

Market Value Chain Research¹: Case Study in Nghia Trung Commune, Bu Dang District, Binh Phuoc Province, Vietnam

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Abstract

Using participatory approach in focus group discussions, in-depth interviews and weighted scoring method, the study aims to identify the most profitable and marketable crops in pursuit of achieving the greatest opportunity for market-driven development from existing farming systems, marketing constraints, strategies and interventions to improve the SSFWM's market access in Nghia Trung.

The perennial crops are highly appreciated compared to annual ones. The first three appreciated perennial plants are cashew, rubber and durian; pepper and coffee are observed in the second rank in Nghia Trung. As a newly-cultivated plant, cacao appraisal has become vague to informants. Concerning market accessibility and growth potential, income generation, cashew, rubber, cassava and durian are highly appraised whereas rambutan, coffee and vegetable are marketably revealed difficult. Key informants have almost appraised Nghia Trung's comparative advantages to cashew, rubber, pepper, durian and cassava. Together with cashew, the benefit to target group criterion is also found favorable for the case of cassava, vegetable.

Under many aspects including market accessibility and growth potential, market performance, income generation and farming conditions, five diversified crops are critically appraised to identify the most profitable and marketable crops. Durian and bamboo shoot have appeared the most profitable with the increasing market demand in the whole country and exportation. However, they have currently dealt with some detriments concerning low technology, water shortage and heavy investment in durian only. Though having stable and local market demand growth, cassava has revealed low financial incentive and gradually decreasing comparative advantages in term of land availability. Rambutan and vegetables are observed behind the three above-mentioned crops. Being commercially grown under the investment in both safe and quality production, vegetables promisingly gain the local demand with stable and sufficient supply.

Low use of technology, weak extensional activities, inadequate supply of production inputs, poor marketing infrastructure and weak market linkage and post-harvest performance are all detriments to the development of agricultural market in Nghia Trung. Thus, there should be more strategic and supportive operations from the GoV, input and output companies, government conducive to farmers' participation and their benefit as a result. Support on techniques and market price information are the most households' necessities. More efficient supply of input factors, extensional activities, irrigation and marketing infrastructure are all demanded. For market efficiency enhancement, the market linkage creation is found efficient link between the government's support, processing enterprises' guarantee and farmers' production investment.

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I. INTRODUCTION

I.1 Problem statement

The project “Agroforestry and Sustainable Vegetable Production in Southeast Asian Watersheds”, aims to alleviate poverty, food scarcity and reduce environmental degradation by integrating vegetable production in agro-forestry system on small –scale farmers both women and men (SSFWM). Its research component in Vietnam has conducted in Nghia Trung commune, Bu Dang district, Binh Phuoc province. The people’s livelihoods in the commune, especially the poor and the native people largely depend on forest-based activities and AFTPs such as pepper, cashew, coffee and rubber. Apart from these main industrial crops, they have gradually diversified their farming systems into such other perennial fruit crops as durian, rambutan and annual crops including cassava, vegetables and bamboo shoot.

Besides technological efforts to build –up an integrated vegetable – agroforestry (VAF) system, the project’s achievement apparently depends on the economic viability of this integrated system. Therefore, the market value chain component research is essential to provide key solutions for more cash crop diversification concerning profitability and marketability in pursuit of achieving the greatest opportunity for market-driven development.

I.2 Research objective

The study aims to identify the most profitable and marketable crops in pursuit of achieving the greatest opportunity for market-driven development from the commune’s existing farming systems. The detailed market value chain analysis has focused on the most commonly diversified crops including vegetables, durian, rambutan, bamboo shoot and cassava. However, the marketing constraints, strategies and interventions to improve the SSFWM’s market access are drawn from the whole commune’s situation including the existing perennial industrial crops.

I.3 Methodology and data collection

The participatory approach has been utilized to collect the primary data in the commune. Two focus group discussions have been implemented at the beginning and at the end of the survey. While the former is to raise the appreciation of currently diversified crops, concerning issues in the agricultural market, the latter draws out conclusions and viable interventions for better performance. Five focused crops are developed for the detailed market value chain analysis. Nine selection criteria were used to evaluate each crop by scoring and weighting. To get the ranking several crops currently cultivated in Nghia Trung, the study has utilized weighted scoring method (see Appendix 03).

Both primary and secondary data are utilized in the study. Secondary data are collected from Bu Dang Department of Statistics, and district and commune officials in Nghia Trung commune.

Primary data are firstly obtained from the survey with such key informants as officials from Nghia Trung commune's People Committee; the nine hamlets' heads in the commune, Farmers Association, Women Union to obtain the thorough appraisal of the commune's existing farming systems (see Appendix 02).

The in-depth interviews of various stakeholders along the market chains have been carried out to get insights of farmers' transaction and to assess their marketing performance with a special focus on purchase and supply strategies, constraints and opportunities, relationships between buyers and purchasers in view of the information distribution, commitments, risk sharing, input and service supply; advantages and drawbacks; quality control; costs and benefits. Besides, the presentation has also accessed the baseline survey data for certain analysis.

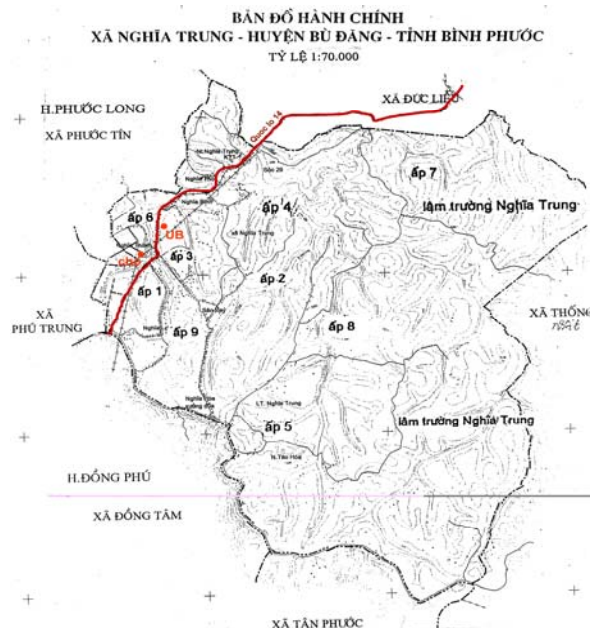
Questionnaires: the first questionnaire has utilized nine criteria (see Appendix 1.1) to explore opportunity for market-driven development such as market demand, opportunities for linkages, crops' value added, employment and income generation, and other aspects of comparative advantage, productivity, government policies, market risks. Second, the questionnaires for in-depth interviews of farmers and middlemen in the market chain were implemented to get insights of farmers' production and market transaction of five diversified crops (see Appendix 1.2 and Appendix 1.3).

1.4 Location and sample

Study site is nine hamlets in the whole Nghia Trung commune, Bu Dang district, Binh Phuoc province. A 306- farmer survey was conducted to get the households' basic information in Nghia Trung commune. In –depth interviews have reached a small sample of 16 farmers and 9 traders to five diversified crops for detailed market value chain analysis. Focus group discussions have conducted with 16 key informants and 27 farmers (see Appendix 02).



Map 01: Bu Dang district in Binh Phuoc province



Map 02: Nghia Trung Commune

1. 5 Structure of the paper

The paper is structured in six sections. Following this introduction we provide an overview of households and agricultural production in Nghia Trung commune. Section three introduces agricultural market and rationales for the most favorable crops under the existing farming systems concerning the greatest opportunity for market-driven development. A detailed analysis of the diversified crops is presented in the next part. Constraints and viable solutions are then explored for marketing improvement in Nghia Trung. The final section draws together the main conclusions.

II. AN OVERVIEW OF HOUSEHOLDS AND AGRICULTURAL PRODUCTION

II. 1 HOUSEHOLDS' CHARACTERISTICS IN NGHIA TRUNG COMMUNE

Nghia Trung has a total population of 12,824 persons in 2,681 households (see Table 01). Agricultural activities -as main occupation in 95% of total households have apparently played an extremely important role in the commune. Their living conditions are so poor with nearly 10% of total households under poverty level, respectively 40% and 94% in lack of electricity and telephone communication, especially in hamlet 07 and 09. More importantly, there have remained 15% of total households in lack of agricultural production land, reported by the commune's People Committee in legal document No. 14/TH-SL/UBND dated Sep. 07th 2006.

Table 01. Some indicators on population and households in Nghia Trung commune

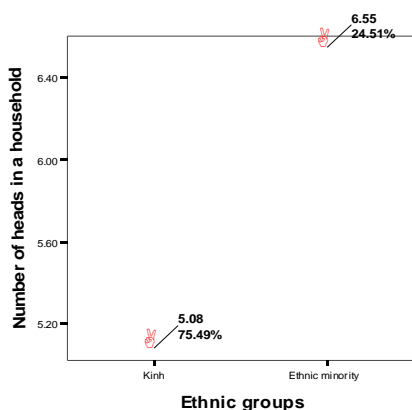
Items	Units	2002	2003	2004	2005
Population	persons	11,838	12,612	14,030	12,824
In which:					
Female	%	46.21	47.15	49.68	53.81
Labors	%	48.23	46.41	54.82	61.00
Numbers of households	households	2,466	2,691	2,729	2,681
In which:					
Agricultural households	households	2,399	2,651	2,646	2,537
Ethnic minority households	households			739	657
Poor households	households	18	135	119	266
Households with electricity use	%	25.55	31.59	43.97	59.68
Households with telephone use	%	1.22	4.50	5.53	5.63
Income per capita	'000VND/ person/ year	4,000	4,500	5,000	5,000

Source: Bu Dang GSO (2006), and data provided by the commune's officials

While 25% of total households are ethnic minority, its population occupies nearly 40% of total population. Reasonably, its average number of heads is higher than that in Kinh households respectively 7 and 5 persons in the survey (see Figure 01). Household's head education level is

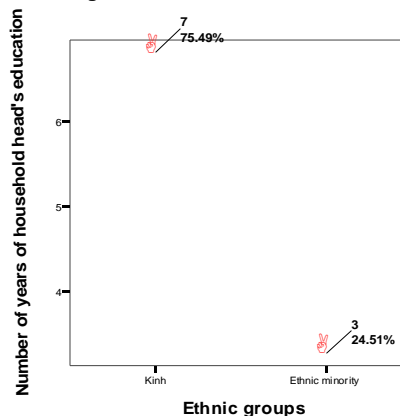
relatively low in the commune and is also found different between minority groups and Kinh (see Figure 02). Some other households' characteristics in the baseline survey are described in Appendix 4.6. In general, most of ethnic groups live in hamlet 5, 7, 8 and 9 relatively far from the 14 National Road. Some trading households are mostly found in hamlets 1 and 4 under the main road location.

Figure 01. Number of household's heads by ethnic groups



Source: Survey data in 2006

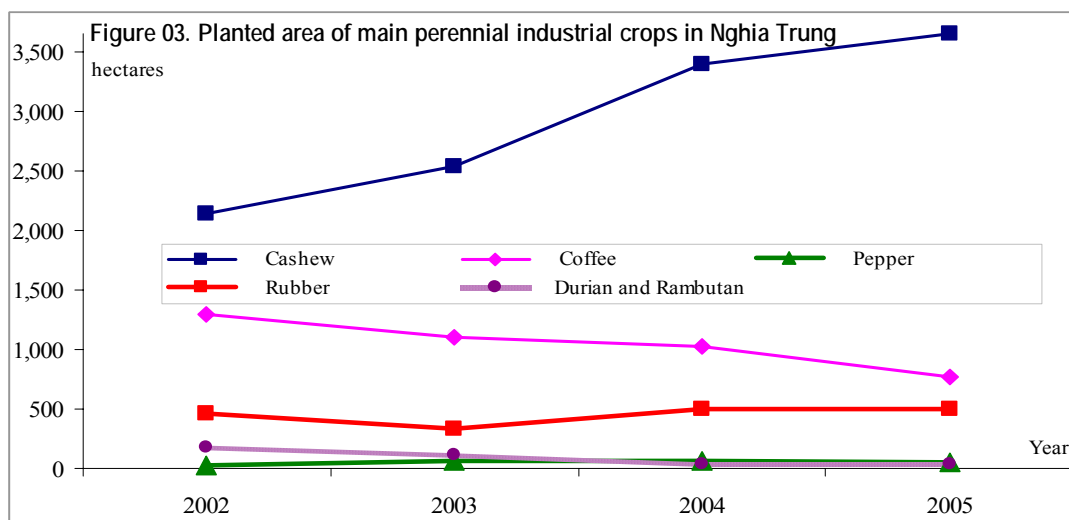
Figure 02. Household's head education by ethnic groups



Source: Survey data in 2006

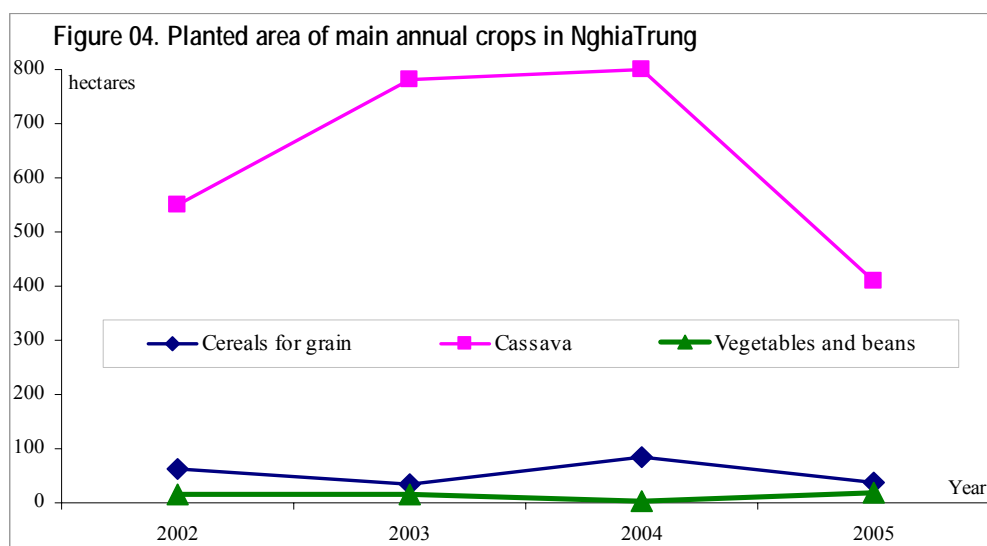
II. 2 AN OVERVIEW OF AGRICULTURAL PRODUCTION IN NGHIA TRUNG COMMUNE

Nghia Trung has a total area of 14,181 hectares (see Appendix 4.1). Of which 60% is forestry land, 40% is agricultural land including 88.8 % and 8.4% respectively perennial and annual crops. Its perennial plants are mainly such industrial crops as cashew (71.8%), coffee (15.14%), rubber (9.8%) and pepper (0.9%) (see Appendix 4.3). In the recent four years, the planted areas of cashew and rubber have significantly increased whereas coffee and perennial fruit crops have declined almost twofold and fourfold, respectively in the 4-year period (see Figure 03, Appendix 4.2). Such a change in planted area has somewhat revealed the local farmers' perception as a response to a negative marketing circumstance. This has induced farmers to fall their existing plant for a more potential one.



Concerning its industrial crops' productivity, Nghia Trung has achieved greater yields compared to the average productivity rates in Bu Dang district and Binh Phuoc province. Such a performance partially derived from the pedology suitability and farming experience.

Total area of annual crops is only 486 hectares, posting a portion of 8.48% in total agricultural land in Nghia Trung. Of which 84.36% is cassava, 7.61% is cereals for grain (e.g. paddy and maize) and 3.7% is vegetables and beans (see Appendix 4.4 and Appendix 4.5). These annual crops' planted areas have sharply decreased in the recent four years (see Figure 04). Except for the case of cassava, the commune's annual crops have appeared less competitive concerning its productivity. Cassava is mostly intercropped with other perennial industrial crops in the vegetative stage; reasonably its planted area has dramatically shrunk in the next 3-year period when industrial crops have become fruitful.



III. ASSESSMENT OF NGHIA TRUNG COMMUNE'S AGRICULTURAL MARKET

This presentation aims to provide a general understanding of the agricultural market in Nghia Trung commune and a rationale for the selection of the most favorable crops under the existing farming systems concerning the greatest opportunity for market-driven development. Some detailed analysis of the diversified crops apart from existing industrial crop and overall recommendations are presented in the next part.

III.1 Sub-sector cultivation map

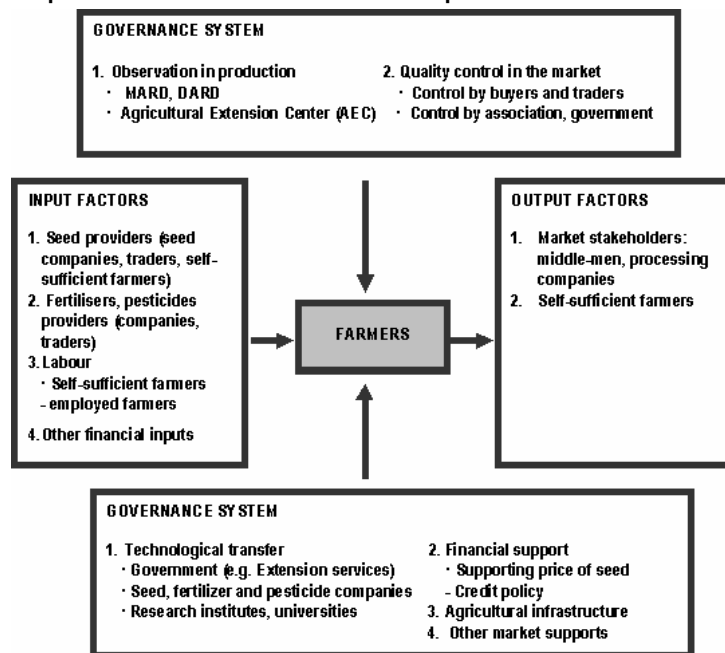
Although this marketing component is unintentionally to detail institutional and policy matters, it seeks to identify factors and stakeholders determining the shape of the agricultural market in Nghia Trung commune. This is represented diagrammatically as a 'map' of the sub-sector (see Figure 05).

Farmers demand several input production factors which are supplied by both private and public sectors including seed, fertilizer, pesticide, irrigation, water, electricity, technology and others.

While some factors are better provided under market mechanism, others have called for the GoV's participation and other supporting program such as irrigation, electricity and technology. These are clarified in the four main supporting factors, namely technology transfer, financial support, agricultural infrastructure and market supports.

Technology transfer has normally been carried out through the Agricultural Extension Center (AEC), Plant Protection Division (PPD)², research institution and university, agricultural companies under their marketing strategies (Loan, L.T, 2005). As for companies, farmers have obtained technology accompany with advanced seed, newly developed fertilizers and pesticide as free samples. However, the commune has not yet established its Agricultural Extension Center but only one extension official in serving the whole commune. Such a weak extensional staff has actually discouraged companies to launch their products and build-up business relationship. There has remained very poor irrigation system without any irrigational work in Nghia Trung commune, reported by the commune's People Committee officials. 40% of total agricultural land in the commune is in water shortage, especially in March, April and May. This corresponding figure has amounted to 70% and 90% respectively in hamlet 07 and hamlet 09.

Map 03. Cultivation sub-sector map



Concerning the input market, the supply of input production factors has mostly served perennial industrial crops. These inputs are delivered to the commune through many middlemen. According to Mr. D. – a trader in Bu Na market (interview on 14/09/2006), only 20% of farmers take the delivery of trading agents at level 01³ in Nghia Trung commune. Second, the supply has not, to some extent

² AEC and PPD belong to the Department of Agricultural and Rural Development

³ Trading agents at level 01 are those who buy seeds, fertilizers and pesticide directly from either importation companies or production factories. At level two or three, traders do not directly purchase these inputs from companies, but

been sufficient for other recently diversified crops, particularly fertilizers and pesticides for durian and seeds for vegetables. In addition, the effectiveness has much depended on the quality of inputs and farmers' technique. As a result, it is the lack of extension officials or more direct supply in Nghia Trung commune that has to some extent diminished the farmers' investment.

Among several input production factors, the survey demonstrates that majority of farmers currently demand capital, market information and technology transfer (see Table 02). In 4-point scale of marking with 4 being the most urgent necessity, it is the first rank at the highest mark of 2.38 to capital, 2.14 to technology transfer and 2.13 to market information. The more necessity is found in the ethnic minority groups compared to Kinh farmers for all input factors.

Table 02. Assessment of the shortage situation of input factors in farming production

Hamlet	% in sample	Mean values of assessment*				
		Capital	Seed, fertilizer, pesticide	Technology transfer	Market information	Labor
1	14.43	2.30	1.74	2.12	2.19	1.37
2	11.07	2.39	1.91	2.33	2.39	1.33
3	13.42	2.50	1.98	2.28	2.33	1.42
4	17.45	2.37	1.81	2.10	2.04	1.48
5	7.72	3.22	1.91	1.83	2.09	1.48
6	5.03	2.47	2.07	1.87	1.80	1.40
7	11.41	2.56	1.94	2.24	2.18	1.42
8	10.74	2.53	1.66	2.19	1.97	1.22
9	8.72	2.46	2.12	2.11	1.96	1.46
Nghia Trung Commune	100	2.50	1.88	2.14	2.13	1.40
- Kinh	75.50	2.38	1.84	2.11	2.11	1.40
- Ethnic minority groups	24.50	2.84	2.00	2.24	2.19	1.41

Source: Baseline survey data in 2006

Note: *: Mean values of assessment on necessity in 4-point scale of marking, 4 being the most urgent necessity and 1 being the lowest

Financial supports are composed of supporting price of seed and credit program. However, certain credit program has been carried out together with certain kinds of crops or animals under the GoV's recommendation including cashew as a strategic crop. Besides, a poor farmer as a member of Farmer Association can purchase fertilizer and pesticide on credit at 50%, repayable remaining 50% after their harvesting from companies. Such a sale on credit has initially achieved but very limited due to Nghia Trung's remote location, a weak linkage among companies, the commune's extension official and Farmer Association. The requirement for such a sale on credit performance is the existence of a formal organization as a legal entity in making transaction with companies. These are either Farmer Association or Farmer Club in the commune. Though Farmer Association in Nghia

through agents at level 01 or level 02 respectively. Besides, the input quality assurance of the level -01 agent is found also more reliable than that of level-02 or 03 agents.

Trung has already established, it has however not competent enough to push this activity which is currently highly demanded by its members.

Agricultural products are sold either directly to end-users at the local market or processing companies or indirectly through traditional market chains. Farmers in some cases have kept a part of their products as seed in the next crop. The farming contract has not yet been carried out; traditional channels are popularly operated in Nghia Trung with the existence of many middlemen like collectors, wholesaler and traders. Post-harvest activities have also been conducted to cassava, bamboo shoot to increase value added. However, such activities are more commonly by traders and still limited to farmers due to their need of money right after harvesting, shortage of labors.



Poor road condition in hamlet 07



Local vegetable sale



Nghia Trung local market

There is only one local market in Nghia Trung in the 14-National Road (see Map 02 and photograph). This local market is so narrow in serving traders, not farmers. When needed, farmers have to illegally take a small space in the entrance for their direct transaction in the early morning. The local marketing infrastructure is rather poor, especially in hamlet 07, hamlet 09, hamlet 05 and hamlet 08. Apparently, such a weak infrastructure has for a long time deliberately pushed up the transaction cost and thus lowered the traders' buying price to the local agricultural products. This has particularly reduced farmers' income to cassava in bulk transaction far from the main road in hamlet 05, 07 and 08; and commercial viability of rambutan in small scale production in hamlet 07 and 09 from which the transportation cost is substantially composed in the selling price.

The agricultural performance is also observed by the GoV, particularly the DARD and MARD in regard to planning on planted area, output and yield; the AEC and PPD concerning more detailed on technology, control on fertilizer and pesticide; such associations as Vietnam cashew nut Association (VINACAS), Vietnam Coffee Association as representatives of processing companies considering quality and trading in the local market. However, more direct control and evaluation on agricultural products' quality have performed by middlemen in the market chains; the association's influence is found insignificant as there are only 3 agricultural processing and trading companies in Nghia Trung.

Relevant policies in cultivation in Nghia Trung commune

There have remained three main policies on plantation in Binh Phuoc province and thus Nghia Trung commune as its component.

Supporting highly yielded seed from the GoV's program: the program has focused on cashew as a strategic plant in Binh Phuoc province. The program has carried out through AEC and PPD so as to encourage farmers to apply highly yielded seed, change from old variety to grafted cashew variety. However, the program's achievement is still a controversial issue in Nghia Trung since such a new variety application also requires high investment of capital, technology and labor which are not easily affordable for the ethnic minority groups in remote area and poor farmers.

Sale on credit of input production from companies: As mentioned, this activity has initially been achieved but very limited in Nghia Trung commune. Actually, such a performance is not the GoV's policy, but it has been derived from the demand and supply in the input market. Farmers have demanded fertilizer and pesticide under the lack of capital for investment, while companies can sell these inputs on 50% credit repayable after 12-month harvesting period of the perennial crops.

GoV's support for the operation of Farm Association, Farm Club and AEC and PPD: Most of these organization operations are technology transfer through training and seminars. Currently, Farm Association and Farm Club have been established but still not competent enough; and an Agricultural Extension Center is highly demanded in the commune to conduct extension activities.

Other supporting policies are the exemption of tax on using agricultural land to perennial crops, building up grafted cashew and cacao models and credit support in general program to poverty alleviation.

III.2 Favorable ranking of the commune's main crops

To identify the most appreciated crops concerning the greatest opportunity for market-driven development, we use nine criteria in the interview with local key informants (see Appendix 1.1). The weighted scoring method (see Appendix 03) is utilized as one input to rank several crops currently cultivated in Nghia Trung. The study's recommendation is however synthesized from the experts' experience, participatory approach in the focus group discussion and in-depth interview in the consideration of several aspects.

Table 03. Matrix ranking of main crops in Nghia Trung commune

Criterion			1	2	3	4	5	6	7	8	9
Conversion factors			12.55	13.63	11.74	9.85	11.47	11.5	11.88	8.64	8.77
Name of crops	Ranking	Total	Average weighted scoring results over 11 criteria (per 100 points)								
Cashew	1	859	9.55	9.45	8.64	7.55	9.00	9.36	9.00	6.91	6.55
Rubber	2	797	9.18	8.91	8.91	6.64	9.18	7.36	8.27	6.18	5.55
Durian	3	681	7.36	7.82	7.73	6.36	8.36	5.55	7.27	4.45	5.00
Pepper	4	672	7.18	7.82	5.64	6.36	8.09	7.00	6.36	5.73	5.45
Coffee	5	657	7.09	7.27	6.27	6.55	7.64	6.27	6.27	4.82	6.27
Cacao	6	599	6.00	6.36	6.36	5.64	5.91	6.18	6.45	5.64	4.82
Rambutan	7	504	5.36	5.36	5.09	4.73	5.55	4.91	5.45	3.64	4.73
Cassava	1	676	7.36	8.36	7.27	5.09	7.73	7.64	6.09	4.36	5.45
Vegetables	2	591	7.09	7.55	5.82	4.18	6.64	7.00	4.91	3.09	5.45

Source: Baseline survey data in 2006



Explaining the criteria in the questionnaire



The commune officials' appraisal

It should be noted that an absolute ranking is generally difficult due to the following reasons. First, each particular soil is suitable for certain crops in particular areas in the commune. Second, each crop possesses its own characteristics such as a long or short crop time, growing stage and technical requirements. Possibly, a crop is profitably intercropped with another in the initial time so as to prevent weed, pest and disease in cultivation. Third, each farmer has his own experience, farming knowledge and investment capacity to manage and make a decision in his farming activities.

The criteria's importance is in Table 03. Prominent among these are the households' market accessibility, the growth in market demand, comparative advantages regarding pedological suitability and products' quality, selling price and income generation and benefits to target groups.

The perennial crops are highly appreciated compared to annual ones (see Table 03). The first three appreciated perennial plants are cashew, rubber and durian; pepper and coffee are observed in the second rank in Nghia Trung. As a newly-cultivated plant, cacao has not yet been harvested in Nghia Trung commune. For this reason, its appraisal has become vague to most of participants.

Table 04. Average cultivation area in a household in Nghia Trung commune

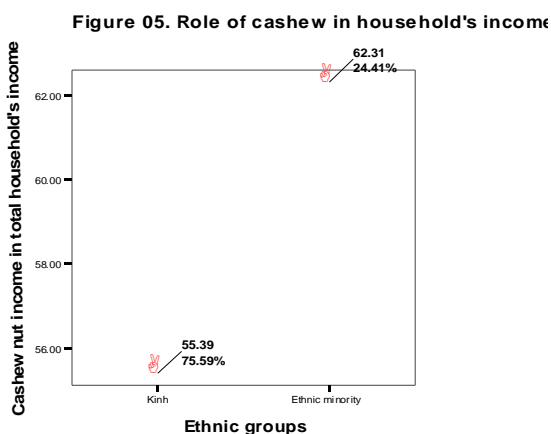
Items	Kinh		Ethnic Minority		Total	
	Mean (ha)	%*	Mean (ha)	%*	Mean (ha)	No. of households
Agricultural production area	3.56	75.49	4.27	24.51	3.73	306
In which: planted areas of each crop						
- Annual crops	0.37	77.42	0.94	22.58	0.50	31
- Cashew	2.75	75.17	3.08	24.83	2.83	298
- Coffee	1.37	69.44	2.05	30.56	1.57	108
- Rubber	1.61	95.65	3.00	4.35	1.67	46
- Pepper	0.28	96.36	0.15	3.64	0.28	55

Source: Baseline survey data in 2006

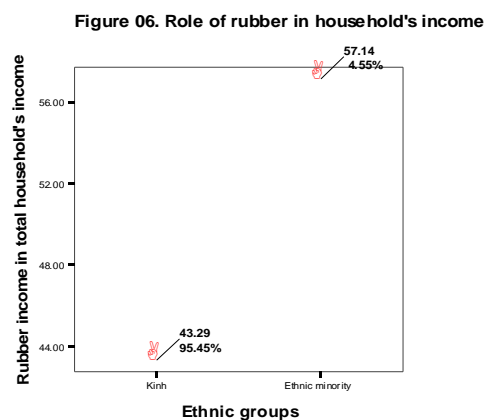
Note: *: percentage of cultivation households in total 306 surveyed households

Concerning market accessibility and market growth potential, cashew, rubber, cassava and durian are highly appraised whereas rambutan, coffee and vegetable are marketably revealed difficult. Cashew nut, rubber and cassava are all attained stronger points concerning stable selling price and

income generation criteria. Key informants have almost appraised Nghia Trung's comparative advantages to cashew, rubber, pepper durian and cassava. Together with cashew, the benefit to target group criterion is also found favorable for the case of cassava, vegetable.



Source: Survey data in 2006



Source: Survey data in 2006

In view of the perennial industrial crops, cashew and rubber are both highly appreciated for the market demand growth, market accessibility, and income generation. Though rubber has generated higher income (criterion 3), cashew generally obtains greater total weighted score for its much stronger points in the benefit to target group, input production market criteria. The fact that rubber has its longer and heavier investment, higher technique requirement in comparison to cashew has actually put the poor farmers or ethnic minority group aside in cultivation decision. Reasonably, cashew is found more popular plant with the cultivation in 97.4% of surveyed households; 2.83 hectares on average in each household (see Table 04). The corresponding figures to rubber are lower, respectively reporting 15% and 1.67 hectares and most of rubber-cultivating households are Kinh (95.65%) and wealthy households in hamlet 01, 02, 03 and 04 (see Appendix 4.7).

Table 05. Average annual household's income and sources in Nghia Trung commune

Income sources	Kinh		Ethnic groups		Total	
	Mean ('000 VND)	%	Mean ('000 VND)	%	Mean ('000 VND)	No. of households
Total household's income	66,514	75.49	54,808	24.51	63,645	306
In which from:						
- Cashew	33,479	75.59	30,869	24.41	32,842	295
- Coffee	31,923	69.49	40,121	30.51	34,424	118
- Pepper	9,461	96.67	3,125	3.33	9,250	60
- Rubber	63,281	95.45	30,000	4.55	61,768	22
% in total income						
- Cashew sale	55.39	75.59	62.31	24.41	57.08	295
- Coffee	36.39	69.49	52.94	30.51	41.44	118
- Pepper	15.42	96.67	9.74	3.33	15.23	60
- Rubber	43.29	95.45	57.14	4.55	43.92	22

Source: Baseline survey data in 2006

Like rubber, pepper seems to be unfavorable to ethnic minority group for its long term and heavy investment (see Table 05). Its contribution to households' income is not as high as cashew, rubber and coffee. Although the absolute income from rubber is higher, cashew also plays a more decisive role with its greater percentage income, especially to ethnic groups (see Figure 05, Figure 06 and Appendix 4.8).

Regarding diversified crops, durian is greatly appreciated concerning its comparative advantages, market accessibility and income generation. As its harvest time is different from the Mekong delta's, its market demand growth appears more potential and competitive in the whole country, more importantly in the high-paid domestic market and exportation. Unfavorably, durian is not highly attainable concerning the benefits to target groups, input market, market risk and the GoV's policies. Like rubber and pepper, durian expansion requires financial supports and capable farmers concerning the long term and heavy investment and high observation on pest and disease in this perennial crop. These requirements actually have obstructed farmers in the course of cultivation.

Cassava is favorably recommended to farmers as an annual crop in comparison to vegetables. The market accessibility and stability, the availability of purchasing system and benefit to target group are the most appreciated criteria. As a crop for poor households and poverty alleviation, cassava has also been appreciated in favor of poor and landless households, low investment and technique requirement, employment generation, especially woman. The shorter the crop time is the less vulnerable farmers endure in their agricultural production. Though not being the first-rate, cassava has rather highly attained in almost criteria.

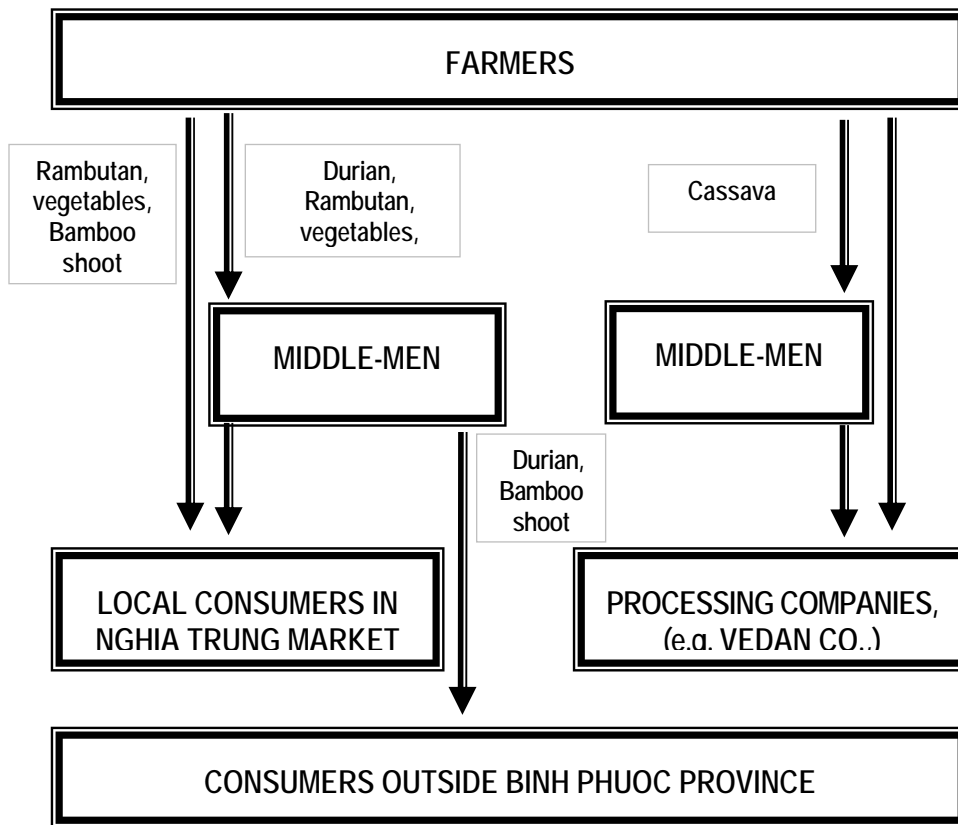
Rambutan and vegetable are found unfavorable for its low income generation, poor input production market and less comparative advantages. While rambutan has adversely appeared in most of criteria, vegetable still remains certain strong points in benefit to target groups and market accessibility.

In summary, Nghia Trung's marketing infrastructure has appeared rather poor without any farmers' convenient outlet in local market, high transportation cost due to poor road. The supply of input factors has almost served the perennial industrial crops and it has to some extent been limited to other diversified crops. Technology transfers have not well achieved in the shortage of extensional workers, without any Agricultural Extension Center and thus weak linkage between farmers, input companies and the GoV's policies. The 9- criterion assessment has usefully provided a full marketing appraisal and critical inputs for more specified concerns to each crop for the next steps. Bamboo shoot is promisingly suggested for the detailed market value chain analysis.

IV. MARKET VALUE CHAIN ANALYSIS

Apart from the common perennial industrial crops, this market value chain analysis concentrates on the five diversified crops, namely durian, rambutan, bamboo shoot, cassava and vegetables. The presentation firstly describes the market chain and value added analysis and then proceeds to some marketing advantages and drawbacks. The constraints and viable solutions are finally drawn out for marketing improvement in Nghia Trung.

IV.1 Market chains of focused crop in Nghia Trung commune

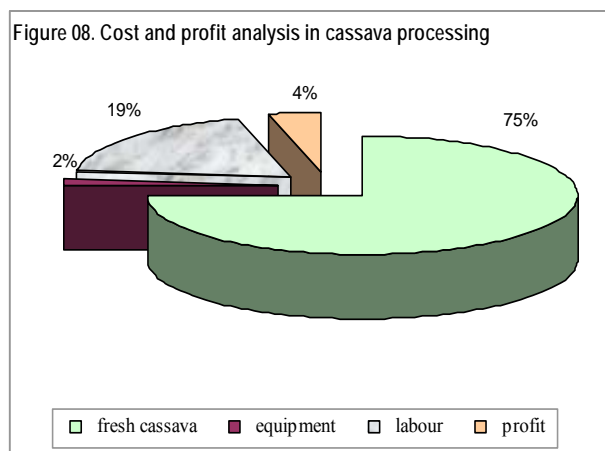


Map 04. Market chains of focused crops in Nghia Trung commune

Unlike other crops, cassava has its own market chains (see Figure 07). Farmers either sell their cassava to middlemen (e.g. collectors, purchasing stations) or more directly to processing companies or other processing units. Nearly 70% of cassava in Nghia Trung has arrived at VEDAN Company in the neighboring Duc Lieu commune (see Map 02). Apart from VEDAN Co., there has also other demand from starch and cattle feeding processing units in or outside Binh Phuoc province.

Cassava has almost been cultivated in hamlet 5, 8 and 7. Very limited is the performance of direct transaction with processing companies, reporting about 5% of farmers mostly located in hamlet 7; the common market chain is still through middlemen as harvesters in the case of package deal or

selling short⁴, transportation providers, and previous production funding. Although selling dried cassava farmers apparently receive higher value added for their preliminary processing (see Figure 08), they mostly sell fresh cassava due to the need of money and labor shortage in the harvesting time.



As for processing performance, farmers additionally obtain 140,000 VND/01 ton of fresh cassava for their labor and value added or equivalently 23% in selling price of dried cassava (see Figure 08). Farmers can gain monthly earnings for their post-harvest drying of 910,000 VND with a normal processing capacity of 6.5 tons of fresh cassava. This income is relatively high and stable in comparison with their farming. More importantly, farmers can make the best use of their working time after harvesting. The requirements for such post-harvest activities are so simple with the availability of drying space and labor.

Regarding remaining crops, while durian and bamboo shoot have competitively reached farther markets, vegetables and rambutan are mostly for home consumption and partially traded in the local market. Durian has mostly reached outside markets and exportation through middlemen in traditional chain. As a newly – diversified plant, the cultivated bamboo shoot has commercially been developed approximately in 15 households in Nghia Trung to add in the shortage of natural bamboo shoot in the forestry which has now been controlled by the government for forestry expansion.



Small -scale vegetable production



In-depth interview with farmers



Sweet potato buds for home consumption

⁴ Package deal is the case that farmers sell their product as a whole without any measurement; selling short is the case of package deal before the harvest point of time. The traders perform harvesting in both cases.

The market accessibility of rambutan and vegetables has locally found limited only in Nghia Trung commune and they are mostly for home consumption. In common cases, farmers deliver their vegetables or rambutan to traders in Bu Na markets for their resale. A few farmers perform their directly sale to end-users in the local market in early morning. As mentioned, the marketability of rambutan is found constrained due to high transportation cost under the existing poor road condition.

IV.2 Analysis of some advantages and drawbacks in marketing performance

Concerning financial incentive for farmers' production investment, Table 06 and Table 07 provide the cost and profit for each of 5 diversified crops under the assumption that the outputs are all sold in the market. Such an assumption is found impossible to vegetables due to limited local consumption capacity and somewhat unsure to bamboo shoot for its newly-established market chains. While costs in vegetative period for perennial crops are allocated during the fruitful lifetime, such an allocation is not necessary for the annual crops.

Although farmers' profit in the whole crop time has highly been achieved, their monthly earnings are not corresponding high for the two reasons. First, the calculation does not take into account the economic of scale effect (or operational capacity). While the middlemen easily operate at several tons in 3-4 months, farmers has only attained moderate output depending on their planted areas and yields. Second, farmers have cultivated in the year all whereas traders have performed their business only in the 2- or 4-month period. Thus, the estimation of monthly earnings of each stakeholder in the supply chain is additionally presented (see Table 06 and Table 07).

The survey has to some extent revealed that the monthly farmers' earnings are second-rate compared to middlemen in the chain, calculated on 1-hectare planted area for farmers and normal trading capacity for middlemen. A high vulnerability in cultivation has however obtained a relatively moderate gain compared to traders in the supply chain.

Vegetable is the different case. The 1-hectare calculation is in reality found impossible concerning limited consumption capacity and marketability. The common production scale of vegetable is 0.1 – 0.5 hectare, thus the 1-hectare farming profit can not be attainable for the case of vegetables. While traders' profit is calculated at normal capacity, however it only accounts for 15-20% of their profit under a quite range of products (interview with traders on 14/10/2006).

Vegetables in Nghia Trung are commonly leafy vegetables such as leaf mustard (cải xanh), choysum (cải ngọt), sweet potato buds (rau lang), and fruit-vegetables including gourd (bầu), wax gourd (bí), smooth loofah (mướp hương). The financial calculation has been conducted for two main cultivated vegetables namely, smooth loofah as a fruit-vegetable and mustard (or choysum) as leafy vegetables. They have 6- and 3- month crop time, respectively.

Table 06. Farmers' cost and profit analysis

Items/Main priority crops	Durian	Thai -seed Durian	Normal rambutan	Bamboo shoot	Bamboo shoot	cassava	cassava	Smooth loofah	Choysum, vegetable mustard
Initial investment time (months)	72	72	48	36	36	6	6	6	3
Fruitful lifetime (years)	15	15	15	20	20	-	-	-	-
Area (hectares)	<i>1.0</i>	<i>2.0</i>	<i>1.0</i>	<i>1</i>	<i>0.15</i>	<i>0.6</i>	<i>2.5</i>	<i>0.1</i>	<i>0.1</i>
a. Cost in construction period									
- Labor cost	8,930,000	14,020,000	2,275,000	9,120,000	595,000	875,000	2,800,000	2,607,500	2,830,000
- Seed	160,000	7,000,000	1,000,000	600,000	200,000	100,000	400,000	50,000	300,000
- Fertilizer and pesticides	14,640,000	10,500,000	12,652,000	1,284,000	96,000			740,000	500,000
- Tree-basin		405,000	350,000					1,439,667	
- Equipment	23,940,000	20,692,000	17,416,667	15,466,667	8,333,333	23,333	23,333	188,333	188,333
Sub-total	47,670,000	52,617,000	33,693,667	26,470,667	9,224,333				
Depreciable charge in a crop time	3,178,000	3,507,800	2,246,244	1,764,711	461,217	998,333	3,223,333	5,025,500	3,818,333
b. Cost in a crop time									
- Labor cost	770,000	1,750,000	350,000	140,000	35,000				
- Fertilizer and pesticides	1,840,000	10,920,000	270,000	428,000					
- Harvesting cost	1,050,000	4,900,000	1,750,000	1,500,000	350,000	210,000	875,000	770,000	1,400,000
- Land heaping		405,000						180,000	
- Other costs	952,000	1,650,000		135,000				950,000	1,400,000
Sub-total	4,612,000	19,625,000	2,370,000	2,203,000	385,000				
1. Total cost in a crop time	7,790,000	23,132,800	4,616,244	3,967,711	846,217	1,208,333	4,098,333	5,975,500	5,218,333
2. Selling price (VND/kg)	7,000	10,000	1,000	3,000	3,000	450	450	2,000	2,500
3. Output (kg)	2,000	9,000	10,000	10,000	1,000	11,500	62,500	4,000	4,700
4. Revenue (VND)	14,000,000	90,000,000	10,000,000	30,000,000	3,000,000	5,175,000	28,125,000	8,000,000	11,750,000
5. Profit (VND)	6,210,000	66,867,200	5,383,756	26,032,289	2,153,783	3,966,667	24,026,667	2,024,500	6,531,667
Monthly average profit	517,500	5,572,267	448,646	2,169,357	179,482	661,111	4,004,445	337,417	2,177,222
For a hectare cultivation									
- Production cost in a hectare	7,790,000	11,566,400	4,616,244	3,967,711	5,641,444	2,013,889	1,639,333	59,755,000	52,183,333
- Productivity (kg/01hectare)	2,000	4,500	10,000	10,000	6,667	19,167	25,000	40000	47000
- Revenue	14,000,000	45,000,000	10,000,000	30,000,000	20,000,000	8,625,000	11,250,000	80,000,000	94,000,000
- Profit	6,210,000	33,433,600	5,383,756	26,032,289	14,358,556	6,611,111	9,610,667	20,245,000	41,816,667
Monthly average profit	517,500	2,786,133	448,646	2,169,357	1,196,546	1,101,852	1,601,778	3,374,167	13,938,889

Source: Data from in-depth interview in 2006

Table 07. Traders' cost and profit analysis

Items	Units	Durian	Rambutan	Cassava	Bamboo shoot	Vegetables
Ratio*		60%/40%		80%/20%		
Trading time	days	150	120	60	120	360
Trading volume	kg	3,100	44,400	68,000	2,240	7632
Margin	VND/kg	2000/4000	500	100/300	1,000/1,000	500
Cost						
Packaging, Storage	VND/a season	400,000	275,000	217,600	300,000	76,320
Equipment cost	VND/a season	20,833		25,000	16,667	50,000
Transportation cost	VND/month		4,440,000	1,632,000		381,600
Communication cost	VND/a season		80,000	30,000		120,000
Labor cost	VND/a season		5,485,000	300,000	200,000	1,080,000
Other costs	VND/a season		120,000		152,000	
<i>Total cost</i>	VND/a season	420,833	10,450,000	2,204,600	518,667	1,707,920
Total revenue	VND/a season	8,680,000	22,200,000	9,520,000	2,240,000	3,816,000
Profit in a season	VND/a season	8,259,167	11,750,000	7,315,400	1,721,333	2,108,080
Monthly average profit	VND/month	2,753,056	2,937,500	3,657,700	430,333	175,673

Source: Data from in-depth interview in 2006

Note: * : trading ratio between Thai-seed durian and normal one or between fresh and dried cassava, respectively

Vegetables are revealed profitable; leafy vegetables are more gainful than fruit-vegetables. On average, farmers can earn a monthly profit of 337,417 and 2,177,222 VND on 0.1 hectare cultivated smooth loofah and choysum, respectively (see Table 06). However, the calculation on one hectare cultivated vegetables is commercially not viable due to limited local consumption capacity. Vegetables are practically grown in Nghia Trung at small scales of 0.1 to 0.5 hectare. Besides, vegetables in Nghia Trung can only be grown in sunny season, not in rainy season. Almost vegetable in Nghia Trung is for home consumption, posting a rate of 95% in total cultivation households, only remaining 5% for sale at the local market.



Imported vegetables in local market



Direct sale of farmers



A vegetable trader in local market

Not only limited demand but also limited market accessibility has empirically revealed in marketing vegetables. Right in the local market, local vegetables can not compete against those imported from Dong Xoai town or Binh Duong province due to its unstable supply and unattractive appearance⁵.

⁵ According to traders, local vegetables are not attractive in appearance though possibly the same quality compared to those imported from Dong Xoai town or other provinces. Such a performance is practically derived from the lack of fertilizer and pesticide usage. There are two cases for such a situation. First, farmers intentionally perform safe-

Thus, imported vegetables have substantially gained local market share. Less comparative advantages are also found in working habit, farming technique, input factors and natural conditions. Vegetable production needs labor efforts more than capital invested. While a good vegetable farmer is often characterized by his cautiousness, diligence, and gleaning, these requirements are not satisfied in Nghia Trung commune.

As an annual crop, cassava is suitably intercropped with other perennial industrial plants as sub-crop during the vegetative stage. Such an intercropping has enabled farmers to reduce weeding cost and to survive for their perennial crop investment; however this possibly decreases the perennial crop's productivity in the latter fruitful period. Cassava has popularly cultivated in hamlet 5, 7 and 9, particularly in the newly-cultivated area or initial structural change one. It has become one important source of households' income, especially the poor and/or ethnic minorities for its popular plant with stable price, low investment cost and simple cultivation requirement. Some financial indicators show that relatively low investment cost in six months and incentive monthly average profit on 1-hectare cultivated area, reporting at 1,101,852 and 1,610,778 VND depending on productivity and investment level (see Table 06).

More importantly, the efficiency in cassava cultivation has also relied on the market demand growth, especially the purchasing capacity of VEDAN company and other starch and cattle feeding processing units. Though the market demand has potentially grown, Nghia Trung has to competed and shared such a market demand with other abundant newly- cultivated area in DakNong under monoculture. The enhancement in farming contract and processing performance will reduce transaction cost in the market and create higher value added and thus increase farmers' earning. However, these production expansions have also called for particular supports in order to obtain the most efficiency in the perennial crops' productivity in latter stage. As might be expected, though cassava is pedologically suitable in Nghia Trung commune, its production expansion is not viable due to its limited area, stable but unattractive financial incentive compared to other industrial crops. Within a certain cultivated area, it has only been intercropped with other industrial crops for which farmers replace their existing plant. Cassava monoculture has now become uncommon in Nghia Trung.

Durian is found the most profitable among the five diversified crops in the survey. Monthly average profits are 2,786,133 and 517,500 VND respectively to Thai-seed durian and normal one on 1-hectare cultivated area (see Table 06). Such a financial incentive possibly reaches greater achievement thank to the market growth potential both in highly-paid domestic segment and exportation. Durian has for a long time cultivated in Nghia Trung but the farmers' investment for sale has initiated in the recent five to ten years. Thai-seed durian is found more profitable than the normal one; however such a profit attainment is also controversial due to strict quality requirement, long-term and heavy investment, and high production risk. Farmers have to guarantee the product's

production for their home consumption. Second, such a vegetable production is not considered as an investment for sale and thus farmers do not take care their farming including investment in fertilizer and pesticide. There are also some cases of poor farmers who can not be affordable for fertilizer and pesticide.

quality in making their transaction with middlemen⁶. Besides, the poor roads has currently induced high transportation cost, especially in durian- planted area in hamlet 08 and 09.

Durian has 5-year period of initial investment with the annual average production costs of 7,790,000 and 11,566,400 VND respectively to normal durian and Thai-seed one. Except for vegetables which are not marketable at a large production scale, durian's investment cost is the heaviest among the five diversified crops. However, Thai-seed durian which meets the strict quality requirement will easily compete with similar products from other provinces owing to its specialty and different harvesting time with that in the Mekong delta.



A rambutan trader



Fresh bamboo shoot



Boiled bamboo shoot

Bamboo shoot is revealed the second rank among diversified crops in term of profitability, market demand and growth potential. There are two kinds of bamboo shoot, namely natural bamboo shoot in the forestry which has now been controlled for forestry expansion and cultivated one which is focused in the discussion. Bamboo shoot has been diversified in the market: fresh (30%), boiled (10%) and dried (60%). Such diversification has actually enabled to stabilize the market price and reduced the market risk for producers and traders. Farmers earn an average monthly profit of 1,196,546 to 2,169,357 VND on one hectare cultivated depending on investment level and productivity. Though bamboo shoot has comparative advantages in term of land suitability, it has difficultly handled with the lack of water for intensive cultivation and technology transfers.

Rambutan is found the worst among five diversified crops in several aspects, namely product quality, low productivity, unpromising marketability and financial incentive. More importantly, rambutan has not comparative advantages in production concerning natural conditions and farming technique. There are three main kinds of rambutan: Thai rambutan, longan- rambutan and normal one. Among the three, normal one is the less economically efficient, it is however popularly cultivated in Nghia Trung commune.

⁶ Traders have kept a partial payment until durian is all sold without any complaint or rejection unless their repayment (if any) is deducted from farmers' revenue.

Table 08. A summary on advantages and drawbacks of the five crops

	Market accessibility and growth potential	Market performance	Selling price and income generation	Comparative advantage	Input market and farming conditions
Durian	<ul style="list-style-type: none"> - Market growth potential (highly-paid domestic market and exportation) for Thai-seed durian - Yet very well-established market chain - Greater demand for Thai-seed durian than normal one 	<ul style="list-style-type: none"> - Strict quality control from middlemen for their warranty transaction with end-users as for Thai-seed durian - High transportation cost due to poor road condition 	<ul style="list-style-type: none"> - Slightly decreasing but still attractive selling price - High income to both Thai-seed durian and normal one 	<ul style="list-style-type: none"> - High comparative advantages for more pedological suitability 	<ul style="list-style-type: none"> - Heavy capital investment and labor's industriousness - Common intercrop with other perennial crops to reduce market and production risk - Lack of qualified seed and technology transfers, fertilizer and pesticide - High production risk of pest and disease
Rambutan	<ul style="list-style-type: none"> - Home or local consumption - Low marketability 	<ul style="list-style-type: none"> - External market demand for Thai rambutan or longan-rambutan while local product is normal rambutan - High transportation cost due to poor road condition 	<ul style="list-style-type: none"> - Unstable price and thus income - Lowest profit 	<ul style="list-style-type: none"> - Less comparative advantages due to lack of specialized farming, low productivity and quality 	<ul style="list-style-type: none"> - Common intercrop with others
Bamboo shoot	<ul style="list-style-type: none"> - Market growth potential of processed product - Yet very well-established market chain - Not well-established market as cultivated bamboo shoot is recently developed. 	<ul style="list-style-type: none"> - Product diversification 	<ul style="list-style-type: none"> - Stable price due to product diversification - Relatively high income 	<ul style="list-style-type: none"> - Pedological suitability 	<ul style="list-style-type: none"> - Simple cultivation requirement - Lack of water for intensive cultivation - Lack of technology transfers
Cassava	<ul style="list-style-type: none"> - Stable market demand under the operation of local processing company (VEDAN, Co.,) - Growth potential of market demand from starch or cattle feeding processing units 	<ul style="list-style-type: none"> - Product diversification (fresh or dried) - Available local traders - Still appearance of non-competitive relations owing to buyer's previous financial support 	<ul style="list-style-type: none"> - Stable price and income - But relatively low income compared to other perennial crops 	<ul style="list-style-type: none"> - More pedological suitability among annual crops, especially to newly-cultivated area - Competition with DakNong province with larger newly-cultivated area and monoculture 	<ul style="list-style-type: none"> - Low investment cost - Simple cultivation requirement - Common intercrop with other perennial industrial crops (cashew, coffee, rubber) in the vegetative period to reduce weeding cost and enable farmer to survive for long term and heavy investment in perennial crops - Possibly to decrease the perennial crop's productivity
Vegetables	<ul style="list-style-type: none"> - Common home consumption - Locally limited demand - Limited market accessibility due to low quality, unattractive appearance, small-scale and unstable supply 	<ul style="list-style-type: none"> - Sale to either direct end-users or traders in local market 	<ul style="list-style-type: none"> - Relatively lower price compared to similar products in other areas - Higher but unstable income than cassava 	<ul style="list-style-type: none"> - Less comparative advantages due to working habit and experience, less pedological suitability and seasonal aspects 	<ul style="list-style-type: none"> - High labor consumption - Lack of farming technique, seed, and labor's industriousness

Table 09. Identification and assessment of market constraint and opportunities

	Constraints	Opportunities	Solutions and ideas	Interventions
Perennial industrial crops (cashew, rubber, coffee, pepper)	<ul style="list-style-type: none"> - Application of high-yield seed and advanced technology for poor and ethnic minority farmers - Lack of direct delivery and reliability of input production factors - Weak purchasing infrastructure (market information, purchasing service, road infrastructure) - Non-competitive transaction under previous funding from traders 	<ul style="list-style-type: none"> - Market demand growth potential - The GoV's establishment of agricultural future market for each specific strategic product 	<ul style="list-style-type: none"> - Application of high-yield seed and advanced technology - Linkage between the GoV's supporting policies, companies, farmers and technology experts - Encouragement of post-harvest activities and coming participation in the future market 	<ul style="list-style-type: none"> - Market price information and marketing consultation, improvement of infrastructure - Technical and credit support in the application of high-yield seed and advanced technology - Linkage creation between input companies, farmers and output companies
Durian	<ul style="list-style-type: none"> - Long term and heavy investment - Lack of qualified seed, fertilizer, pesticide and technology transfers - High production and market risk under warranty transaction - Yet very well-established market chain 	<ul style="list-style-type: none"> - Great market demand and growth potential, especially to highly paid domestic market and exportation - High competitive ability - Processing performance 	<ul style="list-style-type: none"> - Linkage to share out heavy investment and reduce production and market risk - Technology transfer - Investment in processing 	<ul style="list-style-type: none"> - Technology transfer to prevent pest and disease - Intercrop to survive for long term and heavy investment - Linkage for processing and farming contract
Bamboo shoot	<ul style="list-style-type: none"> - Water shortage for intensive cultivation - Lack of technology transfers - Yet very well-established market chain 	<ul style="list-style-type: none"> - Great market demand and growth potential - High competitive ability - Processing for exportation 	<ul style="list-style-type: none"> - Technology transfer - Irrigation improvement 	<ul style="list-style-type: none"> - Experience dissemination within Farm Association - GoV's support on irrigation system - Safe-processing for exportation
Rambutan	<ul style="list-style-type: none"> - Low financial incentive - Less comparative advantages concerning farming technique, product quality and productivity - Low competition 		-	
Cassava	<ul style="list-style-type: none"> - Possible risk of reducing productivity and quality of perennial crops - Limited working capital to increase value added by processing 	<ul style="list-style-type: none"> - Unmet market demand from processing units 	<ul style="list-style-type: none"> - Efficient intercropping - Farmers' processing performance 	<ul style="list-style-type: none"> - Warning the decrease in productivity of perennial crops
Vegetable	<ul style="list-style-type: none"> - Farming technique, seeds - Limited market demand and low market accessibility - Absence of labor industriousness 	<ul style="list-style-type: none"> - Certain local market demand - Labor utilization for food enrichment 	<ul style="list-style-type: none"> - Safe-production with quality improvement to gain local demand - Seeds supply 	<ul style="list-style-type: none"> - Experience dissemination within Farm Association

In summary, under many aspects including market accessibility and growth potential, market performance, income generation and farming conditions, five diversified crops are critically appraised to identify the most profitable and marketable crops in pursuit of the greatest opportunity for market-driven development from the commune's existing farming systems. Durian and bamboo shoot have appeared the most profitable with the increasing market demand in the whole country and exportation. However, they have currently dealt with some detriments concerning low technology, water shortage and heavy investment only for durian. Though having stable and local market demand growth, cassava has revealed low financial incentive and gradually decreasing comparative advantages in term of land availability. Rambutan and vegetables are observed behind the three above-mentioned crops. Being commercially grown under the investment both safe and quality production, vegetables promisingly gain the local demand with stable and sufficient supply.

V. CONSTRAINTS IDENTIFICATION AND COMMERCIALY VIABLE SOLUTIONS

While the detailed analysis has focused on five diversified crops in Nghia Trung commune, this presentation has synthesized information from the general survey, focus group discussion to identify marketing constraints and viable solutions in agricultural market in Nghia Trung as a whole.

1. Low use of technology

It is recognized that perennial industrial crops have evidently played the most important role in the people's livelihoods in Nghia Trung commune. Cashew is the most suitable under the ecology condition besides other industrial crops including pepper, coffee and rubber. Among these industrial plants, cashew nut becomes one of the most important sources of households' income, especially the poor and/or ethnic minorities for its popular plant with stable price, low investment cost and simple cultivation requirement.

Prominent among the growing concerns for cashew expansion is the current government's efforts in application high-yield grafted cashew under the seed supporting program and technical support from the extension officials. Though the government program has paid more attention to and favored the ethnic minority's farming, the better-off have mostly been the Kinh farmers. The reason is that such grafted cashew plantation has required not only seed but also such other more important and decisive factors as farming technique, fertilizer and pesticide and the taking care of growers. Ethnic minority has for a long time experienced normal cashew plantation with fewer requirements of both capital and their taking care⁷. As for ethnic minority farmers, the program success requires the recommendation and practical support in capital investment and farming technique necessary to grafted cashew such as pruning and maintaining.

⁷ For this reason, farmers have chosen normal cashew plantation for its "idle – plant".

Concerning the diversified crops, technology transfers are urgently demanded for both durian under the current production high risk and strict quality requirement and bamboo shoot under great market demand potential. How to efficiently intercrop cassava with other perennial plants should be disseminated unless such an intercrop adversely affects the perennial plant's productivity. Vegetable- cultivation technology follows in need in pursuit of product appearance improvement and high competition ability.

There are possible channels for technology transfers, namely input companies, AEC under the GoV's supports and Farm Club/Association. The removal of current shortage of extensional staff and weak linkage between the commune and input companies will improve the local technology application.

2. Weak extensional activities and poor irrigation system

As mentioned, weak extensional activities actually derived from the shortage of extensional staff and lack of Agricultural Extension Center in the commune. Such a circumstance has for a long time obscurely discouraged the linkage between the commune and input companies or the GoV's program. Though Farm Association in Nghia Trung has already established, it is however incapable to push extensional activity. The current poor irrigational system has adversely affected agricultural productivity, efficiency and intensive farming. The removal of these two constraints has absolutely called for the GoV's supports.

3. Inadequate supply of production inputs especially for diversified crops

Production inputs have currently delivered to Nghia Trung commune through several middlemen. Such a lack of direct delivery apparently increases the production cost and possibly reliability of input quality. The input supply has revealed insufficient for certain diversified crops, particularly vegetables and durian. Besides, the circumstance of previous input funding has obscurely induced non-competitive transactions in selling agricultural products, particularly to poor farmers or in cassava and cashew nut transactions.



Focus group discussion with officials



Drawing conclusion



Focus group discussion with farmers

As it were, the input market development much depends on first demand and then supply. In term of supply, the linkage between input companies and local farmers plays an important role for market betterment concerning low transaction cost, reliable quality, supporting credit sale and usage consultation. For such an achievement, again, there should be an extensional organization, Farm

Associations/Clubs capable enough to address and co-operate with input companies. Regarding demand, the improvement of farming knowledge hopefully manipulates farmers' input usage toward a sustainable and proper manner.

4. Poor marketing infrastructure

Prominent among concerning issues is the poor road condition in Nghia Trung commune which has deliberately pushed up the transaction cost and thus lowered the traders' buying price of the local agricultural products. More considerably, this has actually reduced farmers' income to cassava and durian in bulk transaction far from the main road and commercial viability of rambutan in small scale production since the transportation cost is substantially composed in farmers' revenue.

Nghia Trung local market seems to be incapable of trading demand, particularly in serving farmers. The availability of purchasing system has remained inadequate in the lack of purchasing station level 01⁸ and non-competitive transactions under the previous production funding, especially for the perennial industrial crops (Loan, L.T, 2005). The more middlemen operate in the chain the lower selling price farmers receive. Transactions which occur as settlement of previous funding have empirically experienced 5 to 10 percent lower selling price.

Informal sources of price information are more common than officially formal ones (Loan, L.T, 2005). Unfortunately, the former more or less brings a bias unfavorable to farmers; more advantage to traders from whom price information is derived. Secondly, price information from purchasing station is changeable even within a day. This source turns more risky and unfavorable to farmers in arranging and executing their sale. Thirdly, the lack of price information from local agricultural extension staff and farming association revealed considerable incompetence to perform market consultation. Last but not least, the government's policy has not effectively coincided both technical support and market consultation to farmers.

As purchasing services are expanded and road infrastructure is highly upgraded, farmers will more easily access to purchasing system at low transportation cost to reach higher price. The improvement of poor road circumstance should be called for the GoV's supports; there should be more linkage with output companies to enhance the current purchasing services. This more or less induces more efficiency in agricultural market and thus should be encouraged in the coming years.

⁸ Regarding perennial industrial crops, farmers sell their outputs (cashew nut, coffee, pepper and rubber) through three channels, namely (1) direct sale to purchasing station level 01, (2) to collector/ assembler at farmer's house or farm and (3) sale at purchasing station level 02. The collector is the first link between farmer and other middlemen in purchasing system. He buys smaller lots of scattered agricultural product by his own capital, combines and classifies these into fewer types and finally resells them at a certain location, usually a purchasing station level 01. In addition to assembly, such a person to some extent makes a deal in connection of providing transportation. The distinction between the two levels is to whom the product is resold. While purchasing station level 01 makes a direct sale to processing companies, one level 02 is unable to reach to processing factory, but distributes his purchase to its parent-station, that is, level 01 purchasing station.

The effective formal source should be utilized to update price information day by day at least in the trading period. Market consultation should be designed in the activities of AEC and farm association under the government's manipulation through formal and more effectively accessible sources in fair of both farmers and traders. In seeking for more production investment from smallholders, the government's technical support should coincide with marketing consultation and marketable guarantee of farmers' crop produce. Accordingly, underwriting to purchase of agricultural products should be taken into account in both processing enterprises and related institutions under a package of the government's strategic policies.

5. Lack of market linkage and post-harvest performance

There has remained the weak linkage between processing enterprises and farm -producers or local supplying areas. Thus, these processing enterprises have in reality cut off budget of material by lowering purchasing price for their purchasing cost. These have obviously led to inefficiency in processing industry and detriments to farmers as a result. Direct farming contract is found an effective link between processing enterprise and farmers so as to make sure the quality and quantity. In return, farmers benefit from payment in advance as a credit for their production investment.

The movement of preliminary post-harvest activities from processing companies to households has actually been under market mechanism. The companies save more capacity for further processing and farmers better utilize their working time after harvesting time. Farmers have earned an income of 15% and 23% in the selling price of cashew kernel (Loan, L.T, 2005) and dried cassava, respectively. With a low investment, such an income is relatively high compared to their farming earnings. Farmers more importantly recognize the quality requirement through their post-harvest performance and thus improve their farming accordingly. Though being popular in Dong Phu and Phuoc Long districts, cashew post-harvest activities have not yet been achieved in Bu Dang. Cassava post-harvest performance is very limited to farmers. Thus, these post-harvest activities should be encouraged at household level to create the better linkage between farmer and processing companies in the supply chain.

Last but not least, the government should take measures to reduce market risk. In addition to processing units, the government or one official institution can conduct this underwriting or forward operation, and then these organizations make a deal with purchasing units or processing enterprise as farmers' representative.

In summary, there should be more strategic and supportive operations from the GoV, input and output companies, government conducive to farmers' participation and their benefit as a result. Support on techniques and market price information are the most households' necessities. More efficient supply of input factors, extensional activities, irrigation and marketing infrastructure are all demanded. To improve price and enhance market efficiency, increase the linkage between input and output companies is found efficient link between the government's support, processing enterprises' guarantee and farmers' production investment.

VI. SUMMARY AND CONCLUSION

1. Agricultural production and income contribution

Nghia Trung has a total area of 14,181 hectares, including 60% forestry and 40% agricultural land. Perennial industrial plants amount to nearly 90%; only 8.4% is annual crops. Its perennial plants are mainly cashew (71.8%), coffee (15.14%), rubber (9.8%) and pepper (0.9%). It is recognized that perennial industrial crops have evidently played the most important role in the people's livelihoods in Nghia Trung commune. Cashew is the most suitable under the ecology condition besides other industrial crops including pepper, coffee and rubber. Among these industrial plants, cashew nut becomes the most important sources of households' income, especially the poor and/or ethnic minorities for its popular plant with stable price, low investment cost and simple cultivation requirement.

As it were, a change in planted area has somewhat revealed the local farmers' perception in response to a negative marketing circumstance. Accordingly, the planted areas of cashew and rubber have significantly increased whereas coffee and perennial fruit crops have declined in recent years. Owing to the land suitability and farming experience, Nghia Trung has achieved greater yields to perennial crops compared to the average productivity in Bu Dang district and Binh Phuoc province.

In total annual crop area of 486 hectares, 84.36% is cassava, 7.61% is cereals for grain and 3.7% is vegetables and beans. These annual crops' planted areas have sharply decreased in the recent four years. Except for the case of cassava, the commune's annual crops have appeared less competitive concerning its productivity. As a sub-crop, cassava is temporarily intercropped with other industrial crops in the vegetative stage; reasonably its planted area has dramatically shrunk in the next 3 years.

2. Favorable ranking of the commune's main crops

Evidently, the perennial crops are highly appreciated compared to annual ones. The first three appreciated perennial plants are cashew, rubber and durian; pepper and coffee are observed in the second rank in Nghia Trung. As a newly-cultivated plant, cacao appraisal has become vague to informants. Concerning market accessibility and growth potential, income generation, cashew, rubber, cassava and durian are highly appraised whereas rambutan, coffee and vegetable are marketably revealed difficult. Key informants have almost appraised Nghia Trung's comparative advantages to cashew, rubber, pepper, durian and cassava. Together with cashew, the benefit to target group criterion is also found favorable for the case of cassava, vegetable.

In view of the perennial industrial crops, cashew and rubber are both highly appreciated for market demand growth, market accessibility, and income generation. Though rubber has generated higher income, cashew generally obtains greater total weighted score for its much stronger points in the benefit to target group, input production market criteria. The fact that rubber and pepper have its

longer and heavier investment, high technical requirement in comparison to cashew has become unfavorable to the poor/ethnic minority farmers.

Regarding diversified crops, durian is greatly appreciated concerning its comparative advantages, market accessibility and income generation. However, it is not highly attainable concerning the benefits to target groups, input market, market risk and the GoV's policies. Its expansion requires financial supports and capable farmers concerning the long term and heavy investment and high observation on pest and disease in this perennial crop. Cassava is favorably recommended to farmers as an annual crop in comparison to vegetables with high appraisal on market accessibility and stability, purchasing availability and benefit to target group. Though not being the first-rate, cassava has rather highly attained in almost criteria. Rambutan and vegetable are found unfavorable for its low income generation, poor input market and less comparative advantages. While rambutan has adversely appeared in most of criteria, vegetable still remains certain strong points in benefit to target groups and market accessibility.

3. Marketing advantages and drawbacks for main diversified crops

Under many aspects including market accessibility and growth potential, market performance, income generation and farming conditions, five diversified crops are critically appraised to identify the most profitable and marketable crops in pursuit of the greatest opportunity for market-driven development. Durian and bamboo shoot have appeared the most profitable with the increasing market demand in the whole country and exportation. However, they have currently dealt with some detriments concerning low technology, water shortage and durian heavy investment. Though having stable and local market demand growth, cassava has revealed low financial incentive and gradually decreasing comparative advantages in term of land availability. Rambutan and vegetables are observed behind the three above-mentioned crops. Being commercially grown under the investment in both safe and quality production, vegetables promisingly gain the local demand with stable and sufficient supply.

4. Constraints and solutions for marketing improvement

Low use of technology, weak extensional activities, inadequate supply of production inputs, poor marketing infrastructure and weak market linkage and post-harvest performance are all detriments to the development of agricultural market in Nghia Trung. Thus, there should be more strategic and supportive operations from the GoV, input and output companies, government conducive to farmers' participation and their benefit as a result. Support on techniques and market price information are the most households' necessities. More efficient supply of input factors, extensional activities, irrigation and marketing infrastructure are all demanded. To improve price and enhance market efficiency, increase the linkage between input and output companies is found efficient link between the government's support, processing enterprises' guarantee and farmers' production investment.

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APPENDIX

APPENDIX 01. QUESTIONNAIRES

Appendix 1.1. Questionnaire to key informants in the first focus group discussion

Name of official: _____ Hamlet: _____
 Position: _____ Telephone number: _____

1. Description of 9 selection criteria

Selection criteria	Description/Explanation
1. Unmet market demand and growth potential	<ul style="list-style-type: none"> • Potential for market demand growth • Strong effective existence of unmet demand for products being produced • Continued competitiveness of crop
2. Market accessibility	<ul style="list-style-type: none"> • Availability of traders and consumers • Availability of purchasing infrastructure
3. Selling price and income generation	<ul style="list-style-type: none"> • Stable and increasing selling price • Potential for households' income generation
4. Input production market	<ul style="list-style-type: none"> • Availability of seeds, fertilizer, pesticide and other factors in the market • Good quality of these input factors
5. Relationship among stakeholders in the market chain	<ul style="list-style-type: none"> • Payment method • Prestige in making transaction
6. Benefits to key target groups (women, ethnic groups, the poor)	<ul style="list-style-type: none"> • Viable for those with little land or capital available. • Potential employment, income and food security benefits to the poor, landless poor, rural women and ethnic groups
7. Comparative advantages	<ul style="list-style-type: none"> • Comparative advantages of locally produced products • Pedology suitability
8. Government policies and programming	<ul style="list-style-type: none"> • Government interest in the crop's development (positive linkages with government services, and favorable policies) • Existing programs that can provide synergy and complementary activities.
9. Market risks	<ul style="list-style-type: none"> • Decrease in purchasing capacity • Strict requirement of product quality • Unstable and changeable selling price

2. Assessment of importance of these criteria

10-mark ranking with 1 being the lowest importance and 10 being the most importance; Note (X) in chosen mark for each criterion

Criteria	Assessment of importance									
	1	2	3	4	5	6	7	8	9	10
1. Unmet market demand and growth potential										
2. Market accessibility										
3. Selling price and income generation										
4. Input production market										
5. Relationship between stakeholders in the market chain										
6. Benefits to key target groups (women, ethnic groups, the poor)										
7. Comparative advantages										
8. Government policies and programming										
9. Market risks										

3. Assessment of each criterion for each crop

Name of crops	Criteria (10-mark ranking with 1 being the worst and 10 being the best)								
	1	2	3	4	5	6	7	8	9
Vegetables									
Cassava									
Durian									
Rambutan									
Cacao									
Cashew									
Pepper									
Rubber									
Coffee									
Other suggested crop (specify):									

4. Market assessment of existing local agricultural products

1. Among vegetables, cassava, durian, rambutan and bamboo shoot, which are cultivated in your hamlet?
How common are they in your hamlet?

.....
.....
.....

2. What are your assessments on market potential of these five crops?

.....
.....
.....
.....

3. How do farmers obtain market information?

.....
.....
.....
.....

4. What are the market chains of the above-mentioned five diversified crops?

.....
.....
.....
.....
.....
.....

5. Market constraints and suggested solutions

5.1 What are farmers' difficulties or constraints in their market accessibility to above-mentioned five crops?
And to other agricultural products?

.....
.....
.....
.....

5.2 For further market development, would you please suggest solutions and supports needed to ALL stakeholders in the markets?

.....
.....
.....
.....

Your opinions and contributions will all be considered and reported for further steps in the projects.
Thank you very much for your time.

Appendix 1.2 Questionnaire to farmers

No: Interview date:/09/ 2006

Hamlet:.....Interviewer:

A. GENERAL INFORMATION

1. Would you please provide us some general information about your family?

- Name of household head:..... Ethnicity:(1: Kinh, 2: Tay, 3: Nung, 4: Stieng, 5: Others)

- Interviewee: Relation with household head:.....

2. Which crops do you cultivate and sell their products?

Name of crops	Have you cultivated this crop? since which year?	Have you sold its product? since which year?
<i>Five diversifying crops</i>		
1. Vegetables		
2. Durian		
3. Rambutan		
4. Cassava		
5. Bamboo shoot		
<i>Industrial crops</i>		
6. Cashew		
7. Rubber		
8. Pepper		
9. Coffee		
Others (please specify).....		

3. How is your farming system concerning intercropping or crop rotation? (specify time and area)

.....
.....

4. Would you please give us information on area, age and output of cultivated crops in your farm?

Name of crops	Age of crops (years)	Area (ha)	Actual output (kg)	Cost (‘000 VND)	Revenue

B. PRODUCTION COST FOR SPECIFIC CROP- Name of crop:..... Area:.....

B1. Cost in farming construction period

Items	If yes, how much does this cost? (specify quantity and price)
a. Do you conduct weeding before growing?	
b. Does your land have tractor plough before growing?	
c. Do you hire labor for hole digging?	
d. Do you create seed by yourself or buy up?	
e. Do you have put down basic fertilizer or not? Available or buy?	
f. Do you hire labor for planting?	

B2. Which equipment did you buy for the crop cultivation?

Name of equipment 01:Price:Useful life:..... (months)

Name of equipment 02:Price:Useful life:..... (months)

Name of equipment 03:Price:Useful life:..... (months)

B3. From tree planting to the first harvesting, Which cost have incurred?

Items	Unit	Price	Quantity	Total
Plough against fire				
Weeding				
Watering				
Fertilizer				
- NPK				
- Urea				
- Nitrogenous fertilizer				
- Phosphate				
- Kali fertilizer				
- Muck				
- Others cost				
Herbicide, insecticide				
Labor cost				
Total				

B4. On harvested area in this season (2006); Since this early season how much do you spend cost for planting, maintenance, harvest and selling?

No.	Type of cost	Total (1000 VND)
1	Fertilizer/Pesticide	
2	Spray chemicals	
3	Weeding	
4	Harvest	
5	Preservation, storage	
6	Dry	
7	Others cost	
	Total	

C. HARVESTING AND SELLING PRODUCTS

Code 01. Product types	Code 02. Quality	Code 03. Types of buyers	Code 04. Reasons of choosing selling time	Code 05. Reasons of choosing buyers
1: Fresh	5: Very good	1: Dealer	1: Not have to dry and store (sell immediately harvest)	1: Their high buying prices
2: Dry	4: Good	2: Purchasing station	2: Need money for paying debt or production, consumption	2: Close relation ship (Acquaintance, relatives, neighbors)
3: Sales on average	3: Average	3: Processing units	3: High price	3: Previous funding (being in debt, being provided working capital in advance)
4: Sales before harvest time	2: Bad	4: Others (Specify).....	4: Others (Specify)	4: Payment in advance
5: Others (Specify)	1: Very bad			5. Others (Specify)

C1. Would you please provide us information on your sale in the year 2006?

Month	Amount sold (kg)	Selling price (VND/kg)	Product Types (Code 01)	Product quality (Code 02)	Types of buyers (Code 03)	Rational of selling time (Code 04)	Rational of choosing buyer (Code 05)
1							
2							
3							
4							
5							
6							
7							
5							
9							
10							
11							
12							
Total							

C2. How do you get information on market price? From which source and how often?

C3. Do you pay attention to at which price and to whom the middlemen resell ? (1: Yes, 2=No)

C4. Do you belong to any co-operative or agricultural extension station? (1: Yes; 0: No)

C5. Before selling products, do you pay attention to market price? (1: Yes; 0: No)

C6. Through which source do you get market price information and how often?

D. POST-HARVEST ACTIVITIES

D1. Who performs post - harvesting? Traders or farmers? Reasons?

E. CONSTRAINTS, DIFFICULTIES AND SUGGESTED SOLUTIONS

.....

.....

.....

.....

Your opinions and contributions will all be considered and reported for further steps in the projects. Thank you very much for your time.

Appendix 1.3 Interview of traders (dealer, purchasing station)

Date of interview: Interviewee: Address:

A. THE GENERAL INFORMATION

1. List your agricultural products and the structure of these traded goods?
2. How long have you traded for this crop? In which months?
3. How much is the income by trading this crop in a month? (VND/month).....
4. How much is the total income of your family (VND/month):.....

B. PURCHASING

5. Please provide the information regarding to the price, quantity and source of

Item a: Sellers	Item b: Grading	Item c: Buyers
1. Farmers in your commune	1. Very good	1. Purchasing station (Level 01)
2. Farmers outside the commune	2. Good	2. Processing factory
3. Middle man	3. Ordinary	3. Others (specific)
4. Purchasing station (level 02)	4. Bad	
5. Others (specify)	5. Very bad	

Month	Sellers (see item a)	Quantity (kg)	Categories (see item b)	Price (VND/kg)

6. How much is your total purchase per day?

	Maximum	Minimum	Average
Quantity (kg/day)			
No. of days (kg/day)			

C. SELLING

7. Please provide the information regarding to the price, quantity and source of

Month	Buyers (see item c)	Quantity (kg)	Grade (see item b)	Price (VND/kg)

8. How much is the total sale per day?

	Maximum	Minimum	Average
Quantity (kg/day)			
No of days (kg/day)			

D. Difference between buying and selling price: VND/kg

E. On average, the profit that you get per 01 kg/ton is: VND/kg. Do you include the costs?

- Transportation cost? Not included Included How much is the transportation cost? (specify):.....
- Packing cost? Not included Included How much is the packing cost? (specify):.....

- Communication cost: Not included Included Communication cost? VND/ 01 month
- Labor cost Not included Included Labor cost:VND/01 month

F. EXPENSE INFORMATION

- 9. a. What kind of transportation means do you use?
 - Motorbike Truck others (specify):
 - b. How much is the transportation cost? (Specify the unit):VND/kg (ton).....
 - c. Who pays the transportation cost? Farmers Dealers purchasing station
- Other notes about transportation cost:

LABOR COST FOR DRYING AND COLLECTING

- 10. a. How many labors are there in your business?:people
- b. How much is their monthly salary? VND/01month/01 labor
- 11. a. Do you hire the porters? Yes No
- b. If yes, how much do you pay for them? (VND/ porter):.....
- 12. a. Do you sell all goods bought in the same buying day or store them for some days?
 - Sell them in the same day store them for (days)
- b. Do you hire labor to sun dry the goods?.....If yes, how many people do you hire?:.....
- Cost for these labors? (VND/labor/day).....
- 13. Do you hire labor to collect goods? Yes No If yes, how much do you pay? (VND/labor):.....

CONTAINER

- 14. a. What is the container to store the product? What is the capacity of these containers?
 - Nylon pack (.....kg/01 pack) Bamboo basket (.....kg/01basket) Others (specify):.... (...kg/.....)
- b. Cost of these containers:
 - Pack:đ/01 pack Bamboo basket: đ/01 others (specify).....
- 15. Other cost: Weight scale:....., How long is its useful life?year

COMMUNICATION

- 16. a. How do you contact/communicate with the farmers/middle man?
 - Face to face contact Telephone Mobile phone 4. Others
- b. On average, how much is the cost of telephone per month:..... VND

STORAGE AND DRYING

- 17. a. Do you store product? Yes No If yes, how long do you store?: lost rate:.....%
- b. When and why do you store the product? Selling in big amounts For higher price Others
- c. What is the cost when you store the product?

.....

.....

G. INFORMATION ON TRADING

- 18. What is your solution to deal with the temporary shortage of product?

.....

.....

19. How do you decide the daily quantify of product selling and buying?

- The change of price
- Other from other traders
- Weather
- Others (specify):

20. What information/or source of information that help you to determine/bargain the market price?

- Price (from what sources):
- Product quality
- Selling and buying relationship (specify):
- Others (specify)

21. a. Do you receive any previous funding for you business? If yes, from whom? And how does it operate?

.....

b. Do you pay in advance to your customers? If yes, who is that? And how does it operate?

.....

H. YOUR DIFFICULTIES AND SUGGESTION

.....

Thank you very much.

APPENDIX 02. LISTS OF IN-DEPTH INTERVIEWEES AND FOCUSED GROUP PARTICIPANTS

List of focused group participants

No.	Name	Position	Address	Telephone No.
<i>Commune's officials</i>				
1	Vo Quang Tu	Head of Farmer Association	Hamlet 05	
2	Lang Van Sang	Farmer Association representative	Hamlet 05	
3	Le Thuan	Gardening Association	Hamlet 08	0651997119
4	Huynh Thi Trieu	Commune's official	Hamlet 01	0651966 231
5	Dang Thi Giao	Women Association	Hamlet 03	
6	Luong Thi Trang	Commune's official	Hamlet 02	
7	Nguyen Van Xuan	Farmer Association representative	Hamlet 06	0651966501
8	Tran Anh Tuan	Commune's official	Hamlet 06	0984745488
9	Nguyen Thanh Chien	Commune's official	Hamlet 02	0983974007
10	Huynh Bo	Vice head of hamlet	Hamlet 09	0651966318
11	Nguyen Xuan Luong	Hamlet head	Hamlet 04	
12	Nguyen Thanh Tung	Commune's official	Hamlet 03	
13	Nguyen Van Hao	Vice head of hamlet	Hamlet 05	
14	Le Cong nam	Hamlet head	Hamlet 06	0651966271
15	Van Hong Thai	Commune's official	Hamlet 01	0651966341
16	Vu The Bac	Farmer Association representative	Hamlet 01	0983528220
<i>27 farmers in Nghia Trung commune</i>				

Sample of in-depth interviewees

No of interviewees	Durian	Rambutan	Vegetables	Cassava	Bamboo shoot	Total
Farmers	4	3	3	3	3	16
Traders	2	2	2	2	1	9

APPENDIX 03. WEIGHTED SCORING METHOD

Scoring: Key informants were asked to mark each crop over 9 criteria dependently based on their experience, knowledge and perception. Scores are from 1 as the worst to 10 as the best, that is the higher score, the better appraisal. The maximum total score of each crop over 9 selection criteria will possibly be 90. Average scores of each crop (i) for each selection criteria (j) are as follow:

$$\bar{S}_{ij} = \frac{\sum S_{ij(1...n)}}{N}$$

Where:

- \bar{S} : Average score
- i: crop (1...k)
- j: selection criteria (1...9)
- N: total number of participants (scorers) (1...n)

And total average score of each crop over 9 criteria was:

$$\sum \bar{S}_i = \frac{\sum S_{i1(1...n)} + \sum S_{i2(1...n)} + \dots + \sum S_{i9(1...n)}}{N}$$

Weighting: It is understood that the importance (weight) of each criterion is actually different. They should not be equally entered in the calculation. Therefore, weighting is necessary to identify the relatively importance of each criterion. Accordingly, key informants were asked to give their weighting score for each criterion dependently based on their experience, knowledge and perception. Weighting scores ranged from 1 as the least important to 10 as the most important. The average of weighting scores for each criterion was used as conversion factor (CF) in calculation. Average weighting scores of each selection criteria can be calculated as follows:

$$\bar{WS}_j = \frac{\sum WS_{j(1...n)}}{N}$$

Where:

- \bar{WS} : Average weighting score
- j: selection criteria (1...9)
- N: total number of participants (scorers) (1...n)

Conversion factors: Each criterion’s average weighting score is divided by the sum of average weighting scores of 9 criteria and then multiplied by 100. The total contribution of 9 criteria will be 100%. By doing this, we now convert the maximum total score of 9 criteria of 90 into 100. In this case, each criterion

contributes differently according to its percentage in the total. Each percentage will accordingly be used as CF for each of 9 criteria.

$$F_j(\%) = \frac{\overline{WS}_j}{\sum \overline{WS}_{j(1\dots 9)}} \times 100$$

Where:

F_j : Conversion factor of selection criteria j

j: selection criteria (1...9)

$\overline{WS}_{j(1\dots 9)}$: Total average weighting scores of 9 selection criteria

Ranking: Each CF is multiplied by its corresponding average scores of each criterion to get the weighted average score of each crop as a basis to rank the most favorable in Nghia Trung. The higher total weighted score, the higher rank of this crop.

APPENDIX 04. SUPPLEMENTED DATA ON HOUSEHOLDS AND AGRICULTURAL PRODUCTION

Appendix 4.1. Land use in Nghia Trung commune in 2005

Items	In hectares	In %
Total	14,180.90	100.00
1. Agricultural land	5,729.1	40.40
a. Annual plant	486.0	3.43
b. Multi-year plants	5,086.4	35.87
c. Water surface for breeding fishery	156.7	1.11
2. Forestry land	8,077.5	56.96
3. Specialized use	281.1	1.98
4. Homestead land	93.2	0.66

Source: Data provided by the commune's officials

Appendix 4.2. Perennial industrial crops in Nghia Trung commune

Items	Units	2002	2003	2004	2005
Total	hectares	4,188.80	4,208.50	5,040.40	5,086.40
1. Perennial industrial crops	hectares	3,946.4	4,039.0	4,979.0	5,025.0
Planted area of cashew	hectares	2,135.0	2,542.0	3,400.0	3,650.0
Sown area	hectares	2,135.0	2,257.0	3,376.0	3,381.0
Productivity in Nghia Trung	Quintal /hectare	12.5	12.0	15.0	15.0
Productivity in Bu Dang	Quintal /hectare	9.0	11.0	13.7	13.7
Planted area of coffee	hectares	1,293.0	1,104.0	1,020.0	770.0
Sown area	hectares	1,293.0	1,104.0	1,009.0	770.0
Productivity in Nghia Trung	Quintal /hectare	10.0	11.5	9.0	12.0
Productivity in Bu Dang	Quintal /hectare	9.4	10.6	9.3	11.2
Planted area of pepper	hectares	20.9	64.6	60.0	45.0

Sown area	hectares	6.7	32.4	58.5	45.0
Productivity in Nghia Trung	Quintal /hectare	32.0	30.0	30.0	27.0
Productivity in Bu Dang	Quintal /hectare	30.0	29.7	29.5	27.5
Rubber	hectares	463.5	328.0	499.0	499.0
Others	hectares	34.0	0.4	-	61.0
2. Perennial fruit crops	hectares	242.4	169.5	61.4	61.4
Durian	hectares	63.4	37.0	25.5	25.5
Rambutan	hectares	112.8	84.5	19.2	19.2
Others	hectares	4.0	48.0	16.7	16.7

Source: Bu Dang GSO (2006)

Appendix 4.3. Planted areas of perennial industrial crops in Nghia Trung commune, in %

Items/Year	2002	2003	2004	2005
1. Perennial industrial crops	94.21	95.97	98.78	98.79
Cashew	50.97	60.40	67.45	71.76
Coffee	30.87	26.23	20.24	15.14
Rubber	11.07	7.79	9.90	9.81
Pepper	0.50	1.53	1.19	0.88
Others	0.81	0.01	-	1.20
2. Perennial fruit crops	5.79	4.03	1.22	1.21
Durian	1.51	0.88	0.51	0.50
Rambutan	2.69	2.01	0.38	0.38
Others	0.10	1.14	0.33	0.33
Total	100.00	100.00	100.00	100.00

Source: Bu Dang GSO (2006)

Appendix 4.4. Annual crops in Nghia Trung commune

Items/Year	Units	2002	2003	2004	2005
Total	Hectares	646.1	862	919.1	486
1. Cereals for grain	Hectares	61.7	34	84.7	37
Paddy planted area	Hectares	49	25	69	22
Productivity in Nghia Trung	quintal /hectare	15.4	20.8	14.7	37
Productivity in Bu Dang	quintal /hectare	21.8	24.2	27.2	26.6
Maize	Hectares	12.7	9	15.7	15
Productivity in Nghia Trung	quintal /hectare	25.6	31	30	30
Productivity in Bu Dang	quintal /hectare	25.9	29.9	30.4	30
2. Cereals for tuber	Hectares	559.4	789	809.7	417
Cassava	Hectares	550.7	781	799.5	410
Productivity in Nghia Trung	quintal /hectare	216	240	240	240
Productivity in Bu Dang	quintal /hectare	214.5	234	235.2	232.9
Sweet potatoes	Hectares	6.7	8	10.2	7
Others	Hectares	2	0	0	0

3. Vegetables and beans	Hectares	15	15	1.7	18
Vegetables	Hectares	11.5	7	1.7	12
Productivity in Nghia Trung	quintal /hectare	120	90	80	75
Productivity in Bu Dang	quintal /hectare	112.5	90.5	76	74.3
Beans	Hectares	3.5	8		6
4. Other annual crops	Hectares	10	24	23	14

Source: Bu Dang GSO (2006)

Appendix 4.5 Planted area of annual crops in Nghia Trung commune, in %

Items/Year	2002	2003	2004	2005
1. Cereals for grain	9.55	3.94	9.22	7.61
Paddy (ha)	7.58	2.90	7.51	4.53
Maize	1.97	1.04	1.71	3.09
2. Cereals for tuber	86.58	91.53	88.10	85.80
Cassava	85.23	90.60	86.99	84.36
Sweet potatoes	1.04	0.93	1.11	1.44
Others	0.31	-	-	-
3. Vegetables and beans	2.32	1.74	0.18	3.70
Vegetables	1.78	0.81	0.18	2.47
Beans	0.54	0.93	-	1.23
4. Other annual crops	1.55	2.78	2.50	2.88

Source: Bu Dang GSO (2006)

Appendix 4.8 Average household's income and sources in Nghia Trung commune by hamlets

Hamlet	Total income	Income sources in '000 VND				Income sources in % of total			
		Cashew	Coffee	Pepper	Rubber	Cashew	Coffee	Pepper	Rubber
1	64,129	36,821	45,000	10,787	44,033	66.04	38.56	17.89	36.80
2	73,176	45,192	12,340	7,922	100,875	64.42	16.98	15.08	58.89
3	75,228	43,377	31,282	7,906	65,333	60.70	26.51	11.44	34.04
4	58,123	20,647	33,545	1,750	55,200	47.32	46.17	6.01	48.60
5	45,310	25,591	18,094	14,700	70,000	62.78	31.76	28.44	23.73
6	71,739	51,493	90,000	30,000		76.58	47.37	23.62	
7	52,791	20,004	27,457	30,750	20,000	44.89	45.15	46.72	31.55
8	77,612	35,734	47,456	5,700	64,600	51.04	47.75	9.59	54.73
9	53,337	28,123	36,162	4,033		55.27	53.20	11.12	

Source: Survey data in 2006

Appendix 4.6 Characteristics of households in the general survey

Hamlet	1	2	3	4	5	6	7	8	9	Total
No. of surveyed households	44	34	40	55	24	15	34	33	27	306
- Kinh	43	31	39	38	13	15	22	12	18	231
- Ethnic minority	1	3	1	17	11	0	12	21	9	75
- % Ethnic minority	2.27	8.82	2.50	30.91	45.83	-	35.29	63.64	33.33	24.51
No. of farm households	39	31	38	46	22	15	33	30	26	280
- % of farm household	88.64	91.18	95.00	83.64	91.67	100.00	97.06	90.91	96.30	91.50
No. of years of household's head education	6.32	5.71	5.88	6.67	5.13	5.13	6.97	3.91	6.70	5.95
No. of heads in a household	4.68	5.76	5.53	5.36	5.54	5.33	5.26	5.94	5.89	5.44
No. of labors in a household	2.86	2.91	2.93	2.98	3.29	3.60	2.79	2.76	2.89	2.95

Source: Survey data in 2006

Appendix 4.7 Average agricultural production area and planted area of main perennial industrial crops in a household by hamlets

Hamlet	Agricultural production area		Planted are of annual crops		Planted area of cashew		Planted area of coffee		Planted area of rubber		Planted area of pepper	
	hectares	%	hectares	%	hectares	%	hectares	%	hectares	%	hectares	%
1	3.54	14.38	0.24	12.90	3.04	14.09	1.45	3.70	1.22	28.26	0.32	21.82
2	4.49	11.11	0.37	12.90	3.67	11.07	1.10	6.48	2.23	17.39	0.37	16.36
3	4.30	13.07	0.40	12.90	3.15	13.42	1.46	14.81	1.48	21.74	0.22	30.91
4	2.86	17.97	0.55	19.35	2.02	18.46	1.44	16.67	1.76	15.22	0.18	12.73
5	3.59	7.84	0.31	9.68	2.84	7.38	1.64	6.48	2.00	2.17	0.25	3.64
6	4.21	4.90	0.30	3.23	3.75	5.03	1.00	1.85	1.33	6.52	0.50	1.82
7	2.91	11.11	1.00	19.35	1.88	11.41	1.20	19.44	4.00	2.17	0.40	9.09
8	4.49	10.78	0.25	6.45	3.16	10.07	2.03	19.44	2.00	6.52	-	-
9	4.01	8.82	0.50	3.23	2.95	9.06	2.15	11.11	-	-	0.08	3.64

Source: Survey data in 2006