
Commercialization of smallholder farmers and its welfare outcomes: Evidence from Durgapur *Upazila* of Rajshahi *District*, Bangladesh

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Abstract: Agriculture is the mainstay of Bangladesh economy. It plays important role to the growth and development of the economy of the country. Most of the farmers of Bangladesh are marginal and small farmers. They consume most part of their produced commodities. The market participation rate of them with surplus production is very low. Therefore, the main objective of the present study is to estimate the level of commercialization of smallholder farmers. The study also examines the welfare outcomes of commercialization of these farmers. This study is mainly based on primary data that are collected from Durgapur *Upazila* of Rajshahi *District* of Bangladesh. The required data have been collected from 100 smallholder farmers in the study area. A multi-stage random sampling technique is applied to select the sample farmers. The present study uses household commercialization index to estimate the level of commercialization of smallholder farmers. It also applies one-way ANOVA analysis to examine the welfare outcomes among smallholder farmers working at different levels of commercialization. Firstly, calculation of Household Commercialization Index implies that the average percentage level of commercialization of smallholder farmers in the study area is 57%, which indicates the moderate level of commercialization. And findings from one-way ANOVA analysis indicate that farm households with high degree of commercialization enjoy better welfare outcomes such as consumption of more food and goods, and services. The commercialization of smallholder farmers contributes more to the gross domestic product and economic development of Bangladesh. Therefore, the government and non-government organizations should provide financial support such as input subsidy, credit facilities, training etc. to the smallholder farmers so that they can increase the agricultural productivity and can participate in the market with their surplus production.

Keywords: Agriculture, Smallholder Farmers, Market Participation, ANOVA Analysis, Economic Development

1. Introduction

Smallholder farming is the predominant source of livelihoods of rural households in Bangladesh (IFAD, 2012; World Bank, 2014). Small farms account for 96% of total operational holdings with a share of 69% of total cultivated area (Thapa and Gaiha, 2011). As most of the farmers in the country are marginal farmers, strong agricultural growth in the country has been achieved through the performance of smallholder farming. With better performing of the smallholder farmers, poverty has been reduced, food prices

pushed down, food security and nutritional gap of people has been reduced. As far as the world context is considered, around 80% foods in developing countries are produced under smallholding farms (FAO, 2010). Most of the smallholder farmers in these countries are subsistence oriented in which farmers focus on growing enough food to feed themselves and their families.

However, in recent years smallholder farmers are also taking part in market to sell some portion of their products. Thus, smallholder farming has an important role in transforming agriculture from subsistence to market oriented production or commercial agricultural production. This

commercialization of agriculture is important in the economic development of Bangladesh as a developing country. Through commercialization, smallholder farmers can earn more profit which increases their family income and promotes standard of living. Because commercialization of agriculture is not only just making a shift from subsistence to market oriented farming but also making better welfare outcomes for farmers in the form of increasing consumption of basic and high valued food. Moreover, higher expenditure on education, healthcare, non-food consumption and durable goods for the smallholder farmers can be achieved by commercializing agriculture (Gebreselassie and Sharp, 2007). In Bangladesh, government is trying to provide different support services to improve their livelihood and production system. And many non-government organizations work together with the government for the development of agriculture sector. With the introduction of modern technologies and provision of various supports from the government authorities, agricultural production system in many developing countries is turning to be a commercialized one. In Bangladesh also agricultural production system has gradually been transforming from subsistence farming to commercial agriculture (Razzaque and Hossain, 2007). It is observed that the importance of traditional cash crops such as jute, sugarcane, tobacco, etc. has been diminishing to the farmers of Bangladesh over time. Considering their opportunities, farmers are now turning towards food crops like rice, wheat, fruits and vegetables for commercial production and for gaining more profit (Razzaque and Hossain, 2007). It is observed that commercialization of agriculture can be achieved by promotion of value addition to agricultural commodities, particularly horticultural and dairy products which supports to agri-businesses and links farmers with local and international markets (World Bank, 2009). National Agricultural Technology Project (NATP) of Bangladesh financed by WB and IFAD, integrates small and marginal farmers who produce rice, maize, fruits, vegetables, livestock, fisheries etc. into value chains, so that farmers can produce more products to meet the domestic demand and can export some portion of their products in other countries in the world (MoA, 2014).

However, unless rural markets are well-integrated and risks are low to influence household decision behavior, commercialization of smallholder farmers in Bangladesh may not be possible. The International Food Policy Research Institute (IFPRI) conducted several case studies to investigate the impacts of smallholder commercialization on production, income, nutrition and other social and economic dimensions of farm households. These studies cover several developing countries including Kenya, the Gambia, Rwanda, the Philippines and Guatemala. In most of the cases, the impacts of commercialization are highly specific to location and policy environments (von Braun and Kennedy, 1994; Strasberg *et al.*, 1999). It is worth noting that most of the impact studies reviewed have their own limitations. In most cases, they are one shot studies and do not give the cause-effect relationships in wider perspectives. With this

understanding, the impacts of smallholder commercialization on household welfare may be considered as an issue in Bangladesh.

Therefore, in the context of above discussion, it is clear that commercialization of smallholder farming in Bangladesh is not still high enough and the farmers are still producing under the state of subsistence agriculture (Mahelet, 2007). Smallholder farmers receive low welfare outcomes of commercialization because of market imperfections and high transaction costs (Janvry *et al.*, 1991; Bernard *et al.*, 2007). Thus, the smallholder farmers are not enabled to join with the market for enjoying the possible benefits of commercialization unless the previously presented difficulties are removed and better environment is formed (Bernard *et al.*, 2007).

2. Literature Review

Agricultural commercialization is a complex issue and is defined in various ways as found in different literature. Agricultural commercialization is different from agricultural marketing. Agricultural commercialization is attained when household product choice and input use decisions are made based on the principles of profit maximization (Pingali, 1997). Moreover, commercialization implies increased market transactions to capture the benefits from specialization. Increased market transactions are easily attained when there are favorable policies and institutional arrangements that promote open domestic and international trade environment and the development of market infrastructure and support services that facilitate access to existing markets and the opening up of new market opportunities under a secured legal system (Von Braun *et al.*, 1994). In most of the earlier literature, a farm household is assumed to be commercialized if it produced a significant amount of cash crops, allocates a proportion of its products to market or sells a considerable proportion of its agricultural outputs (Immink and Alarcon, 1993; Strasberg *et al.*, 1999). Agricultural commercialization may be defined as the proportion of agricultural production that is marketed. As such, commercialization can be measured along a range from zero (total subsistence oriented production) to unity (100% of production is sold). Commercialization of agriculture involves a transition from subsistence oriented to increasingly market oriented patterns of production and input use. Economists have long advocated cash crop production as part of a broader strategy of comparative advantage. The underlying premise is that markets allow households to increase their incomes by producing that crop which provides the highest returns to land and labor, and then use the cash to buy household consumption items, rather than be constrained to produce all the various goods that the household needs to consume (Timmer, 1997; Pingali, 1997). Again, agricultural commercialization can be defined as an agricultural transformation in which farmers shift from mainly consumption oriented subsistence production towards market or profit oriented production system (Pingali and Rosegrant, 1995).

Commercialization of smallholder agriculture is not only a means to boost exports or stimulate local economies but also a way to help smallholders to achieve welfare goals that can improve their living conditions (Gebreselassie & Sharp, 2008). Agricultural commercialization has comparative advantages over subsistence production which can generate income for the smallholder farmers (Kennedy and Cogill 1987; Dorsey 1999). The shift of subsistence agriculture towards market orientation (commercializing) can significantly increase the income and welfare of smallholder farmers as well as contribute to economic growth and poverty alleviation (Zhou *et al.*, 2013). In order to specialize their farms for their necessity (i.e. to get cash for the purchase of essential consumption goods and services and agricultural inputs not produced on the farm), smallholders participate in the output market. They make a rational choice that can maximize their utility, or benefit in making decision to participate in market (Gebreselassie & Ludi, 2008). Agricultural commercialization means more than the marketing of agricultural output; it means the product choice and input use decisions are based on the principles of profit maximization (Leavy *et al.*, 2007). There is a scope to improve the seasonal mismatch in demand and supply through agricultural commercialization and facilitate the linkages between on producers and potential buyers in nearby towns (Gebreselassie, 2003). According to the most researchers, if there exist no efficient markets, then commercialization cannot lead to the severance of production from consumption, supporting food diversity and overall stability at household level (Bernard *et al.*, 2007).

However, the shift from subsistence to commercial crop production may have an adverse consequence by exposing households to volatile food market prices and food insecurity unless rural markets are well-integrated and risks are low to influence household decision behavior. Different case studies in African contexts demonstrated that household income increases as farm resources are reallocated from subsistence to commercial crops (Braun *et al.*, 1994). Using empirical evidence from coffee growers in Central Kenya, Dorsey, (1999) showed that households who followed a commercial specialization scheme earned significantly higher annual net income than others. Similarly, farm households who shifted their production from maize/corn to a sugarcane out-growers scheme earned higher income in South Nyanza District of Kenya (Kennedy and Cogill, 1987) and in Bukidnon Province on the southern island of Mindanao in the Philippines (Bouis and Haddad, 1990). However, compared to the smaller but more continuous flow of income in the form of cash and food under semi-subsistence production system, higher income from cash crops in lump-sum payments is usually spent within a short time and more on non-food commodities (von Braun, 1994). This problem is exacerbated in the absence of well-integrated financial systems that promote savings from cash-crop income.

Nonetheless, smallholder commercialization is a means to improve household health and nutrition status. These arguments generally follow two directions. First,

commercialization is assumed to enhance household income which helps to purchase a diversified mix of goods and services (like health care, better housing etc.) or increase the current market basket (Kennedy, 1994a). Second, through the income-food-consumption linkage commercialization is assumed to increase the food intake of household members, which could improve their nutritional and health status (Kennedy, 1994).

3. Methods and Procedures

3.1. Study Area and Sample Selection

The present study is mainly based on primary data collected from the smallholder farmers of six villages from three *unions* of Durgapur *upazila* under Rajshahi *district*. The sample farmers are chosen randomly using multistage random sampling method. For analyzing the commercialization of smallholder farmers and its welfare, the sample has been selected in such a way that it covers all necessary data required for analysis. For conducting present study, the researcher selected the study area with great care so that the estimated results become are representative. The rationale behind selecting Rajshahi for the present study is that Rajshahi *district* is an agriculture-based area. Rice is the dominant crop produced simultaneously with other minor crops such as wheat, potato, vegetables, jute, maize, oilseeds, pulse, onion, garlic etc. in the *district*. Farming is the principle occupation of most of the population and their livelihood mostly dependent on agricultural activities. In this area, farming is characterized by low level of production technology and small size of farm holding. Production is primarily subsistence with little surplus for marketing. Around 80% people of study villages are farmer. In Rajshahi district there is sufficient scope to improve crop production using the improved technologies. For above-mentioned reasons the researcher has chosen Rajshahi district for conducting the research.

Since the researcher is constraint by time and other resources one *upazila*- Durgapur was selected purposively for this study. From this *upazila*, three *unions* are chosen randomly, taking two villages from each. There are 1 *Pourosova*, 7 *unions* and 124 villages in Durgapur *upazila*. Firstly, the researcher selected three unions randomly. The selected *unions* are Noapara, Deluabari, and Jhaluka. In the next stage, two villages from each union are selected randomly. The selected villages are Nondigram and Kashipur from Noapara *union*, Vobanipur and Bera from Deluabari *union* and, Coupukoria and Shaheber from Jhaluka *union*. Next, and then the researcher selected 100 respondents from the three sample *unions* using the systematic random sampling method. Finally, a list of all smallholder farmers is collected from the agriculture extension office of Durgapur and then sample households are chosen randomly from these six villages. A total of 100 farm households are selected for this study. The total sampling information is presented in the following Table:

Table 1. Selection of the Respondents

Name of Union	Name of Village	Number of Sample	
Noapara	Nondigram	17	
	Kashipur	16	
Deluabari	Vobanipur	20	
	Bera	15	
Jhaluka	Coupukoria	16	
	Shaheber	16	
Total	3	6	100

Source: Author's own Calculation

3.2 Analytical Methods

There are several earlier studies which concentrated on measuring the level of commercialization of smallholder farmers and there are many dimensions found in those studies. These dimensions include calculation of the level of commercialization, identification of factors which intensify commercialization and the factors that induce farmers to go for commercialization. There are diverse methods for estimating the level of commercialization and indicators that are also used for measuring the level of commercialization (Randolph, 1992). Majority of earlier studies of smallholder commercialization measure the level of commercialization in terms of the proportion of output sold in markets. A value of zero would imply a totally subsistence oriented household and the value of the index closer to 100 means the higher degree of commercialization (Leavy and Poulton, 2007). Also the degree of farmers participation in output markets could be measured either in terms of the proportion of output sold by the commercialization index or the total value of output sold (Gebreselassie & Sharp, 2008). In measuring household-specific level of commercialization, Govereh *et al.*, (1999) and Strasberg *et al.*, (1999) used a household commercialization index (HCI), which is a ratio of the gross value of all crop sales per household per year to the gross value of all crop production. They told that commercialization can be measured along a range from zero to unity. In another study Govereh *et al.*, (1999) used Crop Commercialization Index (CCI) to estimate the commercialization or non-commercialized of farms.

Thus, to achieve the stated objectives, the present study tries to assess the level or extent of commercialization by calculating the Household Commercialization Index following Govereh *et al.*, (1999) and Strasberg *et al.*, (1999). The advantage the HCI is that it provides the level of commercialization for every household separately.

The majority of agricultural production in Bangladesh is based on subsistence agriculture in a low input-output production system. The introduction of modern technology in agriculture aims at transformation of the subsistence agriculture into a commercialized and market-oriented one. Thus, in measuring the levels of commercialization for the smallholder farmers in the study area, a commercialization index is used as per Govereh *et al.*, (1999) and Strasberg *et al.*, (1999). The commercialization index is formulated in the following way:

$$HCI_i = \frac{\text{Gross value of crop sales by } i^{\text{th}} \text{ household in year } j}{\text{Gross value of all crop production by } i^{\text{th}} \text{ household in year } j} \times 100 \quad (1)$$

Where, HCI_i refers to the extent of i^{th} household's commercialization level. This index measures the ratio of the gross value of crop sales by i^{th} household in year j to the gross value of all crops produced by the same household in the same year. That is, it measures the degree to which a household sells its output to market. If the index is zero, it would signify a totally subsistence oriented household and if the index is to 100, it would signify the higher degree of commercialization.

Commercialization has a significant impact on the welfare of smallholder farmers, which can be represented in terms of consumption of basic food (grains), high value food (livestock product), and expenditure on clothes and shoes, durable goods (TV, fridge, furniture etc.), education and healthcare (Gebreselassie and sharp, 2007). Thus, the researcher analyzes the welfare outcome of smallholder farmers considering the above stated aspects of welfare outcomes of smallholder farmers. Again, for investigating the welfare impact of the commercialization of smallholder farmers, a one-way ANOVA (Analysis of Variance) test is performed. The ANOVA analysis compares the welfare outcomes among household farmers of different level of commercialization. Thus, following Gebreselassie and sharp (2008), a one-way ANOVA analysis is applied to shed some light on the welfare effects of commercialization in terms of followings.

- (i). Consumption of basic food items (Tk. / person / month)
- (ii). Annual expenditure on non-food items (Tk. / person /year)
- (iii). Expenditure on education (Tk. / person / year)
- (iv). Expenditure on healthcare (Tk. / person /year)
- (v). Annual expenditure on housing (repairing or making, Tk/year)
- (vi). Annual expenditure on farm implements (Tk/year).

4. Results and Discussions

A structured questionnaire is used to collect both qualitative and quantitative data on production, consumption, and marketing of farm produce, as well as demographics, social and farm characteristics. The interesting features of collected data are observed. It finds that smallholder farmers have an average of 4.01 *bigha* of cultivated land and they mainly produce variety of crops for their own consumption. However, they also produce some cash crops for the sole purpose of selling in the market. It also finds that smallholder farmers in the study area are faced by some problems such as lack of reliable market information, poor access to inputs and credits and inadequate public support. Thus, most of them cannot be able to produce surplus for marketing and attained low welfare outcomes in terms of agricultural commercialization. Moreover, two samples mean test and one-way ANOVA test are run to examine the existence of any statistically significant differences among smallholder

farmers operating at different levels of commercialization.

In order to examine the welfare outcomes of smallholder farmers in the study area, it is a compulsory factor to estimate the level of commercialization of sampled smallholder farmers. In measuring household level of commercialization, household commercialization index (HCI), which is a ratio of the gross value of all crop sales per household per year to the gross value of all produced crops, is calculated. This index has been used in the past by Govereh *et al.* (1999) and Strasberg *et al.* (1999). According to Govereh *et al.* (1999) and Strasberg *et al.* (1999), the closer the index is to 100, the higher is the degree of commercialization. The household level commercialization (HCI) shows a distinct pattern in the study area and

noticeable variation within the three unions, described in Table 2.

The household commercialization index by union shows substantial variation across the study area. From Table 2, it is observed that the average percentage household commercialization index is 57%, which indicates that the degree of commercialization for the typical smallholder household is 57%. The household commercialization index ranges from 0% to 95% through the study area. This indicates that the most commercialized farmers sell about 95% of the total produced crops and the least commercialized household did not sell at all. This level is nearly consistent with the earlier work by Tirkaso, (2013).

Table 2. Household Commercialization Index by Union

Union	Sample	Minimum index (%)	Maximum index (%)	Mean Index (HCI in %)
Deluabari	35	0	91	54
Noapara	33	0	95	56
Jhaluka	32	0	95	61
Total Study Area	100	0	95	57

Source: Author's own calculation

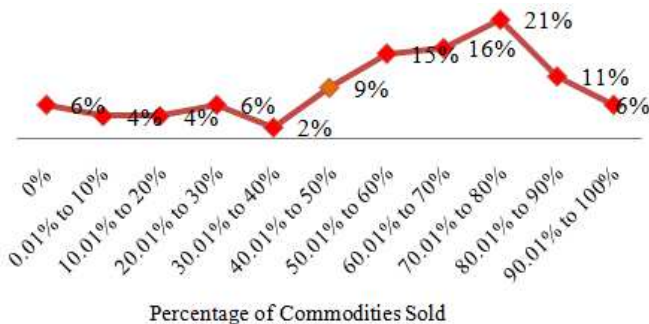
From Table 2, it can be seen that there is also a variation of the level of commercialization across the three unions. The household commercialization indices are 54%, 56% and 61% for the three unions *Deluabari*, *Noapara* and *Jhaluka* respectively. These measures of household commercialization indices clearly verify the level of commercialization within the three unions. *Jhaluka union* is the most commercialized agricultural area where the smallholder farmers sell 61% of their produced crops. The smallholder farmers of other two unions sell 54% and 56% of their produced crops, respectively. Thus, the level of commercialization among the smallholder farmers in the study areas is at a moderate level which indicates that the level of commercialization in the study areas neither is very low nor very high. This is expected, given the features of the selected areas for this study. It is found that in these unions farmers produce different crops, which are highly marketable and they have good access to local and major markets.

fact, the farmers who are most commercialized (HCI= 95%) in the study area are characterized by large settlement of rich farmers which are mainly relied on production of commercial oriented cash crops. Conversely, the farmers with lower mean commercialization indices are mainly those who produce paddy and other necessary food crops.

Figure 1. indicates that proportion of commodities sold by majority of households (21% of total) in the study area ranged from 70% to 80%. Moreover, 16% households sell about 60% to 70% whereas only 6% households do not sell at all of their produced commodities.

The ultimate objective of commercialization of agriculture can be judged by the achievement of some degree in welfare outcomes of the smallholder farmers. In this paper, welfare indicators are represented by consumption of basic food (both grain and non-grain consumables) including rice, pulse, fish, meat, milk, sugar, tea, salt and cooking oil; consumption of non-food items including kerosene, shoes and clothes, durable goods (radio, TV, mobile phone, furniture etc); expenditures on education, healthcare, housing (iron sheets, buildings, etc) and farm implements (Gebreselassie and sharp, 2008). Most of the variables representing welfare in this study are adopted in different studies in different contexts.

One-way ANOVA test is done to find out if there is statistically significant variation in welfare outcomes among farm households at the different levels of commercialization. For the purpose of this study, degree of commercialization (DoC) is grouped into three categories: Low ($\leq 30\%$ of output sold), Medium (30% -75% of output sold) and High ($>75\%$ of output sold). The welfare outcomes of the smallholder farmers through agricultural commercialization are presented in Table 3. Interestingly, Table 3 finds that distinct differences in the welfare outcomes of farm households at different levels of commercialization, that is, the higher the degree of commercialization, the better is the



Source: Author's own Calculation

Figure 1. The Degree of Commercialization among the Farmers

Moreover, the level of participation in output markets varies considerably among sampled farmers, as shown in Figure 1. In

welfare outcomes of farm households.

Table 3. Welfare Outcomes for Households with the Level of Commercialization

Welfare Representative	Level of Commercialization			Prob.> F
	Low	Medium	High	
Expenditure on basic food items	978.30	1211.39	1182.67	0.5572
Expenditure on non-food items	1117.54	1206.18	4790.72	0.0005***
Expenditure on education	3722.50	3542.00	10851.11	0.0006***
Expenditure on healthcare	850.28	1091.61	2461.07	0.0002***
Expenditure on housing	3150.00	4610.00	30633.33	0.0001***
Expenditure on farm equipments	2465.00	8472.8	8759.66	0.3870
Total Number of Observation	20	50	30	100

Note: *** 1% significance level

Source: Author's own Calculation

Table 3 reveals that consumption of basic food has consistent increasing pattern along the commercialization index, low to high. This is also true with expenditures on non-food consumables or high-value food, education, healthcare and housing. This result is in line with the earlier work of Kennedy and Bouis, (1993).

The one-way ANOVA test results confirm that the variation in consumption of basic non-food consumables and expenditure on education, healthcare, and housing among farm households at different levels of commercialization is statistically significant at 1% significance level.

The most commercialized households, defined as those who sold more than 75% of their production, consumed one and a half times as much basic non-food per person as the least commercialized (i.e. those who sold 30% or less). This difference is statistically significant, implying that keeping other factors constant, the observed difference in consumption of non-food items is associated with the variation in market participation. For non-food items, consumption varies even more markedly between the most and least commercialized farmers, and this difference is statistically significant at 1% level. Almost similar differences are observed in expenditure on education and healthcare.

The most commercialized households also spent more on education and healthcare. On average, the least commercialized farmers spent only Tk. 3723 per person per year on education, while their more commercialized neighbors spent more than twice this (about 10851 Tk./person/year). This difference is significant at 1%. Moreover, annual expenditure on healthcare varies among the households working at different market participation level which is also significant at 1%. This result is in line with the Gebreselassie and Sharp, (2008).

The housing expenditure of sampled households also varies with their level of participation in output markets. Annual expenditure on making or repairing house increases significantly with the index of commercialization in the sampled area (at about 10 times from low to high level). This welfare goal may be an important factor to improve the living condition of smallholder farmers.

Because productivity and other outcomes are determined by multiple factors, this result suggests that farm tools and equipments are not yet a significant factor to commercialize

smallholder agriculture in the study area. Therefore, this result indicates that farm households with a high degree of commercialization are better-off in terms of welfare outcomes than households with low level of commercialization.

5. Conclusion and Recommendations

This study is initiated to investigate the commercialization of smallholder farmers in the study area. To meet this objective, we use an index to estimate the level of commercialization among the smallholder farmers. Moreover, a statistical analysis of one-way ANOVA is applied to examine the welfare outcomes of smallholders if they are commercialized. The findings are as follows:

Firstly, the degree of commercialization among the smallholder farmers is moderate in the study area. It is estimated by the household commercialization index and it is observed that the mean level of commercialization is 57%. However, the degree of commercialization differs widely across sampled households and unions, which implies a correspondingly wide variation in the potential and constraints for further commercialization. Secondly, an one-way ANOVA analysis result reveals that there is an increasing pattern of welfare outcomes among the smallholders as they move from low to high level of commercialization.

In Bangladesh, a lot of programs and initiatives related to agriculture have taken by the government and non-government organizations for the development of agriculture sector like distribution of fertilizer and seeds along with ensuring other facilities for the farmers. Due to proper steps by the government and NGOs, crop production has increased by two to three times in the last few years. However, it is evident that without an efficient agricultural marketing system, high crop production cannot be sustained for a long time. For smallholder farmers, agriculture is risky in the face of climate change, price shocks, limited financing options, and inadequate access to healthy and nutritious food. Smallholder farmers can successfully adapt their livelihood strategies to these challenges but need a supportive policy environment. In order to bring a beneficial impact on the livelihood of smallholder farmers, policies ought to target at

facilitating the increase in agricultural production and productivity and promoting agricultural commercialization in a sustainable way. Similarly, the degree of commercialization differs widely across sampled households, which implies a correspondingly wide variation in the potential and constraints for further commercialization. Therefore, specific agricultural commercialization strategy should be customized for different groups of farmers. Programs and initiatives that would improve contact with extension agents in the local area, education, skills, and the proportion of area cultivated to improved crop varieties should be promoted in order to increase market participation and generate improvement in rural households' welfare.

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