue the proposed brand positioning strategy, THCG needs to focus on implementing the following key issues:

- Diversify specialized product lines related to crop group or growth stage. This product diversification is based on the production technology that THCG has been transferred;
- Promote products through events (display products at fairs and exhibitions; organize seminars and conferences);
- In addition, CG will focus on building vertical linkages with key actors in product market segments to promote brand resonance and spread faster.

### 5.2. DETERMINATION OF DIFFICULTIES IN BRAND DEVELOPMENT OF TAN HUNG LARGE FIELD COOPERATION GROUP'S RICE STRAW COMPOST FERTILIZER

Through the survey of CG, the following dificulties were determined (Figure 5.1):

- The capacity of CG’s members on development of brand and label name for CG is still limited;
- Products have not been widely consumed in the market, currently mainly supplied to neighboring localities to perform demonstration models;
- The competition in terms of types and prices for organic fertilizers in general, and RSCFs in particular is quite high, mainly in the product lines of enterprises in Ho Chi Minh City and some northern provinces;
- Due to the limited initial production scale, the distribution of branding development costs on products will be quite high.

In the long term, THCG’s current model and will become a business in the future is necessarily interested in brand development if it is not expected to develop business activities, especially market expansion. In fact, an enterprise that has not built and developed a brand name inevitably leads to difficulties in product consumption in the market, specifically as follows:

(1) Customers will not or hardly recognize the presence of CG's brand and products in the market. Moreover, the product has no brand and is not invested in packaging and label design, which also leads to a lack of recognition and trust from customers;

(2) THT will not have market capacity in the process of negotiating with partners in the vertical link of the RSCF value chain. This causes THCG to accept unfavorable market conditions;

(3) Unbranded products will find it difficult to proactively set product prices as well as establish independent distribution channels. At that time, THCG's products will be priced by distributors (wholesalers and retailers) themselves. This leads to THCG's product price may be higher than the price of similar products in the market and as a result, sales are difficult;

(4) In the era of information technology application in Agricultural material FDs not only use traditional distribution channels through agents (agents, agricultural material shops), but also use media. online (such as website, fanpage, social networks) to carry out promotional and trade promotion activities. Therefore, to be able to exploit this popular advertising and trade promotion method, THCG must build a brand strategy and develop product lines to get information and data sources for communication.

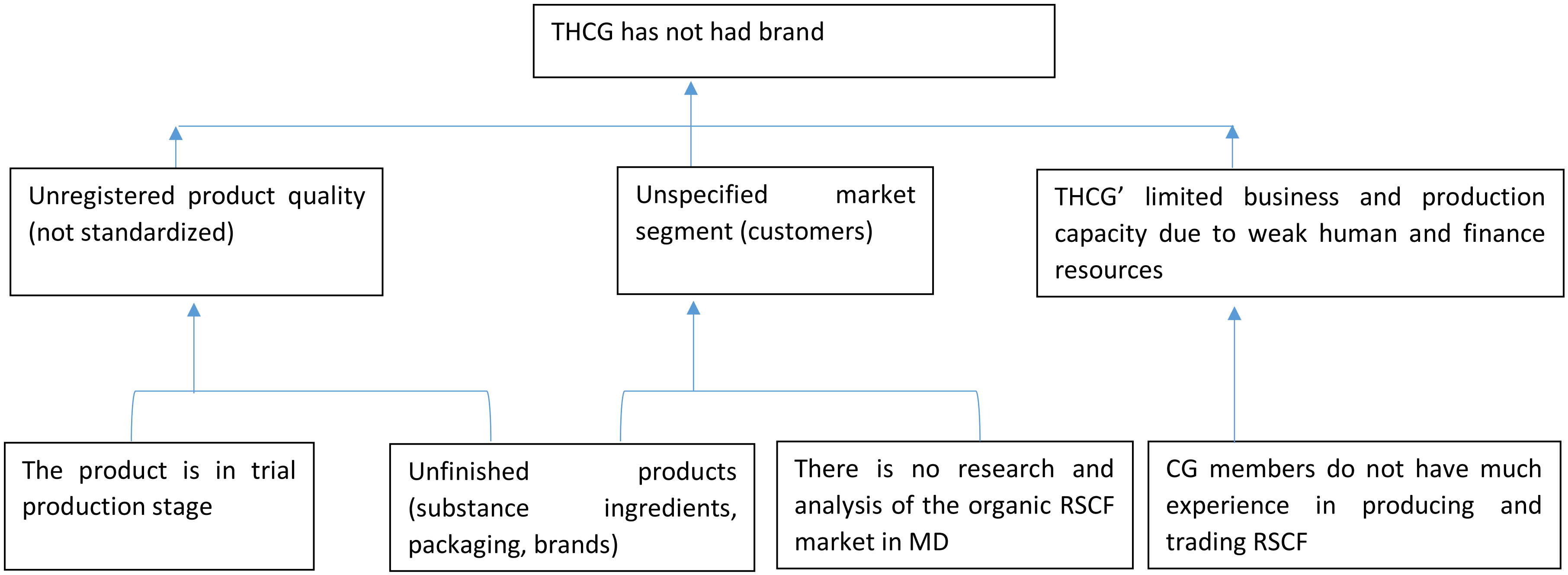


Figure 5.1: Brand development problem tree diagram for THCG

## 5.3. TARGET OF BRAND STRATEGY DEVELOPMENT

Based on the information identified and depicted in the diagram in Figure 5.1, there are three important challenges in developing CG's brand strategy, including: product quality, market segments (customers) and CG’s production and business capacity. Therefore, **target** in CG’s brand development strategy will aim to remove and solve the above challenges in order to achieve **purposes** as follows (details are described in Figure 5.2)

(1.1) Standardizing the quality and perfecting products associated with each market segment according to groups of households producing rice, fruit trees, crops and ornamental flowers;

(1.2) Strengthening communication activities to increase brand awareness of CG's products;

(1.3) Building vertical linkages with identified target customers;

(1.4) Improving CG’s management to implement the brand development strategy.

In order to achieve the four purposes above, CG needs to achieve the **expected results** with specific measurement criteria in the process of implementing the brand development strategy, including:

(2.1) Standardizing product lines corresponding to each crop group (customer segment), including: products for rice production, fruit trees, crops and ornamental flowers;

(2.2) Increasing customer's brand recognition for THCG's RSCF products in the organic fertilizer market;

(2.3) Improving CG's ability to reach target customers through building vertical linkages;

(2.4) Enhancing CG's business development and brand development capacity.

Next, an action plan including specific **activities** is indicated to help CG achieve the above-mentioned expected results, including:

(3.1) Registrating quality standards for complete product lines;

(3.2) Registrating for THCG's complete product lines;

(3.3) Building brand identity for THCG’s the complete product lines;

(3.4) Increasing THCG’s capacity in market analysis and business negotiation skills;

(3.5) Participating in agricultural trade promotion events;

(3.6) Increasing THCG’s capacity in business management knowledge and brand development strategy; and

(3.7) Carrying out communication activities, promoting brands and products on online platforms (website, social networks)

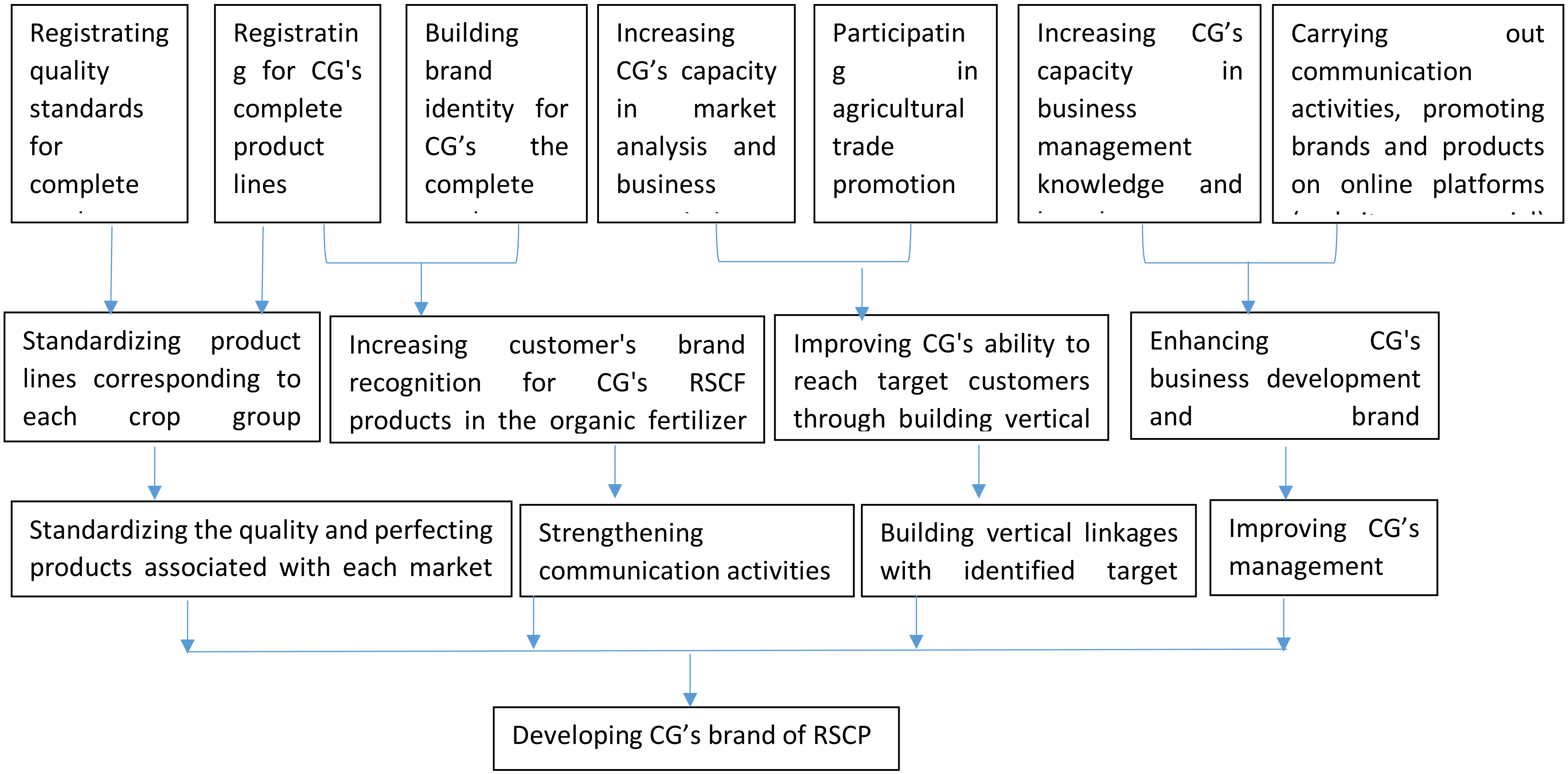


Figure 5.2: Brand development problem tree diagram for Tan Hung LFCG

## 6. CONCLUSION

Through analyzing input and output markets as well as policy mechanisms related to the situation of OFP production and consumption in MD, the study identifies that the source of rice straw material is being used to produce OF, straw mushroom, and raise cows, accounting for 56% of the total rice straw. And, rice farmers burn the remaining amonut of rice straw (44%). However, this study assesses that the source of rice straw for organic fertilizer still has a great potential. However, this study assesses that the source of straw material for organic fertilizer production still has a large space, mainly due to the impact of many policies to encourage efficient use of rice straw, and because the awareness of environmental protection of rice farmers is increasing day by day.

This study also identifies that, the demand for Organic fertilizers in Vietnam in general and in MD in particular is increasing rapidly partly due to improved production awareness of rice farmers in the use of fertilizers, partly due to the impact of policies encouraging the use of agricultural by-products in general, and rice in particular to improve soil fertility, rice yield and quality, and thus contribute to increased income for farmers in general, and rice farmers in particular.

Seeing the market demand for using rice straw to make organic fertilizer to meet the demand for organic fertilizer in general, and straw fertilizer in particular, IRRI provided technical support and a part of the facilities to the Tan Hung cooperation group belonging to Tan Hung ward, Thot Not district, Can Tho city in order to process RSCF. In addition to the technical support and facilities for the cooperative group, IRRI has coordinated with the Center for Training, Research and Economic Consulting, the School of Economics of CTU to support the cooperation group to develop the strategy aiming to upgrade the value chain and develop the RSCF product brand for the cooperative group. The objective of these strategies is to sustainably and effectively develop this product in the future, as well as to replicate it to some other localities in the Mekong Delta.

Through using the tools of value chain analysis and SWOT matrix analysis, the study recommends 05 strategies to upgrade the value chain of RSCF product, including i) Build vertical linkages between THCG and fertilizer distributors and agricultural housethols (including individual and institutional customers) inside and outside the locality, v) Promote investment in product promotion activities, iii) Invest to improve THCG's production, business and market capacity, iv) Cut production costs through expanding vertical linkages with suppliers of input materials (RHs, SMHs, coco peat, cow dung), and v) Develop a brand development strategy for THCG's THCG.

In order to implement the 5$^{th}$ strategy "Develop a brand development strategy for THCG's THCG", the study suggests an action plan, including 07 specific activities: 1) Registrating quality standards for complete product lines; 2) Registrating for THCG's complete product lines; 3) Building brand identity for THCG's the complete product lines; 4) Increasing THCG's capacity in market analysis and business negotiation skills; 5) Participating in agricultural trade promotion events; 6) Increasing THCG's capacity in business management knowledge and brand development strategy; and 7) Carrying out communication activities, promoting brands and products on online platforms (website, social networks)

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## ANNEX 2.1. QUESTIONNAIRE FOR RICE HOUSEHOLD

Date: ………. Month: ……….. Year: 2022

Interviewer: ……………………………………………………………………………………………………………….

Interviewee: ……………………………………………………………………………………………………………

Village/W: …………………… District/Urban district: …………………; Province/City: ………………………

A. PRODUCTION INFORMATION

1. Number of plots used for rice cultivation: …………; In which, area for rice on the largest plot? ……………. ha ***(From here only get the information of the largest plot)***

2. Number of farming crops in a year? ……………. crops

2.1. Area planted with crops: W-S 21-22: …………………ha; S-A 22: ……………. ha; A-W: ……………..ha

2.2. Variety used with crops: W-S 21-22: ……………; S-A 2022: ………………; A-W 2022: ………………

3. Yield per hectare, Yield and selling price

| | Vụ ĐX 2021-2022 | Vụ HT 2022 | Vụ TĐ 2022 |
|---|---|---|---|
| Yield per hectare (1,000 kg/ha) | | | |
| Yield (ton) | | | |
| Selling price (VND/kg) | | | |

B. STRAW INFORMATION

4. Winter-Spring crop 2021-2022

4.1. The way to treat straw? Why do you choose this way? (a) Burning (b) Inearth (c) Selling

…………………………………………………………………………………………………………………………………….

4.1.1 If selling, the way to sell? And why? (a) Fresh straw; (b) Rolled straw

…………………………………………………………………………………………………………………………………….

4.1.2 Selling straw to whom? And why?

(a) Collector (b) Mushroom household; (c) RSCF producer

…………………………………………………………………………………………………………………………………….

4.1.3 Buyer’s ìnormation (Name, Mobile, address): ………………………………………………………………….

4.1.4 The way to trade (who is responsible for rolling straw, delivery, transportation, contact, offering/deciding trading price, and so on …)

…………………………………………………………………………………………………………………………………….

4.1.5 The way to payment?

………………………………………………………………………………………………………………………………………………

4.2 Selling price?

4.2.1. For fresh straw: ……………… thousand VND/ha

4.2.2. For rolled straw: ……………. thousand VND/roll

5. Summer-Autumn crop 2022

5.1. The way to treat straw? Why do you choose this way? (a) Burning (b) Inearth (c) Selling

………………………………………………………………………………………………………………………………………………

5.1.1 If selling, the way to sell? And why? (a) Fresh straw; (b) Rolled straw

………………………………………………………………………………………………………………………………………………

5.1.2 Selling straw to whom? And why?

(a) Collector (b) Mushroom household; (c) RSCF producer

………………………………………………………………………………………………………………………………………………

5.1.3 Buyer's information (Name, Mobile, address): ………………………………………………….

………………………………………………………………………………………………………………………………………………

5.1.4 The way to trade (who is responsible for rolling straw, delivery, transportation, contact, offering/deciding trading price, and so on …)

………………………………………………………………………………………………………………………………………………

5.1.5 The way to payment? ………………………………………………………………………………………………

5.2 Selling price?

5.2.1. For fresh straw: ……………… thousand VND/ha

5.2.2. For rolled straw: ……………. thousand VND/roll

6. Autumn-Winter crop 2022

6.1. The way to treat straw? Why do you choose this way? (a) Burning (b) Inearth (c) Selling

………………………………………………………………………………………………………………………………………………

6.1.1 If selling, the way to sell? And why? (a) Fresh straw; (b) Rolled straw

………………………………………………………………………………………………………………………………………………

6.1.2 Selling straw to whom? And why?

(a) Collector (b) Mushroom household; (c) RSCF producer

………………………………………………………………………………………………………………………………………………….

6.1.3 Buyer's ìnormation (Name, Mobile, address): ………………………………………………….

………………………………………………………………………………………………………………………………………………….

6.1.4 The way to trade (who is responsible for rolling straw, delivery, transportation, contact, offering/deciding trading price, and so on …)

………………………………………………………………………………………………………………………………………………….

6.1.5 The way to payment?

………………………………………………………………………………………………………………………………………………….

6.2 Selling price?

6.2.1. For fresh straw: ……………… thousand VND/ha

6.2.2. For rolled straw: …………….. thousand VND/roll

C. FERTILIZER USING INFORMATION

7. Are you using organic/microbiological fertilizer or RSCF for rice cultivation?

(a) Yes; (b) Not yet

7.1 If not yet, why?

………………………………………………………………………………………………………………………………………………….

7.2 If yes, what kind of fertilizer are you using (trade mark)? ……………………………………………………………………………

7.2.1 Quantity of fertilizer used? ………………… kg/ha

7.2.2 Where to buy? ……………………………………………………………………………………………………………

7.2.3 Buying price? …………………………… thousand VND/kg

7.2.4 How efficient does the fertilizer bring to? (yield/ha, diseae, quality…)?

………………………………………………………………………………………………………………………………………………….

7.2.5 Easy to buy?

………………………………………………………………………………………………………………………………………………….

7.3 Do you intend to continue to use organic/microbiological fertilizer or RSCF in the future? …………….; And why?

…………………………………………………………………………………………………………………………………………………

7.4 In the process of rice production, have you been advised/advised/guided by any organization to use organic/microbiological/RSCF? (a) Yes (b) No

…………………………………………………………………………………………………………………………………………………

7.4.1 If yes, which agents?

…………………………………………………………………………………………………………………………………………………

7.4.2 What specially?

…………………………………………………………………………………………………………………………………………………

------------------ Finished -------------------

## ANNEX 2.2. STRAW COLLECTORS AND ROLLERS

☐ Straw rolling service provider ☐ Straw collector

Date: ……………….; Locality:……………………………

<table>
<tr><td colspan="8">I. GENERAL INFORMATION</td></tr>
<tr><td>1</td><td>Interviewee</td><td colspan="6"></td></tr>
<tr><td>2</td><td>Age</td><td colspan="6">……………</td></tr>
<tr><td>3</td><td>Sex</td><td colspan="6">☐ Male ☐ Female</td></tr>
<tr><td>4</td><td>Mobile</td><td colspan="6"></td></tr>
<tr><td>5</td><td>Description of activity</td><td colspan="6"></td></tr>
<tr><td>5.1</td><td>What product?</td><td colspan="6"></td></tr>
<tr><td>6</td><td>Which year do you start?</td><td colspan="6"></td></tr>
<tr><td>7</td><td>Where do you operate?</td><td colspan="6"></td></tr>
<tr><td>8</td><td>Total labours demanded</td><td colspan="6">…………… manday</td></tr>
<tr><td>8.1</td><td>In which, rent labours</td><td colspan="6">…………… manday</td></tr>
<tr><td>9</td><td>Capital</td><td colspan="6">……… million VND</td></tr>
<tr><td>9.1</td><td>Do you loan?</td><td colspan="6">☐ Yes ☐ No</td></tr>
<tr><td>9.2</td><td>Ratio of loan?</td><td colspan="6">………………..%</td></tr>
<tr><td>10</td><td>Facilities used for activity?</td><td colspan="6"></td></tr>
<tr><td rowspan="5">11</td><td rowspan="5">Rate of revenue and profit in the lastes year</td><td colspan="2">Product</td><td colspan="2">% revenue</td><td colspan="2">% profit</td></tr>
<tr><td colspan="2">P1</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="2">P2</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="2">P3</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="2">Total</td><td colspan="2">100%</td><td colspan="2">100%</td></tr>
<tr><td colspan="8">II. ACTIVIY</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Which month do you conduct activity of stract rolling/buying in a year?</td><td>Jan</td><td>Feb</td><td>March</td><td>April</td><td>May</td><td>June</td></tr>
<tr><td>July</td><td>Aug</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
<tr><td rowspan="2">13</td><td rowspan="2">Which month is the largest production of straw in the field (but not yet fully exploited)?</td><td>Jan</td><td>Feb</td><td>March</td><td>April</td><td>May</td><td>June</td></tr>
<tr><td>July</td><td>Aug</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
</table>

<table>
<tr><td rowspan="2">14</td><td rowspan="2">Which month the output market has the greatest demand (which has not yet been met)?</td><td>Jan</td><td>Feb</td><td>March</td><td>April</td><td>May</td><td>June</td></tr>
<tr><td>July</td><td>Aug</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
<tr><td>15</td><td>The way to approach buyer/seller</td><td colspan="6">☐ Seller/buyer looks for<br>☐ Through brokers<br>☐ Collector looks for customers<br>☐ Collector has known buyer/seller before</td></tr>
<tr><td>16</td><td>Price decision</td><td colspan="6">☐ Seller<br>☐ Buỷe<br>☐ Based on market price (mention the way to calculate market price)</td></tr>
<tr><td>17</td><td>Sign a contract with seller</td><td colspan="6">☐ Yes ☐ No</td></tr>
<tr><td>18</td><td>Sign a contract with the buyer</td><td colspan="6">☐ Yes ☐ No</td></tr>
<tr><td>19</td><td>Business & production capacity</td><td colspan="6">……………ha/year<br>…………..rolls/month<br>…………..rolls/year</td></tr>
<tr><td>19.1</td><td>Do you classify product as selling/buying?</td><td colspan="6">☐ Yes ☐ No</td></tr>
<tr><td rowspan="4">20</td><td rowspan="4">Buying quantity according to buyer</td><td></td><td>Ratio</td><td>Average price</td><td>Place</td><td colspan="2">Vehicle</td></tr>
<tr><td>Farmer</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Straw roller</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Other collector</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td rowspan="6">21</td><td rowspan="6">Selling quantity according to seler</td><td></td><td>Ratio</td><td>Average price</td><td>Place</td><td colspan="2">Vehicle</td></tr>
<tr><td>Mushroom farmer</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Raiser</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Cropping farmer</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Other collector</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Others</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>22</td><td>Profit, cost, revenue</td><td colspan="6"></td></tr>
</table>

| | | |
|---|---|---|
| III. ADVANTAGE & DISADVANTAGE | | |
| 23 | Advantages and disadvantages in stages | |
| 23.1 | Material | |
| 23.2 | Production technology/machines | |
| 23.3 | Capital | |
| 23.4 | Labour | |
| 23.5 | Look for buyers | |
| 23.6 | Agents supporting in production | |
| 23.7 | Other | |
| 24 | Recommendations for business-production development | |

Quesstion 22. The way to calculate efficiency in business & production

Calculation on ha

| No | Item | Unit | Quantity | Unit price | Value |
|---|---|---|---|---|---|
| I | REVENUE | | | | |
| | Rolled straw | Roll | | | |
| II | COST | | | | |
| 1 | Straw rolling | | | | |
| | Buying at the field | VND/ha | | | |
| | Buying from other collector | VND/roll | | | |
| | Rent labour | Manday | | | |
| | Family labour | Manday | | | |
| | Fuel | VND | | | |
| | Depreciation | VND | | | |
| 2 | Transportation | | | | |
| | Rent labour | Manday | | | |
| | Family labour | Manday | | | |
| | Fuel | VND | | | |
| | Depreciation | VND | | | |
| 3 | Storage | | | | |
| | Rent labour | Manday | | | |
| | Family labour | Manday | | | |
| | Fuel | VND | | | |
| | Depreciation | VND | | | |
| 4 | Bán sản phẩm | | | | |
| | Rent labour | Manday | | | |
| | Family labour | Manday | | | |
| | Fuel | VND | | | |
| | Depreciation | VND | | | |
| | Other costs | VND | | | |
| III | PROFIT | | | | |

IV. PROPOSE

IV. ĐÁNH GIÁ XU HƯỚNG PHÁT TRIỂN

1. Trends in straw material source
2. trends in entering the industry
3. Trends in consumption

------------------- Finished --------------------

## ANNEX 2.3. QUESTIONNAIRE FOR STRAW MUSHROOM HOUSEHOLD

Date: ……………….; Locality:…………………………….

<table>
<tr><td colspan="8">I. GENERAL INFORMATION</td></tr>
<tr><td>1</td><td>Interviewee</td><td colspan="6"></td></tr>
<tr><td>2</td><td>Age</td><td colspan="6">Age……………</td></tr>
<tr><td>3</td><td>Sex</td><td colspan="6">☐ Male ☐ Female</td></tr>
<tr><td>4</td><td>Mobile</td><td colspan="6"></td></tr>
<tr><td>5</td><td>Production scale</td><td colspan="6"></td></tr>
<tr><td>5.1</td><td>Rent land</td><td colspan="6"></td></tr>
<tr><td>5.2</td><td>Number of crops in a year</td><td colspan="6"></td></tr>
<tr><td>6</td><td>Number of experience</td><td colspan="6"></td></tr>
<tr><td>7</td><td>Number of labours</td><td colspan="6"></td></tr>
<tr><td>7.1</td><td>In which, rent labours</td><td colspan="6"></td></tr>
<tr><td colspan="8">II. PRODUCTION AND CONSUMPTION</td></tr>
<tr><td rowspan="2">8.</td><td rowspan="2">Production time</td><td>Jan</td><td>Feb</td><td>March</td><td>April</td><td>May</td><td>June</td></tr>
<tr><td>July</td><td>August</td><td>Sep</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
<tr><td>9.</td><td>Straw material used</td><td colspan="6"></td></tr>
<tr><td>9.1</td><td>Quantity of straw used for growing 1.000 m$^2$</td><td colspan="6"></td></tr>
<tr><td rowspan="3">10.</td><td rowspan="3">Buying straw</td><td colspan="2"></td><td>Ratio</td><td>From whom</td><td>Buying price</td><td>Other cost</td></tr>
<tr><td colspan="2">Buying fresh straw</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Buying rolled straw</td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.1</td><td>The reason why you choose the form of straw</td><td colspan="6">- Buying fresh straw:<br><br>- Buying rolled straw:</td></tr>
<tr><td>11.</td><td>Revenue on 1.000 m$^2$ of area for mushroom</td><td colspan="6">- from mushroom:<br>- from straw residue:</td></tr>
<tr><td>12.</td><td>Total cost paid for 1.000 m$^2$ of area for mushroom.</td><td colspan="6"></td></tr>
<tr><td>13.</td><td>Profit:</td><td colspan="6"></td></tr>
<tr><td>14.</td><td>Quantity of straw residue on 1.000 m$^2$ of area for mushroom</td><td colspan="6"></td></tr>
<tr><td rowspan="2">15.</td><td rowspan="2">Straw residue used to</td><td colspan="2"></td><td>Ratio</td><td>Selling price</td><td>Buyer's address</td><td>Selling form</td></tr>
<tr><td colspan="2">Sell to households</td><td></td><td></td><td></td><td></td></tr>
</table>

| | | | | | | |
|---|---|---|---|---|---|---|
| | | growing ornamental flower | | | | |
| | | Sell to fertilize producer | | | | |
| | | Fertilize for plants of the family/throw away | | | | |
| 16. | Advantage and disadvantage in | | | | | |
| 16.1 | finding straw material | | | | | |
| 16.2 | Production technology/machines | | | | | |
| 16.3 | Capital | | | | | |
| 16.4 | Labour | | | | | |
| 16.5 | Treating sub-products | | | | | |
| 16.6 | Others | | | | | |

------------------- Finished --------------------

## ANNEX 2.4. QUESTIONNAIRE FOR RICE STRAW FERTILIZER COOPERATION GROUP

Date: ……………………………………………………………………………..

Place: …………………………………………………………………………….

Interviewee: ………………………………

Interviewer: ……………………………………………….

PART 1: PRODUCTION STAGE

1. Straw material sourece used for production?

| Buying form | Ratio | Buying from | Selling to | Way to calculate buying price | Transportation cost (Who pay and how much? |
|---|---|---|---|---|---|
| 1. Buying fresh straw at the field | | | | | |
| 2. Buying rolled straw | | | | | |
| 3. Buying straw residue | | | | | |

2. The reason why you bought it in the form

- Fresh straw (1): ……………………………………………………………………………..

- Rolled straw (2): ……………………………………………………………………………..

- Straw residue (3): ……………………………………………………………………………..

3. Production factor of input

| Kinds of straw material | Production cycle (day) | The quantity which is used to produce 1 ton of straw manure | | | | |
|---|---|---|---|---|---|---|
| | | Straw | Cow dug | Fuel | Other materials | Man-day |
| 1. Rolled straw (roll) | | | | | | |
| 2. Straw residue | | | | | | |

4. Cost for producing 1 ton of straw manure (Calculating on the base of 1 ton of straw manure)

| Item | Quantity | Buying price | Kinds of straw material (Unit: VND) | |
|---|---|---|---|---|
| | | | 1. Fresh straw | 2. Straw residue |
| 1. Straw | | | | |
| 2. Cow dug | | | | |
| 3. Soil/other substrates | | | | |
| 4. Fuel | | | | |
| 5. Electricity | | | | |
| 6. Chemical/Additives | | | | |
| 7. Family labour (man-day) | | | | |
| 8. Rent labour (man-day) | | | | |

| | | | | |
|---|---|---|---|---|
| 9. Small tools for production | | | | |
| 10. Deprciation | | | | |
| 11. Others | | | | |
| Total | | | | |

5. Is there difference among prodion batch? If yes, ranging from ……… tons to ……….. tons

What is the reason leading to this difference? …………………………………………………………………………

……………………………………………………………………………………………

6. What is the production capacity in year:

- Lowest……….. Highest ……………………

7. Which are the criteria used for measuring product quality?

- Sensory: ……………………………………………………………………………..

- Specific: ………………………………………………………………………….

8. Currently, How many kinds of straw manure do you have? Which plants are they used for? And what stage of growth?

……………………………………………………………………………………………

PART 2: PRODUCT CONSUMPTION

9. Whom are your straw manures sold to? And for what plants?

| Whom do you sell product? | Where is your customer? | Ratio of sold quantity? | What plants is your product used for? | Selling form (contact,transportation, payment)? |
|---|---|---|---|---|
| | | | | |
| | | | | |

Required to get information of customers' name and mobile

10. Selling price of straw manure?

……………………………………………………………………………………………

PART 3: ADVANTAGES AND DISADVANTAGES IN PRODUCTION AND CONSUMPTION PROCESS

11. Comment on straw manure production and consumption

| Issue | Disadvantage/threat | Advantage/opportunity |
|---|---|---|
| Material source | | |
| Production technology/ machines & equipments | | |
| Capital | | |

| | | |
|---|---|---|
| Labour | | |
| Market of organic fertilizers | | |
| Product development (Designing product, package, trade mark) | | |
| Looking for customers | | |
| Productive supporters | | |

12 To develop straw manure production, what do you suggest?

------------------- Finished --------------------

## ANNEX 2. 5. QUESTIONNAIRE FOR FERTILIZER DISTRIBUTORS

Date: ………………………………………………………………………..

Place: ……………………………………………………………………….

Interviervee's full name: ……………………………

Interviewer's full name: ………………………………………………..

Screening question: Do you sell any organic fertilizers?

- If yes (continue)
- If no (Stop)

PART 1: PURCHASE

1. The source of organic fertilizers which you are trading

| Kinds of organic fertilizer | Who are suppliers? |
|---|---|
| Traditional organic fertilizer | |
| 1. Manure | |
| 2. Green manure | |
| 3. Garbage/straw fertilizer | |
| 4. Vermicompose | |
| Industrial organic fertilizer | |
| 5. Bio-organic fertilizer | |
| 6. Microbial organic fertilizer | |
| 7. Mineral organic fertilizer | |

2. Plants usiing organic fertilizer

| Kinds of organic fertilizer | What plants are they used for? | Ratio of consumed quantity (%) |
|---|---|---|
| Traditional organic fertilizer | | |
| Industrial organic fertilizer | | |

3. Which following forms do you use to buy organic fertilizers for trading (*Mark X in the chosen cells*)

[ ] Organic fertilizer companies/productive units come to your store in order to introduce their products

[ ] Organic fertilizer companies/productive units which used to/are trading with you coming to your store in order to introduce their products

[ ] You are actively looking for organic fertilizer suppliers

[ ] Other forms: ……………………………………………….

4. What payment forms have you used to pay for organic fertilizer suppliers? (*Mark X*)

[ ] Before suppliers deliver products

[ ] Right after suppliers deliver product

[ ] Pay advance …….% of total payment, and pay the rest after …………. days when receiving products.

[ ] Others (Specific)…………………………………………………………………

PART 2: CONSUMPTION

10. Which month is the most and least consumed organic fertilizer of the year? (*Mark X*)

| Consumed quantity | Jan | Feb | March | April | May | June | July | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The most | | | | | | | | | | | | |
| The least | | | | | | | | | | | | |

The reason why organic fertilizers are consumed the most/the least

……………………………………………………………………………………………

……………………………………………………………………………………………

11. How much per kilo do the price of organic fertilizers fluctuate?

- Traditional organic fertilizer: the lowest ………….(VND/kg) The highest………….(VND/kg)

- Industrial organic fertilizer: the lowest………….(VND/kg) The highest………….(VND/kg)

12. The size of package (*Mark X*)

| Kinds of organic fertilizer | Bag 1kg | Bag 3kg | Bag 5kg | Bag 10kg | Bag 20-25kg | Note: Write which kinds are consumed the most and the least |
|---|---|---|---|---|---|---|
| Traditional | | | | | | |
| Industrial | | | | | | |

13. Types of organic fertilizer (*Mark X*)

| Kinds of organic fertilizer | Substrate | Tablet | Solution | Others |
|---|---|---|---|---|
| Traditional | | | | |
| Industrial | | | | |

PART 3: ADVANTAGE AND DISADVANTAGE IN BUSINESS

14. Coment on organic fertilizer business

| Issue | Disadvantage/threat | Advantage/opportunity |
|---|---|---|
| Supplying source of organic fertilizer | | |
| Product diversification | | |
| Capital for business | | |
| Labor recruiment | | |
| Market information | | |
| Looking for organic fertilizer suppliers | | |
| Consummers' knowledge in using organic fertilizer | | |
| Loacal agents/supporters | | |

15 To develop organic fertilizer industry, what do you recomment?

16. Please, give an assesment of organic fertilizer using trend (Kinds, Level of use, price, and so on, v.v…)

------------------- Finished --------------------

## ANNEX 2.6. QUESTIONNAIRE FOR AGRI HOUSEHOLD

Date: ………. Month: ……….. Year: 2022

Interviewer: ………………………………………………………………………………………………………………….

Interviewee: ……………………………………………………………………………………………………………

Village/W: …………………… District/Urban district: ………………….; Province/City: ………………………

1. Which plants are you growing? ……………………………………………………………………………………

2. What kinds of fertilizer are you using (trade mark)? ………………………………………………………………………………

3. Quantity of fertilizer used? ………………… kg/ha

4. Where to buy? …………………………………………………………………………………………………………

5. Buying price? …………………………… thousand VND/kg

6. How efficient does the fertilizer bring to? (yield/ha, diseae, quality…)?

…………………………………………………………………………………………………………………………………….

7. Easy to buy?

…………………………………………………………………………………………………………………………………….

8. Could you please tell me what are difficulties in using organic fertilizers?

…………………………………………………………………………………………………………………………………….

9. Do you intend to continue to use organic/microbiological fertilizer or straw fertilizer in the future? …………….; And why?

…………………………………………………………………………………………………………………………………….

10. What do you recommend in order to be more benefits as using organic fertilizers in the future?

…………………………………………………………………………………………………………………………………….

------------------- Finished --------------------

## ANNEX 2.7. QUESTIONNAIRE FOR EXPERTS

Date: ………. Month: ……….. Year: 2022

Interviewer: ………………………………………………………………………………………………………………….

Interviewee: ……………………………………………………………………………………………………………

Working unit: …………………………………………………………………………………………………………….

Village/W: …………………… District/Urban district: …………………; Province/City: ………………………

1/ Could you plesae give some comments on demand site of organic fertilizer market?

2/ Could you please give some comments on supply site of organic fertilizer market?

3/ Could you please tell me what are factors effecting demand and supply of organic fertilizer market?

4/ Which current policies do you think that they have a positive affect to organic fertilizer market?

5/ What do you think about the development trend of organic fertilizer market in the future?

------------------ Finished -------------------

## ANNEX 2.8. DISCUSSION QUESTIONS IN THE WORKSHOP

Date: ………. Month: ……….. Year: 2022

1/ Could you plesae describe the supply chain of straw product in locality?

2/ Could you please tell me how farmers traet straw material?

3/ Could you please tell me what are current difficulties in farmers' using organic fertilizer?

4/ Could you please tell me what is the trend in farmers' using organic fertilizers?

5/ Do you have any recommendations for farmers' straw treatment?

------------------- Finished --------------------

## ANNEX 2.9. LIST OF PERSONS ATTENDING THE WORKSHOP

| NO | FULL NAME | AGENT |
|---|---|---|
| 1 | TRAN THI KIM THUY | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF CAN THO CITY |
| 2 | PHAN THANH TRUC | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF CAN THO CITY |
| 3 | TRAN THI YEN PHUONG | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF CAN THO CITY |
| 4 | LE NHUT TAO | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF CAN THO CITY |
| 5 | PHAM NGUYEN TRUNG HIEU | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF CAN THO CITY |
| 6 | DANG NHAT TRUONG | CULTIVATION & PLANT PROTECTION STATION, VINH THANH DISTRICT, TPCT |
| 7 | NGUYEN THI BICH TRAN | CULTIVATION & PLANT PROTECTION STATION, VINH THANH DISTRICT, TPCT |
| 8 | LUU THI KIEU THAM | CULTIVATION & PLANT PROTECTION STATION, THOI LAI DISTRICT, TPCT |
| 9 | LE ĐINH DU | CULTIVATION & PLANT PROTECTION STATION, THOT NOT DISTRICT, TPCT |
| 10 | NGUYEN THANH PHUOC | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF SOC TRANG PROVINCE |
| 11 | NGO THANH LOAN | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF SOC TRANG PROVINCE |
| 12 | LY THI DIEM KIEU | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF SOC TRANG PROVINCE |
| 13 | HA HUU DAN | CULTIVATION & PLANT PROTECTION STATION, KE SACH DISTRICT, SOC TRANG PROVINCE |
| 14 | LE NGOC SON | CULTIVATION & PLANT PROTECTION STATION, LONG PHU DISTRICT, SOC TRANG PROVINCE |
| 15 | LAM THI THU HUONG | CULTIVATION & PLANT PROTECTION STATION, TRAN DE DISTRICT, SOC TRANG PROVINCE |
| 16 | NGO THANH LIEM | CULTIVATION & PLANT PROTECTION STATION, MY XUYEN DISTRICT, SOC TRANG PROVINCE |
| 17 | NGUYEN THI HONG CAM | CULTIVATION & PLANT PROTECTION STATION, MY TU DISTRICT, SOC TRANG PROVINCE |
| 18 | LY NGUYEN HUNG | CULTIVATION & PLANT PROTECTION STATION, THANH TRI DISTRICT, SOC TRANG PROVINCE |
| 19 | DUONG CUC MI | CULTIVATION & PLANT PROTECTION STATION, SOC TRANG CITY, SOC TRANG PROVINCE |
| 20 | PHAM THI MY XUYEN | CULTIVATION & PLANT PROTECTION STATION, NGA NAM DISTRICT, SOC TRANG PROVINCE |
| 21 | THACH THU HIEN | CULTIVATION & PLANT PROTECTION STATION, VINH CHAU DISTRICT, SOC TRANG PROVINCE |
| 22 | HUYNH THI NGOC HUAN | CULTIVATION & PLANT PROTECTION STATION, CHAU THANH DISTRICT, SOC TRANG PROVINCE |

| | | |
|---|---|---|
| 23 | LE VAN CHAN | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF DONG THAP PROVINCE |
| 23 | TRAN THI TUYET NGOC | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF DONG THAP PROVINCE |
| 25 | PHAN MINH NHAT | SUB-DEPARTMENT OF CULTIVATION AND PLANT PROTECTION OF DONG THAP PROVINCE |
| 26 | VUONG HUYNH NHU | CENTER FOR AGRICULTURAL SERVICE, TAN HONG DISTRICT, DONG THAP PROVINCE |
| 27 | PHAM VAN MOT | CENTER FOR AGRICULTURAL SERVICE, HONG NGU DISTRICT, DONG THAP PROVINCE |
| 28 | NGUYEN VAN MANH | CENTER FOR AGRICULTURAL SERVICE, HONG NGU DISTRICT, DONG THAP PROVINCE |
| 29 | NGUYEN THANH HUNG | CENTER FOR AGRICULTURAL SERVICE, TAM NONG DISTRICT, DONG THAP PROVINCE |
| 30 | DANG THI Y | CENTER FOR AGRICULTURAL SERVICE, THANH BINH DISTRICT, DONG THAP PROVINCE |
| 31 | TRAN THI THUY HUYNH | CENTER FOR AGRICULTURAL SERVICE, THAP MUOI DISTRICT, DONG THAP PROVINCE |
| 32 | NGUYEN THI DIEM TRINH | CENTER FOR AGRICULTURAL SERVICE, CAO LANH DISTRICT, DONG THAP PROVINCE |
| 33 | NGUYEN THI KIM HUONG | CENTER FOR AGRICULTURAL SERVICE, LAP VO DISTRICT, DONG THAP PROVINCE |
| 34 | MAI HOANG LINH | CENTER FOR AGRICULTURAL SERVICE, LAI VUNG DISTRICT, DONG THAP PROVINCE |
| 35 | VO HUU PHUC | CENTER FOR AGRICULTURAL SERVICE, CAO LANH CITY, DONG THAP PROVINCE |
| 36 | NGUYEN HUU DUY | CENTER FOR AGRICULTURAL SERVICE, THANH BINH DISTRICT, DONG THAP PROVINCE |
| 37 | DUONG VAN TINH | CENTER FOR AGRICULTURAL SERVICE, THANH BINH DISTRICT, DONG THAP PROVINCE |

**Annex 4.1. Some kinds of organic fertilizer and substrates distributed at stores/agents trading ornamental flowers**

(i) 



Packaged OF (ii) Ready-madecompost (iii) Agricultura waste & by-products

**Annex 4.2. Some kinds of industrial organic fertilizer**



## Annex 4.3: Some kinds of traditional organic fertilizers



**Anex 2.5.1 Strategies to upgrade the straw manure value chain**

| | **Strength (S)** | **Weakness (W)** |
|---|---|---|
| | **$S_1$**: In the long term, RSCF helps to improve the nutrition of arable land, as well as contribute to reducing production costs, increasing yield per hectare, reducing disease, and thus increasing profits for production households cultivating crops in general.<br>**$S_2$**: Cultivation of rice and straw mushroom has been a traditional occupation in many localities in the study area.<br>**$S_3$**: The system of FDs is dense in the localities, so it is very convenient in the stage of product distribution.<br>**$S_4$**: THCG members have consensus and enthusiaRSCF in starting a business, as well as experience in the field of agricultural production.<br>**$S_5$**: THCG members have good relationships with RHs, SMHs, FDs and AHs in the region.<br>**$S_6$**: THCG is close to the rice and mushroom production area. | **$W_1$**: THCG is limited in product development capacity (RSCF processing technique, design of labels, packaging, branding, product diversification, e-commerce application).<br>**$W_2$**: RHs' environmental protection awareness is still limited because a large number of RHs still treat rice straw in the way of burning, thus limiting the source of straw material for THCG.<br>**$W_3$**: Habits and practices of using organic fertilizers of AHs are still limited<br>**$W_4$**: THCG in the study does not have a strong brand name and THCG's business management and market access capabilities are limited.<br>**$W_5$**: THCG's facilities for production and consumption of RSCF are limited<br>**$W_6$**: Due to THCG's small production scale of THCG, the RSCF supply is limited, leading to an unexpanded distribution channel, and therefore limited market share and revenue.<br>**$W_7$**: THCG still operates in the form of a community group, has not yet developed into a cooperative group or cooperative, so it will be limited in accessing state and local support policies, as well as in the future when expanding its scale. production, the unit will face difficulties in selling products to institutional customers. |

| **Opportunity (O)** | **offensive strategy group (SO)** | **Adjustment strategy group (WO)** |
|---|---|---|
| **$O_1$**: THCG has received support from the Project "Ensuring Food Systems of the Asian Deltas for Livelihood and Climate Restoration" by IRRI Rice Institute in terms of technology transfer, sample analysis, and machinery and equipment support, designation of label packaging.<br>**$O_2$**: Actors participating in the chain receive support from local authorities, relevant departments in production and business activities (rice, mushroom, organic fertilizer, organic fertilizer business).<br>**$O_3$**: Vietnam is likely to benefit from participating in the market for selling carbon certificates.<br>**$O_4$**: THCG has access to the National Target Program, specifically the State OCOP product development program.<br>**$O_5$**: Prices of inorganic fertilizers tend to increase continuously.<br>**$O_6$**: The economic development trend towards circular economy and green economy worldwide in general, and in Vietnam as well as in MD in particular is being developed more and more deeply, creating opportunities for the cctors participating in RSCFVC having access to many supporting policies from international and domestic organizations.<br>**$O_7$**: There are many policies to support technical, financial, and physical facilities of the central and local governments for RHs, SMHs, agricultural mechanization service providers, and facilitate the increase in raw input materials for RSCF; | **$S_{3-5}O_{1-2,4,6,8-9}$**: Build vertical linkages between THCG and fertilizer distributors and agricultural househols (including individual and institutional customers) inside and outside the locality | **$W_{1,4}O_{1-2,4,6,8-9}$**: Develop a brand development strategy for THCG's THCG<br><br>**$W_{1,4-7}O_{1-3,5,7-8}$**: Invest to improve THCG's production, business and market capacity |

| | | |
|---|---|---|
| **$O_8$**: There are many institutes and universities operating in MD, IRRI, and non-governmental organizations that have been and will have programs to support technical, business knowledge and production organization for RHs, SMHs, THCG, and AHs.<br>**$O_9$**: The free trade agreement between Vietnam and countries with an increase in importing Vietnamese agricultural products such as EVFTA, CPTPP, etc will create opportunities for Vietnam's agricultural exports, but with stricter production standards, including limiting the use of inorganic fertilizers, and instead increasing the use of organic fertilizers, this is also an opportunity for RSCFVC to grow in the future | | |
| **Threat (T)**<br>**$T_1$:** In the market, there are currently many organic fertilizer brands introduced and distributed at distributors, so it will more or less create a challenge in entering the market for THCG;<br>**$T_2$**: The State's agricultural restructuring program in the direction of reducing inefficient rice production areas to other crops and livestock will reduce the supply of straw materials in the RSCFVC;<br>**$T_3$**: The war between Russia and Ukraine will increase the cost of fuel and transportation, thereby increasing the cost of products, and thus affecting the competitiveness of products, as well as the purchasing power of AHs;<br>**$T_4$**: The Covid-19 epidemic has not shown signs of a complete | **Coping/adaptation strategy group (ST)**<br><br>**$S_{2,4\text{-}6}T_{1\text{-}6}$**: Cut production costs through expanding vertical linkages with suppliers of input materials (RHs, SMHs, coco peat, cow dung) | **Defensive Strategy Group (WT)**<br><br>**$W_{2\text{-}4,7}T_1$**: Promote investment in product promotion activities |

| | | |
|---|---|---|
| end and there are many complicated developments, so it is still possible that all agricultural sectors in general, and the organic fertilizer production industry in particular will not avoid the risk of supply chain disruption in the future. Therefore, this is considered a potential challenge for RSCFVC;<br>**$T_5$**: RSCFVC is likely to be competed for fresh straw raw materials with the cattle industry; and<br>**$T_6$**: The effects of climate change (erratic weather, saline intrusion, prolonged drought, etc.) will definitely decrease rice yield, and thus reduce the input of straw material in the RSCFVC | | |