WOMEN'S ROLES IN AGRICULTURAL COMMERCIALIZATION: AN EMPIRICAL STUDY IN THAKURGAON DISTRICT, BANGLADESH

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CERTIFICATE

This is to certify that the research work entitled, **"WOMEN'S ROLES IN AGRICULTURAL COMMERCIALIZATION: AN EMPIRICAL STUDY IN THAKURGAON DISTRICT, BANGLADESH"** conducted by **LAILA AKTER ZAMAN** bearing Registration No. **12-04799 (July-December/2018)** under my supervision and guidance in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M. S.) IN DEVELOPMENT AND POVERTY STUDIES** in the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information received during this study has been dully acknowledged by her.

Dated: December, 2018

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DEDICATED TO MY BELOVED PARENTS

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The Author

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LIST OF ABBREVIATIONS

ARSS	Agriculture and Rural Statistics Survey
BBS	Bangladesh Bureau of Statistics
CFI	Constrained Faced Index
DAE	Department of Agricultural Extension
FAO	Food and Agricultural Organization of the United States
HCI	Household Commercialization Index
LFS	Labor Force Survey
SAAO	Sub-Assistant Agriculture Officer
SPSS	Statistical Package for Social Science

WOMEN'S ROLES IN AGRICULTURAL COMMERCIALIZATION: AN EMPIRICAL STUDY IN THAKURGAON DISTRICT, BANGLADESH

ABSTRACT

LAILA AKTER ZAMAN

The specific purpose of the study was to determine the women's roles in agricultural prpduction. Attempts were also made to determine and describe the selected socio-economic characteristics of women and to explore the contribution of the selected determinants of women to their roles in agricultural commercialization in the study area. Thakurgaon Sadar upazila under Thakurgaon district was purposively selected from which two unions namely, Nargun and Jagonnathpur were randomly selected, a total of four villages, two from each union were selected randomly as the locale of the study. Data were obtained from 118 farm families randomly selected from total of 557 household farm families of selected villages from two unions. A structured interview schedule was used for collecting data during the period of 15th July to 15th August, 2019. The findings of the study revealed that the majority 61.9 percent of women moderately engaged in agricultural commercialization and 28.0 percent in high involvement followed by 10.2 percent in low engagement, respectively. The study revealed that poultry rearing (90%) and livestock rearing (81%) were mainly managed by women respondents. Multiple regression analysis shows that education, farm size, market orientation, women engagement in farming and marketing problems had significant contribution to rural women's involvement in agricultural commercialization. The remaining characteristics of the respondents, namely age, annual family income, market distance did not show any significant contribution with their involvement. The findings revealed that an overwhelming majority (89.9 percent) of the respondents had medium to high involvement of rural women in agricultural commercialization at the study area. Therefore, the findings indicate that still there is a huge scope to increase women's involvement in agricultural commercialization.

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Women play a vital role in the agricultural production in many countries including Bangladesh. Their role spans from tilling of land, cultivation, harvesting, processing, and marketing of produce. It is known in recent times that a major share of income of rural households is obtained through women activity, and sometimes even share of women's income in the household economy is more than the share of men.

In traditional rural societies of Bangladesh, commercial agricultural production is mainly male-dominated. Men prepare land, irrigate crops, and harvest and transport produce to market. They own and trade large animals such as cattle, and are responsible for cutting, hauling and selling agricultural produce. In fishing communities, capturing fish in coastal and deep-sea waters is almost always a male domain. However; women participation in agriculture is gradually increasing.

In traditional rural societies, women's responsibilities are mainly confined to maintaining the household. They raise children, grow and prepare food, manage family poultry, and collect fuelwood and water. Nevertheless, they might play an important, mostly unpaid, role in generating family income, by providing labor for planting, weeding, harvesting and threshing crops, and processing products for sale. Women may economically contribute to the family income by selling vegetables from home gardens or forest products. Modern-day agriculture recognizes Women's contributions to food crop production and commercialization. Particularly in Southeast Asia, they provide up to 90% of the labor used in rice cultivation (FAO, 2009).

However, the growing participation of women in agriculture has been changing their role in agriculture. A woman can easily make her self-sufficient through the income from the agriculture sector. Besides caring for crop fields, crop sorting and processing, storing, irrigation, harvesting and some other related works, women are also participating in core cultivation with males.The largest employment generating sectors are agriculture, forestry and fishing, in which sectors female participation is

63.1 percent and male participation is 34 percent across the country, according to the latest statistics (Quarterly Labor Force Survey 2015-16) of Bangladesh Bureau of Statistics (BBS).

From crop cultivation to fisheries women participate in a wide range of activities. Women also spend most of their time in pre-harvesting with the average time in home gardening being 6-8 hours per week (Akhter *et al.*, 2010).In case of harvesting of vegetables women are more effective than man. Due to the structure of their hands, they can harvest quickly as well as in a larger amount. For homestead gardening most of the inter-cultural operations are mostly performed by the women of the house as male members are busy outside.

In previous time women only worked in domestic ground or only did some domestic agriculture works such as paddy drying and preserving but now they are doing harvesting, tilling, irrigation and others works outside their homes.Women leadership in agriculture has changed the rural economy and demand for woman labor is increasing every day (Biswas, 2017).

Agricultural commercialization refers to the process of increasing the proportion of farm production that is sold by farmers (Pradhan *et al*., 2010). Commercialization of agriculture as a characteristic of agricultural change is more than whether or not a cash crop is present to a certain extent in a production system. It can take many different forms by either occurring on the output side of production with increased marketed surplus or occur on the input side with the increased use of purchased inputs. Commercialization is the outcome of a simultaneous decision-making behavior of farm households in production and marketing (von Braun *et al*., 1994).

Commercialization of smallholder farming is widely considered as one of the most effective means of dealing with poverty in the developing countries like Bangladesh. And, it is undoubted that commercialized farming contributes significantly to the livelihoods of rural households in Bangladesh (FAO, 2009; World Bank, 2014). A rising middle class (estimated at over 30 million) has fueled demand for high-quality agriculture products.

According to the Bangladesh Bureau of Statistics (BBS), for FY 2014-15 (provisional estimate), crops, livestock, fisheries, and forest products account for about 16 percent of Bangladesh's total GDP and employs approximately 47 percent of the total population. Most agricultural production in Bangladesh is characterized by traditional subsistence farming. Bangladesh produces a variety of agricultural products such as rice, wheat, corn, legumes, fruits, vegetables, chicken, meat, fish, and seafood. Rice is considered the main staple in the Bangladeshi diet. Less arable land and limited natural resources increase the importance of developing new agricultural technologies, such as salt-tolerant or submergence tolerant seed varieties, to help increase productivity for future demand needs. Strikes, floods, cyclones, and drought also can affect agricultural productivity levels and incomes. In Bangladesh, the average size of the actual area cultivated is only .5 hectares and small farms account for 96 percent of operational holdings with a share of 69 percent of cultivated area (Thapa and Gaiha, 2011). Most importantly, improved agricultural productivity can do magic to appease poverty from grass root level (Asfaw *et al.*, 2012).

The primary agricultural producers are small-scale and marginal farmers who comprise approximately 80 percent of all farming households and own about 50 percent of the total cultivated land (BBS, 2012). Arable land accounts for 50 percent of the country's land with an annual utilization rate of 190 percent (BBS, 2011), and the country has accomplished 100 percent rice self-sufficiency (Bangladesh Bank, 2015). With an increased output of the smallholder farmers, poverty can be reduced, food prices pushed down, food security, and nutritional gap of people improved. Consequently, market participation and transition from subsistence to commercial farming can bring revolutionary changes in economic growth and subsequent improved standards of living and welfare (Osmani, 2015). In Bangladesh, market access of smallholder farmers, being one of the predominant sources of livelihood, can work as efficiently as larger firms when supported by parallel services and credit facilities from the government (World Bank 2007). It is recognized that agricultural commercialization and investment are the key strategies for promoting accelerated modernization, sustainable growth and development, and hence, poverty reduction in the sector.

According to Agriculture and Rural Statistics Survey (ARSS) 2017, it is seen that the highest 49.50% household annual agricultural income comes from crops followed by agricultural laborer 24.04%, livestock 14.18%, fishing 4.57% and the rest 1.65% permanents crops (fruits), poultry 1.24%, forestry 1.26% and others source 3.57% of income respectively.It is also observed that the highest 31.26% household non-agricultural income comes from service followed by business 19.14%, remittance 16.12%, non-agricultural labor 13.60%, industry 8.14% and the rest 43% income taken, assets sell, transport and others source of income respectively.

About one-third offamilies at the national level is agriculture households. In most parts of Bangladesh, agriculture is the main occupation of women. Many ethnic groups, for example, Santal, Chakma, Garo have been for centuries working as the agricultural labor force. About 88% of the female labor force works in agriculture. In the household, women prepare 80% of the food, whereas the men make only 20% (Zaman, 2002).

In spite of their intensive contribution women are disfavored from all sides-law, religion, tradition and society.In Bangladesh with equallevel of higher education and higher income, women may still remain less empowered than men in termsof decision making in agriculture (Sraboni *et al.*, 2013). Here women earn less on anaverage ofper hour than men. Controlling for differences in age, educational background, industry, occupation and geographic location yields an estimated gender wage gap of 15.9%, but including the effects of industrial and occupational segregation into the estimate yields an estimated wage gap of 23.1% (Kapsoss, 2008). In the agriculture sector, the female workers get on an average about 40% less wage in spite of performing the same duty or providing the same amount of their counterpart (Zaman, 2002).

Yet they have the least access to the means for increasing output and yields for moving from subsistence to high-value market-oriented farming practices.

Improvement of socio-economic welfare will largely depend upon higher affordability of farm inputs such as fertilizers, pesticides, and improved seeds, which would eventually bring about an increase in productivity and eventual growth (Ukoha *et al.*, 2005). According to Gebreselassie and Sharp (2007), smallholder farmer's commercialization can bring better household welfare, promoting living standards

through consumption of high valued foods, purchase of homedurables better education for their children, and improved health standards.

Therefore, the study tries to find out the relationship between agricultural commercialization and women's roles in rural Bangladesh. Consequently, it is essential to explore the topic of women's roles in agricultural commercialization to determine the following objectives.

1.2 Statement of the Problem

In Bangladesh, women hardly participate in agricultural activities outside their homes. About half (49 percent) of the population of Bangladesh is women; among them, 45.6 percent are associated with farming activities (Agricultural Diary, 2012). Women's participation in rural development, more particularly in agricultural development in Bangladesh, is the most critical strategy. Bangladeshi women play a significant role in agricultural production. But due to a lack of adequate knowledge and skills towards the new technology, they are not able to participate in agrarian commercialization activities. Technology is continuously changing. There is enormous scope for increasing the production of crops throughout the year. They make these contributions by participating in pre and post-harvest operations and various activities under homestead agriculture.

In the light of the above discussion and the background information, the present study has been undertaken with the following research questions:

- What are the women's roles in agricultural commercialization in Bangladesh?
- What are the determinants that influence women's roles in agricultural commercialization in rural Bangladesh?
- To what extent the selected determinants influence women's roles in commercialization in Bangladesh?

Thus, the study is a pioneer study in this region, rural farmers, particularly women, are expected to be benefited from the research. Besides, the findings might be useful to formulate national policy and further research.

1.3 Specific Objectives of the Study

i. To determine the women's roles in agricultural production in the study area;
ii. To describe socio-economic characteristics of women in the study area;
iii. To explore the contribution of the selected determinants that influence women's roles in agricultural commercialization;

1.4 Scope or Rationale of the Study

There is a considerable scope of production and marketing of crops in the study area. Yield can be increased by increasing the technical efficiency of existing agricultural crop production and marketing. There is adequate scope to increase the income of the rural farmers by increasing varietal performance and improving production practices through appropriate use of chemical and organic fertilizer, insecticides, and pesticides as well as the use of high-yielding varieties. The promotion of proper handling, packaging, and transportation could help increase crop grower's incomes at the farm gate. The study was new for that region; it will enhance the existing crops production. The study would be helpful for policy-makers for strengthening the study area's food policy programs as well as national food policy programs. This study also identified the marketing problems regarding agricultural commercialization in the region. The study would also help the researchers and development workers to formulate appropriate policy measures for uplifting the livelihoods of poor households for this region.

1.5 Justification of the Study

The intensification of agricultural trade fosters the commercialization of small-farm production. This growing integration into the market tends to generate a broader change in rural livelihoods, which usually includes diversification of household income, wage labor from off-farm activities, and migration. Household resources, including land, tend to be reallocated in favor of cash crops. This may undermine household food production and women's traditional roles as primarily responsible for family food security. Undoubtedly, women can play a vital role if their full talent can be explored in crop cultivation and commercialization. If women can perform their roles in crop cultivation skillfully and adequately, they will be able to ensure food security and family nutrition, increase family income and contribute to the overall improvement of Bangladesh. So, when rural women's are involved and included with

these development activities and are aware of their rights and claims, their participation in crops cultivation will be increased to a great extent.

Agricultural commercialization brings improved rural livelihood, income-earning opportunities, increased income and developed institutions and infrastructure. Agricultural commercialization may improve food crop productivity and provides a source of cash that allows the household to overcome credit- related constraints on the purchase of fertilizer and other cash inputs. Cash income from commercialized production patterns also facilitates the ability to purchase new seeds and equipment that may promote food crop productivity. Commercial farming brings important drivers of intensification, production, food security, farm incomes and improved livelihood of rural people of Bangladesh. In crop commercialization, women have the least access to the means for increasing yields and moving from subsistence crops to market-oriented production. To understand agriculture commercialization, it is imperative to investigate factors that influence household decisions to participate in the market.

1.6 Assumptions of the Study

The researcher had the following assumptions in mind while undertaking this study:

- The respondent farm women of the study area were capable of furnishing adequate information, views, and options.
- The responses furnished by the respondent were valid and reliable.
- Information furnished by the respondents included in the samples were representative of the whole population of the study.
- The researcher personally collected data was well adjusted herself to the social environment of the study area. Hence the data collected from the respondents were free from any bias and with no hesitation.

1.7 Limitations of the Study

Though the respondents were available in the village, the collection of required data was not an easy task. The researcher of the study had to face specific problems during data collections, which are noted below:

- Most of the farmers had little idea about research work. So it was difficult to explain the purpose of the study and to convince them about the need for the study.
- Most of the respondents were not habituated with this type of research. So a considerable amount of time had to spend to explain to them the purpose of the study.
- Since the respondents did not have enough time and interest to sit for the interview, because, they remained busy with their on and off farm activities. For this, duration of each meeting was kept as short as possible.
- The researcher had to depend on respondent's memory to collect information because most of them did not keep any written records on their farm business.
- Respondents from all categories were often unable to recall the exact information such as income, sales volume, cost, total production etc. The reliability of data, therefore, posed some confuting.

1.8 Organization of the Thesis

Chapter one describes the background, rationale of the study, justification of the study, objectives, assumptions of the study, and limitations of the study. The second chapter provides a review of the literature. The third chapter consists of the research methodology. The fourth chapter determines women's roles in agricultural commercialization, chapter five provides the socio-economic profile of the respondents, and chapter six has briefly discussed the determinants that influence women's roles in agricultural commercialization in the study area. Finally, chapter seven contains summary, conclusions, and policy recommendations.

CHAPTER II
REVIEW OF LITERATURE

The main purpose of this chapter is to review past researches in connection with the present study. The researcher came across with some expert opinions and has tried her best to collect useful information through searching relevant studies, journals, periodicals, popular articles and the Internet. These enhanced the researcher's knowledge for a better and clear understanding of the present study. Again, few studies were not found entirely relevant to the present research yet their findings, methodology of analysis and suggestions have a significant influence on the present study. Review of some research works related to the current research is discussed below. The study used several critical concepts such as crop commercialization, women roles in agricultural commercialization and their constraints in marketing. This chapter has been presented in five sections as follows:

Section 1: Agricultural Commercialization
Section 2: Process of Crops Commercialization
Section 3: Role of Women in Agricultural Commercialization
Section 4: Relationship between Selected Characteristics of the Respondents and Agricultural Commercialization
Section 5: The Conceptual Framework of the Study

2.1 Agricultural Commercialization

In most literature, a farm household is assumed to be commercialized if it is producing a significant amount of cash commodities, allocating a proportion of its resources to marketable products, or selling a considerable portion of its agricultural outputs (Immink and Alarcon 1993; Strasberg *et al.*, 1999). The commonly accepted concept of commercialization is, therefore, that commercialized households are targeting markets in their production decisions, rather than being related simply to the amount of product they would likely sell due to surplus production (Pingali and Rosegrant 1995). In other words, production decisions of commercialized farmers are based on market signals and comparative advantages, whereas those of subsistence

farmers are based on production feasibility and subsistence requirements, and selling only whatever surplus produce is left after household consumption requirements are met.

According to Pingali (1997), agricultural commercialization is more than marketing agrarian products. Pingali argued that agricultural commercialization is attained when household product choice and input use decisions are made based on the principles of profit maximization.

Commercial farming is a process which involves a transformation from production for household subsistence to production for the market. This necessarily implies the monetization of the rural economy. Through the process, traditional smallholder producers are integrated into the world market economy (Brush and Turner, 1987). Therefore Pingali's concept of agricultural crop commercialization was applied in the current study. Leavy *et al.* (2007) also reported that 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.

According to Randela *et al.* (2008), "improved market access encourages the rural farmer as increased wages and employment from the commercialization of agriculture facilitates the ways towards a broad spectrum of development in the entire rural economy." Bernard and Spielman (2008) and Jaleta (2009) also reported that the core rationale behind agricultural commercialization is that increasing income from the ability of smallholder farmers to produce high valued crops, which gives them more top access towards household consumption items.

2.2 Process of Crops Commercialization

There are three levels of market orientation as far as food production systems are concerned, according to Pingali and Rosengrant (1995). These three levels are termed as subsistence systems, semi-commercial systems, and commercial systems based on the farm households' objective for producing a specific crop, their source of inputs,

their product mix, and their income sources. Table 2.1 presents the three classifications with the respective characteristics of the households belonging to each

category. This way of categorizing the market orientation of farm households may not be applicable in many developing countries as simplistic as it is. However, it has much resemblance to the food production systems of smallholder dominated countries of Africa and South-east Asia. Smallholder commercialization is part of an agricultural transformation process in which individual farms shift from a highly subsistence-oriented production towards more specialized production targeting markets both for their input procurement and output supply level (ILRI, 2009).

Table 2. 1 Level of market orientation and its related systems (Pingali and Rosengrant, 1995; Leavy and Poulton, 2007)

Level of market orientation	Farmer's objectives	Sources of inputs	Product mix	Household income sources
Subsistence system	Food self-sufficiency	Household generated (non-traded) inputs	Wide range	Predominantly agricultural
Semi-commercial system	Surplus generation	A mix of traded and non-traded inputs	Moderately specialized	Agricultural and non-agricultural
Commercial system	Profit maximization	Predominantly traded inputs	Highly specialized	Predominantly non-agricultural

In a broad sense, crops commercialization could be seen as the strength of the linkage between farm households and markets at a given point in time (ILRI, 2009). This household to market linkage could relate to output or input markets either in selling, buying or both. Alternatively, smallholder commercialization could also be seen as a dynamic process: at what speed the proportion of outputs sold and inputs purchased are changing over time at household level (ILRI, 2009). Opportunities, therefore, exist nationally and internationally, which would promote increased production and income from crops commercialization. To take advantage of these opportunities staple foods must be considered as commercial crops as well as safeguards for domestic food security (URT, 2009).

2.3 Role of Women in Agricultural Commercialization

In most developing countries, agriculture is an important sector. A significant portion of agricultural activities takes place in rural areas. It is now widely demonstrated that rural women, as well as men, throughout the world, are engaged in a range of productive activities essential to household welfare, agricultural productivity, and economic growth. Yet women's substantial contribution continues to be undervalued in conventional agricultural and economic analyses and policies, while men's contribution remains the central, often sole focus of attention (Jiggins *et al*., 1998).

Women play a significant role in the agricultural labor force and agricultural activities, although to a varying degree. Consequently, their contribution to agricultural output is undoubtedly extremely significant, although difficult to quantify with any accuracy (Doss, 2011). The claim is often heard that women produce 60 to 80 percent of food in most developing countries and half of the world's food supply (Mehra and Rojas, 2008).

The outcome of women's participation in the continuity of cash crop production in those farmlands would not have received proper management and the economic empowerment of women that reduce the poverty level of their household (Afolabi, 2012). This study examines the impact of women's involvement in the commercialization of agriculture on gender relations, using processes of agricultural commercialization and rural change as a lens through which to explore shifting gender power dynamics.

Mohammed (2012) reported that food sufficiency can only be guaranteed by continued gender involvement in agriculture. There is, therefore, the need for an aggressive approach to ensure that gender participation in agriculture is at an increasing rate.

In a study conducted in Pakistan, Saghir, Hassan and Javed (2005) reported that the rural women who were involved in the cleaning of wheat for milling are ranked as first-order then sun drying of agricultural products, cleaning of storeroom, storing of products in bags and transportation of wheat for milling as the second, third, fourth and fifth-order activities. It is cleared that women were extensively involved in

activities at their home but less participation was shown in transportation due to physical wear and tear of their body.

Ahmed (2017) stated that a significant relationship between commercialization and household welfare, with key variables like market access and internal farming activities positively and significantly contributing to improved household income and farm outputs. The regression result further predicts a 16.9% improvement in household welfare if farmers actively work on commercialized farms with better market access and internal farm activities.

Strasberg *et al.* (1999) stated that agricultural commercialization is a process that involves the transformation of subsistence-oriented smallholder farming systems into systems that are primarily oriented toward production for the market. Agricultural commercialization can be defined simply in terms of the proportion of farm output sold in the market. While Von Braun (1994) has a more extensive argument about commercialization that it involves increased market transactions to capture the benefits from higher market participation, commercialization should be about proper decision making as regards input and output decisions, market concentrations and production techniques as well. Commercialization is known to have comparative advantages over subsistence agriculture; it generates income for rural households, expansion in the use of hired labor than it was in subsistence production (Von Braun, 1994; Dorsey, 1999).

One study calculated that agricultural productivity in sub-Saharan Africa could rise 20% if women had equal access to land, seed and fertilizer (FAO, 2009). Women's adoption of new crop production technologies is also strongly affected by who controls and ultimately owns the crop.

Farming is generally believed to have a higher potential to create jobs, increase returns to the asset that the poor people possess, i.e., labor and land, and it pushes down the price of most foodstuffs and raise their welfare (Hazell *et al.*, 2007). On the other hand, Kirui and Njiraini (2013) observes that collective action initiatives and the use of Information and Communication Technology (ICT) tools will improve competitiveness and promote the relevance of female smallholder farmers in the commercialization process.

Fabiyi *et al.* (2007) observed that women participate in almost all agricultural activities except felling of trees and spraying of chemicals. They participate mainly in land clearing, planting, weeding, harvesting, transporting of produce, processing and marketing. These findings are similar to that of Boserup (1970) who states that rural women perform nearly all the tasks connected with food production except tree felling and other heavy duties. A similar investigation conducted in India showed that more than 60% of agricultural operations are performed by women farmers (Shiva, 1991).

Fabiyi *et al.* (2007) also reported that that women tend to produce crops for family consumption as well as crops that generate income within their locality to enable them to take care of themselves. The activities of these women go beyond crop production to other agricultural aspects like livestock and poultry production. More than 70% were involved in the rearing of livestock and about 20% produce sheep and poultry.

2.4 Relationship between Selected Characteristics of the Respondents and Agricultural Commercialization

There was some literature found directly on the relationship between selected characteristics of the respondents and agricultural commercialization. Some of those are mention below:

2.4.1 Age and commercialization

Pandict *et al.* (2013) conducted a study to identify the relationship between the personal characteristics and vegetable marketing of Trishal Upazila under Mymensingh district found that there was no significant relationship between the age of the farmers and vegetable cultivation and marketing.

Kirui and Njiraini (2013) notably reported that among the farmer-specific characteristics, age and gender significant in influencing commercialization. Specifically, the log of age has a significant positive effect on commercialization. However, female household heads were less likely to participate in the markets.

Agwu and Anyanwu (2014) also found that the coefficient of age of the respondents was significant at 10 percent level and had a positive sign. This implies that with increasing age, there is the probability of women participating in the marketing of food crops. Many studies have revealed that those who fall within the active age

brackets engage in agriculture and related activities given the drudgery nature of the enterprise.

Martey and Al-Hassan (2012) stated that the age of the household head is significantly associated with an increase in the extent of maize commercialization. The extent of maize sales increases by 0.2% for every additional year added to the age of the household head. Age of the household head is used as a proxy for experience in farming. It is believed that older household heads have more contacts which allow trading partners to be discovered at lower cost relative to younger household heads.

Hailua and Manjureb **(**2015) also found that age of the household head had a significant effect on the extent of commercialization; an increase of household age by one year, level of commercialization increased by about 0.6% on the average. Age is a proxy for measuring farming experiences. Farmer being landlord is significant in determining participation in the market.

Emilola *et al.* (2016) found that the age of household head was found to be positively significant with the extent of crop sales that indicate that with increasing age, there is the probability of women participating in the marketing of food crops.

Abdullah, Rabbi and Ahamad (2017) showed that factors such as age, the number of family members who assist in farm work, household size, vocational training, and farmer being landlord are the factors that positively affect participation in the market. Similarly, rice output, off-farm income, credit, and income from rice positively affect the welfare of smallholder farmers.

2.4.2 Education and commercialization

Mulwafu *et al.* (2013), Ele *et al.* (2013), Adereni *et al.* (2014) and Sylvester *et al*. (2014) reported that education and extension services were significant factors contributing to the level of commercialization of smallholder farms.

Kabiti, *et al. (*2016) found that years of formal education of the household head was found to have a significant positive influence ($p<0.05$) on the level of input commercialization of a household in the study area. The marginal effect indicates that a year increase in formal education acquired by the household head will result in a 0.024 unit increase in the level of commercialization. Education is theorized to have a

positive impact on the farmers' understanding of production and market dynamics and hence, influence farmer's level of input commercialization (Martey *et al*., 2012).

Educational attainment enhances the farmer's ability to appreciate the essence of credit, new techniques, and information disseminated from extension agents, which impact positively on commercialization (Tolno *et al.*, 2015). The study carried out by Randela *et al.* (2008) highlights that farmers with higher educational levels are more likely to understand and interpret information better than others and thus experience reduced search, screening and information costs.

Kirui and Njiraini (2013) Results showed that, among capital endowment variables, education level, farming experience, non-farm as well as total farm income positively influence the commercialization process.

Tufa (2014) also found that the education of the household head was found to be of positive impact on the sales value of horticultural crops and statistically significant at 10% level. Education increases the ability of farmers to gather and analyze relevant market information, which would improve the managerial capacity of the farmers in terms of better formulation and execution of farm plans and acquiring better knowledge to improve their marketing performance.

Fabiyi *et al.* (2007) observed that the educational level of the respondents seemed to be low. Most of them had only primary and secondary education (63%), only a few had tertiary education 12%, while 25% had no formal education. According to Adams (1982), formal education has the potentials for making up some of the deficiency in man; it enhances understanding and communication in agriculture.

2.4.3 Farm size and commercialization

Emilola *et.al* (2016) found that farm size was significant positive influence indicating that an increase in farm size would increase the degree of commercialization of the households. The extent of food crop commercialization increases by 0.06 for every additional hectare of land put to food crop cultivation. The result confirms the findings by Rahut *et al.* (2010) who established an increase in the degree of food crops commercialization with farm size.

Tufa (2014) also found that farm size was also found to have a positive and significant influence on farmers' likelihood to participate in horticultural crops market at 10% level.

For other instances, Martey and Al-Hassan (2012) highlighted that the percentage of maize and cassava sold by the households increases with farm size. As farm size increases over a certain minimum, there are diminishing marginal returns that affect the volume of sale by percentage of households selling. It is therefore concluded that farm size influences the level of agricultural commercialization.

Olwande *et al.* (2010) also support that households with larger farm sizes are able to produce marketable surplus and hence participate more in the market. Land ownership status of households significantly influences the extent of agricultural commercialization.

Ele *et al.* (2013) elsewhere reported that land size coupled with the membership in cooperatives are important factors determining the level of commercialization of smallholder farms.

Mazengia (2016) also showed that there was a positive and significant relationship between a household's landholding size and intensity of food crops output market participation at 1% significance level. As the landholding size increases by a hectare the household will sell an additional 3.8 quintals of maize. This indicates that the farmers with relatively higher landholding have more space to produce both food crops and cash crops.

2.4.4 Annual family income and commercialization

Kabiti (2016) reported that households with higher off-farm income are expected to have a higher input commercialization index. Household off-farm income was significant at 5 percent level of significance with a positive sign that implies that an increase in household off-farm income would increase the level of output commercialization. Household income can impact the land size cultivated and types of operations of the farm which in turn influence commercialization. Household income also has the potential of reducing the dependency on agricultural produce as food and income sources; and hence increased commercialization.

Dube (2016) observed that household income was also found to positively and significantly influence commercialization and the result is significant at 1% level. Increasing income of the farm households will lead to an increase in the probability of commercialization among the farmers.

Hailua (2015) has found that the average annual income of a crop market participant in the study area was higher than those of the non-participants. Similarly, Gebreselassie *et al.* (2007) found that farmers who participated in crop output markets gained a significantly higher proportion of their income from non-participants.

A study conducted by Emilola (2016) showed that increasing income from farm- and –off-farm activities of the household leads to an increase in the extent of commercialization among the farmers. This finding is also confirmed by Siziba *et al.* (2011) reveal off-farm income was positively related to the level of cereal sale in sub-Saharan Africa.

Agwu (2014) reports that higher income could lead to a higher probability of women participating in food crop marketing. While credit is a problem for all small businesses, the lack of access to credit and financial services is particularly acute for women. Therefore, richer women will be more disposed to participate in business, food crop marketing inclusive than poorer ones

Household income, both farm and non-farm, have the potentials of reducing dependency on the agricultural output, and thus, the quantity and volume traded and hence, commercialization (Agwu and Ibeabuchi, 2011, Agwu *et al.,* 2012 and Muhammad-Lawal *et al.*, 2014).

About 80% of the food consumed in Asia and Sub-Saharan Africa is produced by these small farms. Most of the smallholder farmers focus on a subsistence level of production in which they produce only for self-consumption. Dorsey (1999) showed that those household earn more annual income that follows commercialization.

2.4.5 Market orientation and commercialization

Khatri (2013) in her study stated that the low economic status of women limits their opportunities for broader participation in the market. This is compounded by the trouble women experienced in child-bearing and rearing. It is necessary to particularly identify women as an integral part of the agricultural extension policy and develop

gender-specific operational guidelines that will direct the extension activities of women farmers.

Hailua (2015) has found that the level of participation in crop marketing was significantly higher among respondents that are involved in off-farm activities than those dependent only in agricultural production. Household participation in non-farm activities, especially the share of non-farm income to the total household income, seemed to have an impact on their market entry decision.

In their study on vegetable farmers in Southwest Nigeria, Akinlade *et al.* (2013) found that at intermediate ages, market participation increases with age but decreases as household head advances in age. Farmer's demographics like gender might have an impact on market participation as such female farmers are constrained from market participation (Kirui and Njiraini, 2013). On the other hand, collective action initiatives (farmer groups) significantly and positively influence commercialization.

2.4.6 Market distance and commercialization

Dube (2016) also found that distance of the farm homestead from the nearest town significantly and positively influences commercialization. A unit kilometer increase in the distance of the homestead to the nearest town increases the probability of commercialization by 0.1%. The result is consistent with Sebatta *et al.*'s (2014) findings.

Kabiti (2016) reported that the marginal effect of distance of the farm from the input market indicates that a one kilometer increase in the distance will result in a 0.002 unit increase in the level of input commercialization in the study area. Households that are located closer to the markets are more likely to have a lower level of input commercialization than those which are further away.

The expectation, according to Sharma and Wardhan (2015), would be that the closer the farmer is to the input markets the higher their input commercialization level due to reduced transportation and other transaction costs. This could be attributed to the fact that farmers who stay far from the town (where markets are located) are more likely to go there less than those who stay closer. The farmers who stay a distance from the input market are prone to buy their inputs earlier than those who are inthe proximity

of the market. This protects the farmers who stay far away from the town from the last-minute input rush, which is usually characterized by the unavailability of inputs on the market. Also, the farmers who buy early are more likely to get lower prices and thus, they acquire more inputs from the market at a given amount of money. Access to road is another variable which was found to be significant ($p<0.05$) in this study. Households with access to a road are more likely to have a higher level of input commercialization. A road serves as a linkage between the farm and the input market. Therefore, this means that farms with access to roads can also easily access input markets and thus have higher input commercialization. Access to road also enables input marketers to get to the farm easily.

Emilola (2016) also reported that distance to market was seen to be significant at 5% level but with a negative sign. The implication is that the extent of crop commercialization decreases by 0.02 for a kilometer increase in the distance from household residence to the nearest market. Households further away from market places have lower commercialization. This result is in line with previous studies like Okezie *et al.* (2008).

Hailua (2015) reported that distance to the nearest local market, as measured by the time taken to reach the local market from the homestead, family size, and price of fertilizers had significant and negative impact on intensity agricultural commercialization. At the margin around the mean values, as time taken to local market increased by one minute, the degree of commercialization decreased by 0.4%. This could be due to the higher transaction cost for marketing and lower agricultural intensification as market distance increase.

Tufa (2014) found that distance to the nearest market was negatively affected households' likelihood to sell horticultural crops and statistically significant at 5% level. An increase in the distance that the households would travel to arrive at the nearest market by one walking hours would decrease the probability of the households to market participation.

Kirui (2013) also stated that among the farm-specific variables, distance to bank and the number of crop enterprises grown by the farmer are significant in influencing commercialization. The study finds a significant negative effect of distance on market participation. This finding may suggest that the transaction and opportunity costs

associated with time taken to reach markets may outweigh the benefits of market participation.

Gebremedhin and Jaleta (2010), Gani and Adeoti (2011) and Akinlade *et al.* (2013) found that households closer to market outlets were more likely to participate in marketing activities than households living farther to market outlets.

This implies that the location of farmers in respect of potential markets is an important factor in encouraging farmers to increase their sales. This result is in conformity with the findings of Berhanu and Moti (2010) and Solomon et al. (2010), which found that being closer to the market, enhance market participation.

Martey (2012)also found that distance from a household head's residence to a nearest market is an indicator of travel time and cost to the market is significantly associated with a lower level of cassava sales. The extent of cassava sales decreases by 0.4% for each additional kilometer in the distance from household's residence to the nearest market.

Von Braun *et al.* (1999), Rukuni *et al.* (2006), Hazell (2007), Louw *et al.* (2008) and Kirsten *et al.*, (2012), similarly found that lack of markets for the produce, low market information and technology, high transaction costs, poor agro-ecological conditions, and prevalence of diseases limited agricultural commercialization.

2.4.7. Women engagement and commercialization

Khatri (2013) in her study stated that the majority of the respondents were not involved in processing either at domestic or commercial level this was due to the lack of knowledge regarding this aspect.

Nazli and Hamid (2007) and Sindhu (2007) stated that rural women played an important role in farm activities especially in drying, storage and cleaning of grains in all the zones proving that they were a major role contributor to the family food and economic security.

Dawn (2004) found that in Pakistan, rural women provide most of the labor force in agricultural activities, taking responsibilities for storage, handling, stocking, processing and marketing.

Begum (2002) observed that women perform all (100%) of domestic work, 80% of processing and storing crops, 60% of weeding, 80% of harvesting, 80% caring for livestock and 55% of planting works in agriculture sector of the country.

Naher (2000) found that most of the rural women participated in each of the four selected homestead activities such as 62% in farm related activities, 54% in poultry rearing, 47% in goat rearing and 40% in case of homestead vegetable cultivation. Their extent of participation was also high.

Supekar (2002) mentioned that to enable women to undertake the agricultural or other income-generating programs, it is very essential that specific need based training courses are to be prepared and conducted. These training programs shall include inter cropping management patterns, agro-processing and preservation, marketing, packaging, advertisement for entrepreneurship development, seed collection and selection, nursery activities, forestry, appropriate low-cost technology, organic farming etc.

Amin *et al.* (2009) studied that participation level of rural women regarding farm activities in Pakistan and reported that most of the activities related to take the crop to the market and mills were performed by the husbands (67.97%) with limited participation in food preservation and processing whereas, the wives were mainly involved in cleaning of store rooms, storage of agricultural products in bags and preparation of marmalades and pickles. The participation of women was very high in storage, drying, packaging of grains and low in marketing.

2.4.8 Marketing problems and commercialization

According to Mabuza *et al.* (2013), the inclusion of transport-related variables in their study was meant to account for the opportunity cost of producer's time spent in organizing transport to convey their produce to distant markets. Producers who supplied the retail market had an opportunity cost of time spent in organizing transport and time spent during transportation. As a result, this study also regards transportation as a transaction cost component.

Makhura and Mokoena (2003) stated that poor road conditions, high transport costs and distant markets have been identified as factors that affect improved market access for emerging farmers in.

According to Gustavsson *et al.* (2011), vegetables straight from the farm can be spoilt

in hot climates due to lack of infrastructure for transportation, storage, cooling and markets.

According to Jari (2009), market infrastructure such as sheds and stalls in spot marketsare crucial in maintaining freshness of agricultural produce. Bhopal (2004) also reported that storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. It ensures a continuous flow of goods in the market. Randela (2003) stated that harvest usually occurs at the same time for all farmersproducing the same product leading to a glut of produce that cannot be consumed immediately.

Food and Agriculture Organization (2013) said that information must be received ontime for it to be effective. In developing countries, however, such information is notalways obtainable and may not always be reliable, so there is increased risk of poormarket performance and failures.

Mabuza *et al.* (2013) found in his study that farmers are able to make timely and better informed production and marketing decisions if they have full and easy access to reliable and up-to-date market information.

Mkhabela (2005) in his study found that exposure to market information is of vital importance to farmers as it can assist them in making sound marketing decisions.

2.5 Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly contains at least two important elements, i.e. a dependent variable and an independent variable. A dependent variable in that factor which appears, disappears or varies on the researcher introduces, removes or varies as the independent variables. An independent variable is a factor that is manipulated by the researcher in this attempt to ascertain its relationship to an observed phenomenon. A simple conceptual framework for the study is shown in Figure 2.1.

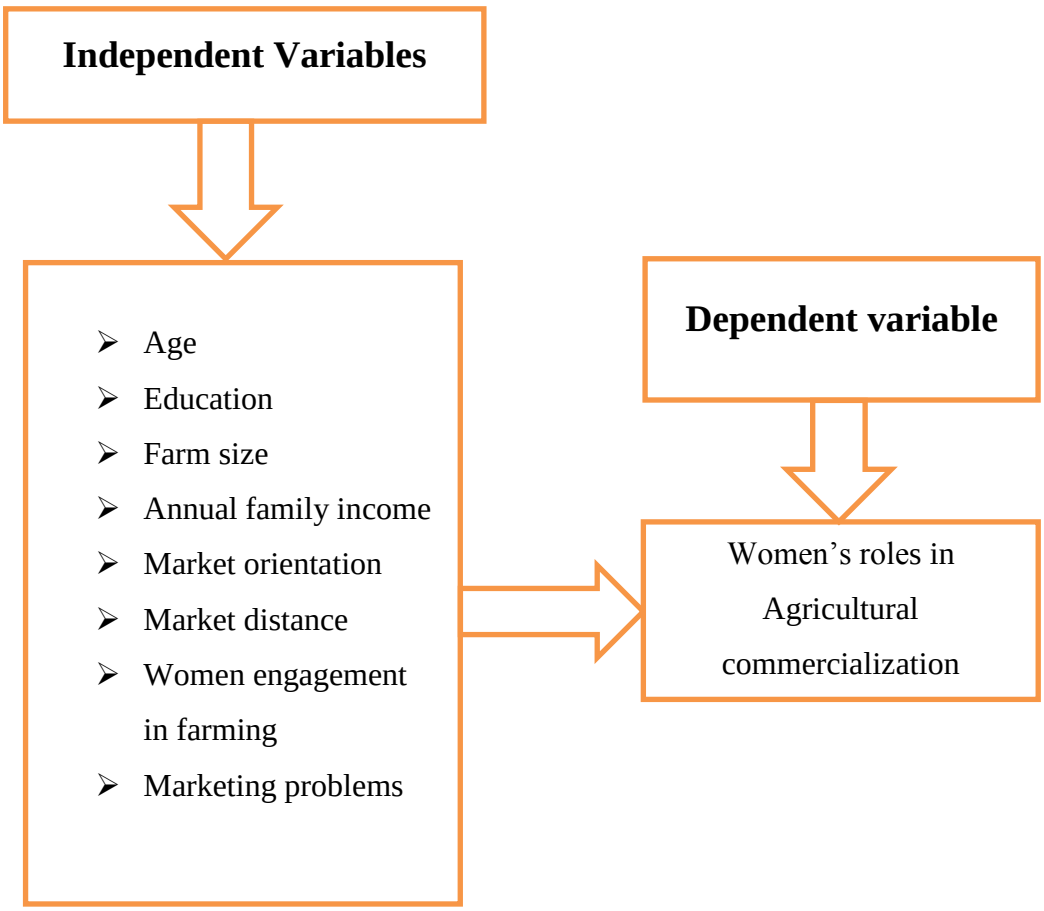


Figure 2.1 The conceptual framework of the study

CHAPTER III
METHODOLOGY

This chapter presents a detail description of the methods adopted at different stages of the study. Methodology is an indispensable and integral part of any research. The methodology of the study is adopted by various steps to select the best method fit to attain the set objectives of the research. This chapter presents a detailed description about the study area, selection of the study area, selection of respondents, data collection procedure, duration of survey, editing and tabulation of data and analytical techniques followed in this study. The tools and methods used and followed for the study by considering the specific objectives of the study are given below.

3.1 Study Area

Thakurgaon is a district in the north-western side of Bangladesh. It is a part of the Rangpur Division and borders India to the west. It consists of five upazilas. These are Thakurgaon Sadar, Baliadangi, Haripur, Ranisankhali, and Pirganj upazila (Figure 3.1).

In Bangladesh, as a whole, agriculture is the basis of the economy, and Thakurgaon has been striving for a long time to be economically productive, agriculture forming a major part of the district's economy. Thakurgaon produces many agricultural products, such as rice, wheat, sugarcane, seasonal vegetables, fruits, etc.

However, the community's distance from the capital causes difficulties in getting sufficient technical and logistic support and in transporting local products to the national market. It is not easy for the producers to reach the national or local market hub for market their produce.

3.2 Selection of Study Area

As the selection of the study area is an important step and it largely depends upon the objectives of the study. Therefore, careful thought was placed on the selection of the study area. The study area has some favorable characteristics like topography, soil and climate condition for producing crops.

The following factors were considered in selecting the study area:

- Thakurgaon is one of the high yieldings and widely crops producing district of the country. Here, all kinds of information needed for the study are available.
- Researcher's easy access to the study area and his familiarity with its socio-economic conditions.
- Sufficient number of women respondents who involve in farm activities.
- So far, no such study was conducted in this area.

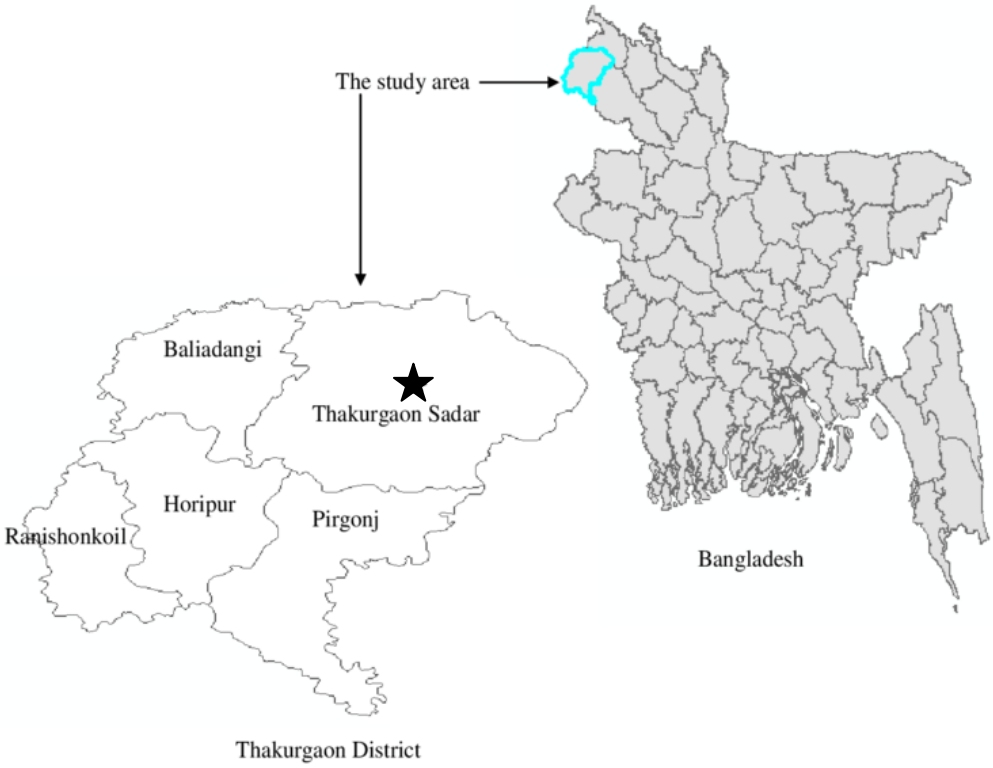


Figure 3.1 A map of Thakurgaon district showing the study are

3.3 Population and Sample Size of the Study

At first, Thakurgaon Sadar upazila was purposively selected for the study. Sadar upazila has 22 unions from which two unions viz Nargun and Jagonnathpur were randomly selected. The numbers of villages of Nargun union were 10 and Jagonnathpur were 11. Out of 21 villages, from these two unions, four (21) villages were selected randomly and the rural women of these four selected villages constituted the population of the study (Figure 3.2). A total of 557 household farm families were found in these four villages. From which a total of 118 farm families were determined using an appropriate sample determination technique with 8% confidence interval. Respondents were selected using a stratified random sampling technique, which is given in Table 3.1.

Table 3.1 Population and sample of the study

Unions	Villages	Population (No. of farm households)	Sample size
Nargun	Gabindonagar	90	19
	Nischintopur	118	25
Jagonnathpur	Alampur	169	38
	Dodapara	180	36
Total		557	118

Figure 3.2 A map of Thakurgaon Sadar upazila showing the study area (Nargun and Jagonnathpur union)

3.4 Data Collection Procedure

3.4.1 Data collecting instrument

Keeping objectives in mind researcher prepared an interview schedule carefully for collecting necessary data from the respondents. Interview schedules were prepared on the basis of specific objectives of this study. Items of the variables were adapted from previous studies whenever possible. Expert opinions were also sought in order to prepare the interview schedule. A pre-test was carried out, and alterations and adjustments were made in the schedule based on the experience of the pretest. The English version of the interview schedule is shown in appendix-A.

3.4.2 Data collection

Data collection is not an easy task. It must be done sincerely, because a successful report depends on reliable data. Before beginning the interview, each respondent was given a brief description of the aim and objectives of the study. The questions were asked in a simple manner and friendly environment with an explanation where it was felt necessary. Data were collected under the continuous supervision of the supervisor. The researcher herself collected the relevant data from the selected villages through face to face interview. The researcher also met with the Sub-Assistant Agriculture Officer (SAAO) of the respective block and explained the objectives of the study and requested them to provide necessary help and co-operation in collecting data. Data collection was carried out during 30 days from 15th July to 15th August, 2019. Responses were collected free from any bias.

3.4.3 Processing of data

The collected data were processed through editing, coding, tabulating and classifying on the base of the characteristics. For completing the pre-tabulation task, data were verified to eliminate errors, inconsistency or omission in data collection and to avoid irrelevant information. Data were classified, tabulated and analyzed to accomplish the objectives of the study. Data were presented mostly in the tabular form because it was of simple calculation, widely used and easy to understand. Raw data were inserted in a computer using the concerned software Statistical Package for Social Sciences (SPSS v.23) computer package.

3.4.4 Tabulation and analysis of Data

The first step was taken to examine the data of each schedule to find out any changeability or omission in the data collection and to avoid irrelevant information. The data were edited carefully to eliminate possible errors contained in the schedules while recording information. Processed data were transferred to SPSS data editor and compiled to facilitate tabulation. Information was collected initially in local units. After checking them, these were converted into quantitative form by using suitable scoring. Inconsistencies in the data were removed. Necessary tables were prepared by shortening the data. The collected data were analyzed according to the objectives of the study. The analysis was done using SPSS v.23. Descriptive analyses such as range, number, percentage, mean, standard deviation were used whenever possible. Multiple linear regressionwas used to find out the contributions of the selected characteristics to women's involvement in agricultural commercialization.

3.5 Measurement of Variables

3.5.1 Measurement of independent variables

It was relevant to follow a methodological procedure for measuring the selected variables in order to contact the study in accordance with the objectives already formulated. The procedures for measuring the independent variables are described below:

3.5.1.1 Age

Age of a respondent was measured in terms of years from birth to the time of interview which was found on the basis of response (Azad, 2014). A score of one (1) was assigned for each year of age. Question regarding this variable appears in item no. 1 in the interview schedule (Appendix-A).

3.5.1.2 Education

Education of a respondent was measured on the basis of her/his years of schooling. If a respondent passed class 4, his/her education score was given as 4. If a respondent did not know how to read and write his education score was given as zero (0). A score of 0.5 was given to that respondent who could sign his/her name only. Question regarding this variable appears in the item no. 2 in the interview schedule (Appendix-A).

3.5.1.3 Farm size

Farm size of a respondent was determined as the total area of his/her farm. It included a summation of the area of homestead area (including pond), own land under own cultivation, the land was taken from others on Borga system, land given from others on Borga system and land taken to others on lease where the unit of measurement was in hectare.

The following formula was used in measuring the farm size:

Total farm size = A1+A2+1/2 (A3+ A4) +A5

A1= Homestead area (including pond)
A2= Own land under own cultivation
A3= Land taken from others Borga system
A4= Land given from others on Borga system
A5= Land taken to others on lease

3.5.1.4 Annual family income

Annual income of a respondent was measured in '000' BDT on the basis of total yearly earning from farm and non-farm sources by the respondent herself/himself and other family members (Appendix-A).

3.5.1.5 Market orientation

Market orientation of the respondent was measured by the number of years a respondent involved in agricultural commercialization or marketing. The measurement included from the year of starting of first agricultural marketing till the year of data collection. A score of one (1) was assigned for each year of involvement (Appendix-A).

3.5.1.6 Market distance

Market distance affects negatively farmer's productivity. Farm distance, inadequate road infrastructure, and transport modes translate into a waste of productivity to farmer. Market distance is an important factor of low productivity. Distance of the farm household's residence from the nearest market was measured in kilometers (Appendix-A).

3.5.1.7 Women engagement in farming

Women's participation in farm activities is gradually increasing. The farm activities are land preparation, sowing/transplanting, weeding, irrigation water management, harvesting, threshing, storing and processing, transporting, sale of crops and seeds to local/regional markets, poultry rearing, livestock rearing and fish culture. Women may economically contribute to the family income by selling vegetables from home gardens or forest products and by providing labor for planting, weeding, harvesting and threshing crops, and processing products for sale. The engagement of a farmer on-farm activity was determined by computing an involvement score based on the responses against fourteen responses regarding agricultural commercialization. The engagement in farming activities of a respondent could range from 0 to 100 where 0 indicated no engagement in farm activities and 100 indicated the highest level of engagement in farm activities (Appendix-A).

3.5.1.8 Marketing problems in agricultural commercialization

Each of the respondents was asked to indicate the degree of problems faced by him/her against each of the seven selected marketing problems in agricultural commercialization. The alternative response was regularly, often, occasionally, rarely, and not at all problems. The score of 4, 3, 2, 1 and 0 were assigned to these alternative responses, respectively. Finally, the marketing problem score of a respondent was determined to sum up the weights of his/her responses to all the seven statements. Thus, the marketing problem faced score of the respondent was ranged from zero 0 to 28, where 0indicating no problem of the respondents and highest '28' indicating very high problems of the respondents (Appendix-A).

Attempts were made to compare the constraints by using Constraints Faced index (CFI) with the following formula:

$$CFI = C_{Re} \times 4 + C_{Of} \times 3 + C_{Oc} \times 2 + C_{Ra} \times 1 + C_{No} \times 0$$

Where CFI= Constraint Faced Index

C_{Re} = No. of respondents faced regular marketing problems

C_{Of} = No. of respondents faced often marketing problems

C_{Oc} = No. of respondents faced occasionally marketing problems

C_{Ra}= No. of respondents faced rarely marketing problems

C_{No} = No. of respondents faced not at all marketing problems

Thus, the possible CFI of constraints items could range from 0–421, where 0 indicating no problems and 421 indicating regular problems.

3.5.2 Measurement of the dependent variable

Due to different definitions of agricultural commercialization in literature, different yardsticks have been developed to measure it. The most widely adopted measurements of agricultural commercialization are the three household level indices developed by Von Braun *et al.*, (1994), that is, output and input side commercialization; rural economy commercialization; and degree of a household integration into the cash economy. For each type of commercialization, the authors formulated indices that can be used to measure the extent of household commercialization. The Household Commercialization Index (HCI) measured the proportion of the value of agricultural output sold in the market and purchased inputs to the total value of agricultural production. The two indices measured household participation in output and input markets respectively. The focus of this study is agricultural commercialization measured by the proportion of the value of agricultural output sold in the market to the total value of agricultural production.

$$\mathrm{HCI_i} = \left[\frac{\text{Value of agricultural sales in Market}}{\text{Agricultural production value}}\right] \times 100$$

Commercialization score could range from 0 to 100, while 0 indicating no commercialization and 100 indicating very high commercialization. The findings from this study are useful in informing policy for appropriate interventions that can stimulate and enhance an all-inclusive smallholder agricultural productivity and development growth mediated through the commercialization process.

3.6 Model Specification

The Multiple-linear regression model is specified as follows;

$$Y_i = \beta_o+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_6X_6+\beta_7X_7+\beta_8X_8+ \mu$$

Where: Y_i = is the dependent variable, which is the commercialization index

X_1= Age of the woman respondent (years)

X_2= Education of the woman respondent (years)

X_3= Farm size (in hectares)

X_4= Annual family income of the household (in thousand)

X_5= Market distance (in kilometers)

X_6= Market orientation (number of years involve in marketing)

X_7= Women engagement in agricultural work (score: 0-100)

X_8= Marketing problems in commercialization (Score: 0-4)

μ= Error term

β_o= Constant

β_1-β_8= Coefficients

The Multiple-linear regression model will be used to measure the contribution of the selected determinants of women's roles in agricultural commercialization.

3.7 Statement of Hypothesis

A hypothesis is a conjectural statement of the relation between two or more variables. Hypotheses are always in declarative sentence form and they relate either generally or specifically variables to sentence form and they relate either generally or specifically variables to variables. A hypothesis may be broadly divided into two categories, namely the research hypothesis and null hypothesis.

3.7.1 Research hypothesis

In the light of the objectives of the study and variables selected, the following research hypotheses were formulated to test them in. The research hypotheses were stated in positive form, the hypotheses were as follows:

"Each of the selected characteristics of the farm women had a contribution to their involvement in agricultural commercialization."

3.7.2 Null hypothesis

In order to conduct statistical tests, the research hypotheses were converted to the null form. Hence, the null hypotheses were as follows:

"Each of the selected characteristics of the farm women had no contribution to their involvement in agricultural commercialization."

CHAPTER IV
ROLES OF WOMEN IN AGRICULTURAL PRODUCTION

Following the objectives of the study, the main purpose of this chapter is to determine women's roles in agricultural commercialization. Women play a significant and crucial role in agricultural development and commercial farming. The nature and extent of women's involvement in agriculture varies greatly from region to region. But regardless of these variations, women are actively involved in various agricultural activities and commercial farming.

4.1 Roles of Women in Agriculture and Commercial Farming

In many farming communities, women are the main custodians of knowledge on crop varieties. In some regions of sub-Saharan Africa, women may cultivate as many as 120 different plants alongside the cash crops that are managed by men (FAO, 2009) and Women are of vital importance to rural economies. Rearing poultry and small livestock and growing food crops, they are responsible for some 60% to 80% of food production in developing countries (FAO, 2011).

Rural women perform numerous labor-intensive jobs such as weeding, hoeing, grass cutting, picking, cotton stick collection, separation of seeds from fiber, keeping of livestock and its other associated activities like milking, milk processing, preparation of ghee, etc.

FAO (2011) reported that out of total female main workers, 55 percent were agricultural laborers and 24 percent were cultivators. However, only 12.8 percent of the operational holdings were owned by women, which reflect the gender disparity in ownership of landholdings in agriculture. Moreover, there is a concentration of operational holdings (25.7 percent) by women in the marginal and smallholdings categories.

Food security is a major concern to millions. It is built upon three foundational pillars- food availability, food access (largely economic access to food), and food utilization or nutritional security. Women play important roles in achieving all three pillars of food security, not just in than last one as many may expect. In fact, their role in achieving the first pillar is becoming more important, as many witness many are calling the "feminization of agriculture." In many countries the rural male population

is falling far more rapidly than the rural female population as males migrate in search of better incomes (Brown, 2015).

Again in most of the developing countries agriculture is considered to be one of the most stimulating factors for growth and poverty reduction. Though the rural economy of developing countries like Bangladesh largely depends on agriculture and women are one of the crucial resources in agriculture, the sector is often underperforming in part because of the lower productivity of women. In Bangladesh, being a traditional Muslim society, women's participation in economic activities in general and in agriculture in particular has remained low (Jaim, 2011).From the eighties the countries female labors are emerged as largest industrial labor force in the garment sector, still in the rural Bangladesh more women are involved in farm activities than non-farm sectors. Women provide larger share of food in the household than men, still they are often disfavored from various sides like law, religion, tradition etc. Despite doing almost equal amount of work a female labor get less wage than a male (Zaman, 2002).

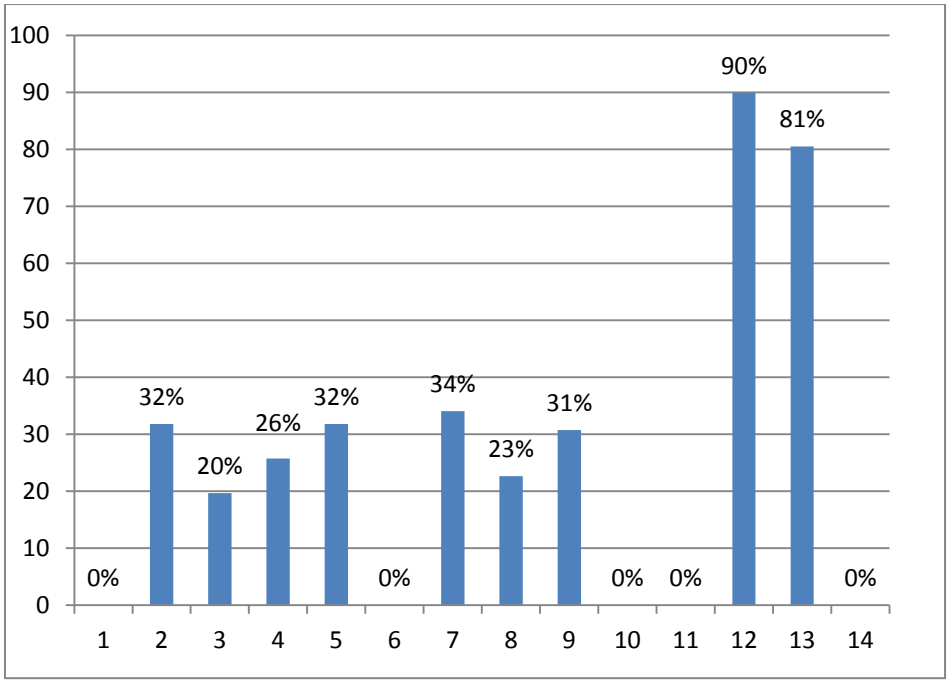
Mainly rural women are engaged in agricultural activities in three different ways depending on the socio-economic status of their family and regional factors. They work as: paid laborers, cultivator doing labor on their own land, managers of certain aspects of agricultural production by way of labor supervision and the participation in post-harvest operations.

Economic Survey 2017-18 says that with growing rural to urban migration by men, there is 'feminization' of agriculture sector, with increasing number of women in multiple roles as cultivators, entrepreneurs, and laborers. Globally, there is empirical evidence that women have a decisive role in ensuring food security and preserving local agro-biodiversity. Rural women are responsible for the integrated management and use of diverse natural resources to meet the daily household needs. This requires that women farmers should have enhanced access to resources like land, water, credit, technology and training which warrants critical analysis in the context of India. In addition, the entitlements of women farmers will be the key to improve agriculture productivity. The differential access of women to resources like land, credit, water, seeds and markets needs to be addressed.

Livestock is the primary livelihood activity used to meet household food needs as well as supplement farm incomes. Some studies have revealed rural women earn extra income from the sale of milk and animals. Most women are engaged in cattle management activities such as cleaning of animals and sheds, watering of cattle, milking the animals, fodder collection, preparing dung cakes, collection farmyard manure. Except for grazing, all other livestock management activities are predominantly performed by women. Men, however, share the responsibility of taking care of sick animals. The women are playing a dominant role in livestock production and management activities. Poultry farming is one of the major sources of rural economy. The rate of women participation in poultry farming at household level is central in the poultry industry.

4.2 Women Engagement in Farming in the Study Area

The researcher purposely selected 14 items of farm activities. The activities were land preparation, sowing/transplanting, application of fertilizers, application of herbicides, weeding, irrigation water management, harvesting, threshing, storing and processing, transporting, sale of crops and seeds to local/regional markets, poultry rearing, livestock rearing and fish culture. In the study area, item 1 (land preparation), item 6 (Irrigation water management), item 10 (Transporting), item 11 (Sale of crops and seeds to local/regional markets) and item 14 (fish culture) were only managed by male counter partners while females were performed the following farm activities as shown in Figure 4.1.



Legend:

1. Land preparation, 2. Sowing/ Transplanting, 3.Application of fertilizers, 4.Application of herbicides, 5.Weeding, 6.Irrigation water management, 7.Harvesting, 8.Threshing, 9.Storing and processing, 10.Transporting, 11.Sale of crops and seeds to local/ regional markets, 12.Poultry rearing, 13.Livestock rearing, 14.Fish culture

Figure 4.1 Women engagement in farming

Data contained in Figure 4.1 revealed that poultry rearing (90%) and livestock rearing (81%) were mainly managed by women respondents. For crop farming, 34% of respondents were involved in harvesting, 32% in transplanting and weeding, 31% in storing and processing, 26% in herbicide application, 23% in threshing, and 20% in fertilizer application, respectively. The findings showed that the overwhelming majority (82.3 percent) of the farmers had small to medium farm size in the syudy area. In rural area of Bangladesh, most of the farmers live below a subsistence level. Having smaller farm sizes might be one of the prominent reasons why farmers are reluctant to involve in commercial farming.

With women predominant at all levels-production, pre-harvest, post-harvest processing, packaging, marketing of the agricultural value chain, to increase productivity in agriculture, it is imperative to adopt gender specific interventions. An inclusive transformative agricultural policy should aim at gender-specific intervention to raise productivity of small farm holdings, integrate women as active agents in rural

transformation, and engage men and women in extension services with gender expertise.

4.3 Commercialization of Agricultural Products in the Study Area

The observed score of commercialization ranged from 15.00 to 88.19. The mean score was 57.89 with a standard deviation of 17.32. Based on the commercialization index of agricultural products, respondents were classified into three categories as shown in Table 4.1.

Table 4.1 Distribution of the respondents according to the household commercialization index

Categories	Respondents		Mean	Std
	Numbers	Percent		
Low (Up to 40 score)	19	16.1	57.89	17.32
Medium (41-75 score)	81	68.6		
High (>75 score)	18	15.3		
Total	118	100		

Data contained in Table 4.1 revealed that the majority (68.6 percent) of the women had medium commercialization of agri products as compared to 16.1 percent and 15.3 percent having low and high commercialization of products, respectively. The result implies that less than one-fifth of the respondents (15.3 percent) were commercially engaged in farming, while the majority (84.7 percent) were less to moderately involved in commercial agriculture. Since the majority of the respondents (82.3 percent) had small to medium farms, this finding is consistent that shows the target respondents mainly consume their produce at home or use for a purpose other than selling for income generation. Given the case, there is an ample scope to increase commercialization of products in the study area by minimizing problems that rural women faced for participating in the agricultural markets.

CHAPTER V

DESCRIPTION OF SOCIO-ECONOIC CHARACTERISTICS OF WOMEN

This section deals with the characteristics of farm women. Different women possess different characteristics which are focused on their behavior. Socio-economic characteristics of the sample farmers are very important in the use of research planning because there are numerous interrelated and constituent attributes characterize an individual and profoundly influence the development of her behaviors and personality.

5.1 Socio-economic Characteristics of the Respondents

Respondents differ from one another for the variation of socio-economic aspects. However, for the present research, a few of the socio-economic characteristics have been taken into consideration for discussion. A summer profile of farm women interviewed in this study is given in Table 5.1.

Table 5.1 Provides a summary profile of farm women's characteristics

Sl. No.	Characteristics (with measuring unit)	Range		Mean	Std
		Possible	Observed		
01.	Age (years)	Unknown	20-62	37.03	10.06
02.	Education (schooling years)	Unknown	0-14	6.77	3.90
03.	Farm size (hectare)	Unknown	.05-3.68	.79	.69
04.	Annual family income ('000'BDT)	Unknown	85.7-669.0	223.71	147.59
05.	Market orientation (years)	Unknown	4-40	15.06	8.74
06.	Market distance (kilometer)	Unknown	7.0-17.0	12.02	3.98
07.	Women engagement in farming (score)	0-100	23.57-30.71	26.20	1.31
08.	Marketing problems in the study area (score)	0-28	14-22	18.81	1.70

5.1.1 Age

Age of the respondents varied from 20 to 62 years, the average being 37.03 years with the standard deviation of 10.06. According to their age, the respondents were classified into three categories as young-aged (up to 35 years), middle-aged (36- 50 years), and old- aged (above 50 years) based on the classification provided by the Ministry of Youth and Sports, People's Republic of Bangladesh. The distribution of the respondents according to their age is shown in Table 5.2.

Table 5.2 Distribution of the respondents according to their age

Categories	Respondents		Mean	Std
	Numbers	Percent		
Young aged (Up to 35 years)	59	50.0	37.03	10.06
Middle aged (36-50 years)	46	39.0		
Old aged (>50 years)	13	11.0		
Total	118	100		

Data represented in Table 5.2 indicate that 50.0 percent of the respondents were young aged as compared to 39.0 percent being middle and 11.0 percent old aged. Data also indicates that the old and young aged respondents constitute almost 89.0 percent of total respondents. The young and middle-aged respondents were generally more involved in agricultural commercialization than the old aged.

5.1.2 Marital status of the respondents

Based on marital status, the respondents were classified into five categories namely married, unmarried, separated, divorced and widowed. The distribution of the farmers following their marital status is presented in Table 5.3.

Table 5.3 Distribution of the respondents according to their marital status

Marital status	Respondents	
	Numbers	Percent
Married	109	92.4
Unmarried	0	0
Separated	0	0
Divorced	0	0
Widowed	9	7.6
Total	118	100

Data presented in Table 5.3 indicated that the majority (92.4 percent) of the respondents were married while 7.6 percent were widowed. The findings indicated that the majority (92.4 percent) of the women were married. Other categories were not present in the findings.

5.1.3 Education

The education level of the respondents ranged from 0 to 14 according to the year of schooling. The average education score of the respondents was 6.77 with a standard deviation of 3.90. Based on their level of education, the women were classified into five categories as shown in Table 5.4.

Table 5.4 Distribution of the respondents according to their level of education

Categories	Respondents		Mean	Std
	Numbers	Percent		
Cannot read and write (0)	3	2.5	6.77	3.90
Can sign only (0.5)	18	15.3		
Primary education (1-5)	19	16.1		
Secondary education (6-10)	64	54.2		
Above secondary education (>11)	14	11.9		
Total	118	100		

Data shown in Table 5.4 indicated that 54.2 percent of the women were in secondary level education compared to 2.5 percent cannot read and write, 15.3 percent can sign only, 16.1percent had primary level education, and 11.9 percent had the above secondary level of education. Data also revealed that the majority (70.3%) of the women had educational qualifications from primary to secondary. Education broadens the horizon of the outlook and expands one's capability to analyze any situation related to his work and life. A literate farmer is expected to be more informed and responsive to the demand of the market. Therefore, he/she will be able to make an informed decision about commercializing of his produce.

5.1.4 Farm size

Farm size of the respondents ranged from 0.05 hectare to 3.68 hectares with a mean of 0.79 and a standard deviation of 0.69. Based on their farm size, the farmers were classified into four categories, followed by DAE (1999) as shown in Table 5.5.

Table 5.5 Distribution of the respondents according to their farm size

Categories	Respondents		Mean	Std
	Numbers	Percent		
Marginal farm (Up to 0.20 ha)	20	16.9	0.79	0.69
Small farm (0.21-1.0 ha)	58	49.2		
Medium farm (1.0-3 ha)	39	33.1		
Large farm (>3 ha)	1	0.8		
Total	118	100.0		

Data presented in Table 5.5 demonstrated that almost half of the respondents (49.2 percent) had small farm compared to one-third (33.1 percent) had medium farm and 16.9 percent having marginal farm. Only 0.8 percent of the respondents had large farms. The findings indicated that the overwhelming majority (82.3 percent) of the farmers had small to medium farm size. In Bangladesh, most of the farmers live below a subsistence level. Having smaller farm sizes might be one of the reasons why farmers are reluctant to involve in commercial farming.

5.1.5 Annual family income

Annual family income of the respondent ranged from 85.7 to 669.0 thousand taka. The mean was 223.72 thousand taka and standard deviation was 147.59. Based on annual family income, the respondents were categorized into three groups as shown in Table 5.6.

Table 5.6 Distribution of farm respondents according to their annual family income

Categories	Respondents		Mean	Std
	Numbers	Percent		
Low income (Up to 150 '000'BDT)	53	44.9	223.72	147.59
Medium income (150-300 '000'BDT)	38	32.2		
High income (>300 '000'BDT)	27	22.9		
Total	118	100		

Data shown in Table 5.6 indicated that the highest proportion (44.9 percent) of the respondents had low annual family income, while nearly one-third (32.2 percent) of the respondents belonged to the category of medium annual family income followed by little more than one-fifth (22.9 percent) of them had high annual family income. It further revealed that the majority (77.1 percent) of the respondents had low to medium annual family income. They also have other income sources. Most of the respondents involve in many non-agricultural activities (such as small business, service etc). In some family there are immigrant member and it is a way of income. The gross annual family income of a farmer is an important indicator of how much she/he can invest in his farming. The higher income increases the possibility of investing in commercial crop production and marketing of the farmers.

5.1.6 Market orientation

Computed scores of the farmers about involvement in agricultural marketing ranged from 4 to 40 years with a mean of 15.06 and a standard deviation of 8.75. Based on the involvement of marketing in agricultural production, the respondents were classified into three categories as follows in Table 5.7.

Table 5.7 Distribution of the respondents according to their market orientation

Categories	Respondents		Mean	Std
	Numbers	Percent		
Low orientation (Up to 10 years)	34	28.8	15.06	8.75
Moderate orientation (10-20 years)	58	49.2		
High orientation (>20 years)	26	22.0		
Total	118	100		

Data contained in Table 5.7 shows that half of the respondents (49.2 percent) had moderate orientation, whereas 28.8 percent had low orientation and 22.0 percent had high orientation. Data also indicated that 78 percent of the farmers had moderate to low orientation to market for selling agricultural produce.

5.1.7 Market distance

Market distance of the respondent ranged from 7.0 to 17.0 kilometers. The mean was 12.02 kilometers and a standard deviation was 3.98. On the basis of market distance, the respondents were categorized into three groups as shown in Table 5.8.

Table 5.8 Distribution of the respondents according to their market distance

Categories	Respondents		Mean	Std
	Numbers	Percent		
Less distance (Up to 10 km)	38	32.2	12.02	3.98
Moderate distance (10 -14 km)	44	37.3		
Long distance (>14 km)	36	30.5		
Total	118	100		

Data presented in Table 5.8 demonstrated that the highest proportion (37.3 percent) of the respondents had moderate distance compared to 32.2 percent had less distance, and 30.5 percent had long distance. The findings indicated that the overwhelming majority (69.5 percent) of the respondents lived within 14 km of the local market.

5.1.8 Farming engagement of women in agricultural commercialization

Involvement of rural women in agricultural commercialization by the women scored from 23.57 to 30.71 with a mean and a standard deviation of 26.20 and 1.31, respectively. The major activities were land preparation, sowing/transplanting, application of fertilizers, application of herbicides, weeding, irrigation water management, harvesting, threshing, storing and processing, transporting, sale of crops and seeds to local/regional markets, poultry rearing, livestock rearing and fish culture. Based on rural women involvement in agricultural commercialization, they were classified into three categories.

Table 5.9 Distribution of the respondents according to rural women involvement in agricultural commercialization

Categories	Respondents		Mean	Std
	Numbers	Percent		
Low engagement (Up to 25 score)	12	10.2	26.20	1.31
Moderate engagement (25-27 score)	73	61.9		
High engagement (>27 score)	33	28.0		
Total	118	100		

Table 5.9 indicates that among the respondents, 61.9 percent of women moderately engaged in agricultural commercialization and 28.0 percent in high involvement, followed by 10.2 percent in low engagement, respectively. Hence, most of the respondents (89.9 percent) had moderate to high engagement in agricultural commercialization.

5.1.9 Marketing problems faced by women in agricultural commercialization

The scores of marketing problems faced by rural women in commercial farming ranged from 14 to 22 against the possible range of 0 to 28 with an average of 18.81 and a standard deviation of 1.70. Based on the observed scores of marketing problems faced in agricultural commercialization, the respondents were classified into the three categories, i.e. low, moderate and high marketing problems. The distribution is shown in Table 5.10.

Table 5.10 Distribution of the respondents according to marketing problems faced in agricultural commercialization

Categories	Respondents		Mean	Std
	Numbers	Percent		
Low problem (Up to 16 score)	6	5.1	18.81	1.70
Moderate problem (16-20 score)	96	81.4		
High problem (>20 score)	16	13.6		
Total	118	100		

Data of Table 5.10 show that among the respondents, the highest 81.4 percent of respondents belong to the group of moderate level marketing problems and the lowest 5.1 percent in low-level marketing problems followed by high-level marketing problems (13.6 percent). Among the respondents, most of the respondents (95%) have moderate to high-level marketing problems in agricultural commercialization in the study area. Marketing problems that were faced by rural women in commercial farming in the study area is presented in Table 5.11.

Table 5.11 Marketing problems in agricultural commercialization in the study area

Sl. No	Items of marketing problems	CFI	Rank order
1.	Lack of cleaning and drying facilities	235	6
2.	Lack of advanced processing and preservation knowledge and skills	281	4
3.	Lack of transport facilities	266	5
4.	Absence of sufficient storage facilities (e.g. cold storage)	421	1
5.	Lack of market information	281	4
6.	Price fluctuation	322	3
7.	Lack of co-operative marketing	413	2

According to Constraint Facing Index (CFI), the **'**absence of sufficient storage facilities (e.g., cold storage)' positioned the 1st and 'lack of cleaning and drying facilities' in the last. The result showed that 'co-operative marketing' was absent and 'price fluctuation' of crops was a regular phenomenon. Lack of advanced processing and preservation knowledge and skills and lack of market information, both positioned 5th and lack of transport facilities in the 6th.

In the study area the respondents reported that most of the farmers did not have sufficient cleaning and drying facilities and they brought their produce to the markets

as it is assembled from the fields. Thus cultivators were placed at a disadvantage while selling their produce because uncleaned and undried products were valued at a lower rate. There is not much organized storage for agricultural produce in the study area and what is available is not within the reach of the average farmer. Thus the methods used by most of the farmers were of indigenous type such as, storage in woven-split bamboos, bamboo baskets, jars and pitchers, mud-walled golas and golas made of bamboo and wood, etc and they have to suffer a huge loss during storage. The respondents of the study area also reported that about seven categories of middlemen were engaged in the movement of agricultural produce between the producer and the consumer. They were faria, bepari, aratdar, dalal or broker, stockist, wholesaler and retailer. This intermediaries affect the efficiency of agricultural marketing. The respondents also reported that private sources of finance were too costly and to avoid taking loans from sources, they sold their produce immediately after harvest at a very cheap rate.

CHAPTER VI
CONTRIBUTING FACTORS THAT INFLUENCE WOMEN'S ROLES IN AGRICULTURAL COMMERCIALIZATION

Various factors influence farm households regarding commercial farming. Some common factors are gender/sex, age, marital status, education, family member, family labor/ hired labor, farm size, farm income/ annual family income, farming experience, distance to market, access to credit, organization participation, access to information and so on. Some studies revealed that these influential factors positively or negatively affected the farm household's participation in commercial farming. Some observations related various factors that influence farm households in agricultural commercialization are given below:

Agwu observed (2014) that the household size, income, farming experience, farm size, distance to market, membership of the society and access to credits, were all significant at various probability levels and with different signs in influencing agriculture commercialization in the study area.

Age of household heads, age dependency ratio, and family size have been pull factors affecting the proportion of sales downwards whereas the size of cultivated land and livestock ownership have been push factors facilitating a higher share of sales. Among the statistically significant determinant factors, the size of cultivated land played the leading role in improving the volume of crop sales (Bekele, 2015).

In many instances, agricultural commercialization was affected by the size of the household, a distance of homestead to market, and household income.

Shewaye (2014) noted that the larger the total farm size, the larger the area allocated to the crop production, thereby increasing the number of products available for sale and thus the per-unit transaction costs will be lower due to the economics of scale.

Transport is important both for out-bound and in-bound inputs to the farm. If the public transport system is not available in the area, inputs may not be obtained on time. As a result, production is negatively affected and ultimately the marketing of the produce.

6.1 The Contribution of the Selected Determinants of Rural Women to their Involvement in Agricultural Commercialization

Multiple regression analysis was computed to estimate women's involvement in agricultural commercialization as shown in Table 6.1.

Table 6.1 Multiple regression coefficients of contributing factors related to the engagement of rural women in agricultural commercialization

Dependent variable	Independent variables	β	*P*	R^2	Adj. R^2	F
Women's roles in agricultural commercialization	Age	-.334	.11	.400	.356	9.074
	Education	.264	.02*			
	Farm size	.525	.00**			
	Annual income	-.282	.09			
	Market orientation	.578	.00**			
	Market distance	-.067	.44			
	Women engagement in farming	.245	.00**			
	Marketing problems	-.170	.04*			

** Significant at $p < 0.01$;* Significant at $p < 0.05$,

The null hypothesis was there is no significant contribution with selected characteristics of women (age, education, farm size, annual income, market orientation, market distance, farming engagement of women, marketing problems) and engagement of farm women in agricultural commercialization.

The findings of the study revealed that the characteristics of the women were taken as independent variables together were effective in predicting farm women involvement in agricultural commercialization. The observed F ratio was significant at 0.01 level of significance indicated the model is statistically fit. All the independent variables jointly explained 40% of the variance of farm women's roles in agricultural commercialization.

However, each predictor may expound some of the variance in rural women's engagement in agricultural commercialization conditions simply by chance. The adjusted R^2 value penalizes the addition of external predictors in the model, but values

of .356 still show that the variance in women's extent of involvement in agricultural commercialization can be attributed to the predictor variables rather than by chance and the F value indicate that the model was significant (p<0.01).

Table 6.1 shows that education, farm size, market orientation, women engagement in farming, marketing problems had a significant contribution to women's involvement in agricultural commercialization. Concerning contribution, education had the strongest predictor (β= .578, p<0.01) followed by farm size (β= .525, p<0.01), women engagement in farming (β= .245, p<0.01) and education (β= .264, p<0.05) while marketing problems was found as the least stronger contributor (β= -.170, p<0.05) to women's involvement in agricultural commercialization. Important to note here that, among all significant contributors, marketing problems were found negatively influenced women's participation in commercial farming.

6.1.1 Contribution of education to rural women's involvement in agricultural commercialization

The contribution of education to rural women's involvement in agricultural commercialization by testing the following null hypothesis; "there is no contribution of education to rural women's involvement in agricultural commercialization."

The p-value of education was found .02. The following observations were made based on the value of the concerned variable of the study under consideration.

a) The null hypothesis was rejected. So it can be said that there is a significant contribution of education to rural women's involvement in agricultural commercialization.

b) The contribution of education was significant at 5% significance level.

c) The sign between education and involvement was positive which indicates higher education more the involvement of rural women in agricultural commercialization.

Based on the above finding, it can be summarized that women had more education increased the capabilities of involvement in agricultural commercialization. Education enhances the abilities of women that enabled them to involve in agricultural commercialization.

6.1.2 Contribution of farm size to rural women's involvement in agricultural commercialization

The contribution of farm size to rural women's involvement in agricultural commercialization by testing the following null hypothesis; "there is no contribution of farm size rural to rural women's involvement in agricultural commercialization."

The p-value of farm size was found .00. The following observations were made based on the value of the concerned variable of the study under consideration.

a) The null hypothesis was rejected. So it can be said that there is a significant contribution of farm size to rural women's involvement in agricultural commercialization.

b) The contribution of the farm size was significant at 1% significance level.

c) The sign between education and involvement was positive which indicates larger the farm size more the involvement of rural women in agricultural commercialization.

Based on the above finding, it can be summarized that women had large farm size increased the capabilities of involvement in agricultural commercialization. Farm size enhances the abilities of the women that enabled them to involve in agricultural commercialization.

6.1.3 Contribution of market orientation to rural women's involvement in agricultural commercialization

The contribution of market orientation to rural women's involvement in agricultural commercialization by testing the following null hypothesis; "there is no contribution of market orientation to rural women's involvement in agricultural commercialization."

The p-value of farm size was found .00. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a) The null hypothesis was rejected. So it can be said that there is a significant contribution of market orientation to rural women's involvement in agricultural commercialization.

b) The contribution of the market orientation was significant at 1% significance level.

c) The sign between market orientation and involvement was positive which indicates higher the market orientation more the involvement of rural women in agricultural commercialization.

Based on the above finding, it can be summarized that women had high market orientation increased the capabilities of involvement in agricultural commercialization. Market orientation enhances the abilities of the women that enabled them to involvement of rural women in agricultural commercialization.

6.1.4 Contribution of women's engagement in farming to their involvement in agricultural commercialization

The contribution of rural women's engagement in farming to their roles in commercialization by testing the following null hypothesis; "there is no contribution of women's engagement in farming to their involvement in agricultural commercialization."

The p-value of women's engaged in farming was found .00. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a) The null hypothesis was rejected. So it can be said that there is a significant contribution of women's engagement in farming to their involvement in agricultural commercialization.

b) The contribution of the farming engagement of women was significant at 1% significance level.

c) The sign between the farming engagement of women and involvement was positive which indicates higher farming engagement of women more the involvement of rural women in agricultural commercialization.

Based on the above finding, it can be summarized that a high farming engagement of women increased their capabilities of involving in agricultural commercialization.

6.1.5 Contribution of marketing problems to rural women's involvement in agricultural commercialization

The contribution of marketing problems faced by women to their involvement in agricultural commercialization by testing the following null hypothesis; "there is no contribution of marketing problems to rural women's involvement in agricultural commercialization."

The p-value of farm size was found .04. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

a) The null hypothesis was rejected. So it can be said that there is a significant contribution of marketing problems faced by women to their involvement in agricultural commercialization.

b) The contribution of the marketing problems was significant at 5% significance level.

c) The sign between marketing problems and involvement was negative which indicates lower the marketing problems more the involvement of rural women in agricultural commercialization.

Based on the above finding, it can be summarized that women had low marketing problems increased the capabilities of involving in agricultural commercialization. Marketing problems decrease the abilities of the women that enabled them to involve in agricultural commercialization.

CHAPTER VII
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

7.1 Summary of Findings

7.1.1 Roles of women in agricultural commercialization

The highest proportion (90 percent) of the respondents had involvement in poultry rearing followed by 81 percent had involvement in livestock rearing while 23 percent in threshing, and 20 percent in fertilizer application, respectively.

7.1.2 Selected characteristics of the rural women

Age

Age of the farmers ranged from 20 to 62 years, the average being 37.03 years with a standard deviation of 10.06. Highest proportion (50.0 percent) of the women were found young.

Marital status

The highest proportion (92.4 percent) of the respondents was found married compared to 7.6 percent were found widowed. The findings indicated that a large proportion (92.4 percent) of the women were married.

Education

Education score of the respondents ranged from 0 to 14 with an average of 6.77and a standard deviation of3.91. The highest proportion (54.2 percent) of the women was under the secondary level of education.

Farm size

Farm size of the respondents ranged from .05 hectares to 3.68 hectares with a mean of .79 and a standard deviation of .69.The majority (49.2 percent) of the respondents had had small farms.

Annual family income

Annual family income of the respondents ranged from 85.7 to 669.0 thousand taka. The mean was 223.72 thousand taka and a standard deviation of 147.59. The highest proportion (44.9 percent) of the respondents had low family annual income, while

(32.2 percent) of the respondents belonged to the category of medium annual family income compared to 22.9 percent of them having high annual family income.

Market orientation

Computed scores of the respondents about involvement in agricultural marketing ranged from 4 to 40 years with a mean of 15.06 and a standard deviation of 8.75. The highest proportion (49.2 percent) of the respondents had moderate orientation, whereas 28.8 percent had low orientation, and 22.0 percent had a high orientation.

Market distance

Market distance of the respondent ranged from 7.0 to 17.0 kilometers. The mean was 12.021 kilometers and standard deviation was 3.9831. The highest proportion (37.3 percent) of the respondents had moderate distance compared to 32.2 percent had less distance, and only 30.5 percent had long distance.

Women's farming engagement

Farming engagement of women in agricultural commercialization scored from 23.57 to 30.71with the mean and a standard deviation of 26.20 and 1.31 respectively. The highest proportion (61.9 percent) of the respondents belong to the group of moderate engagement regarding agricultural commercialization and 28.0 percent in high involvement and 10.2 percent in low engagement, respectively.

Marketing problems in agricultural commercialization

The scores of marketing problems faced in agricultural commercialization of the respondents ranged from 14 to 22 against the possible range of 0 to 28 with an average of 18.81 and a standard deviation of 1.70. Among the respondents, the highest 81.4 percent respondents belong to the group of moderate level marketing problems in agricultural commercialization.

According to Constraint Facing Index (CFI), in the study area absence of sufficient storage facilities (e.g., cold storage)' positioned the 1stand 'lack of cleaning and drying facilities' in the last.

Commercialization of agriculture

The majority of the women (68.6 percent) are in medium commercialization of crops in the study area as compared to (16.1 percent) and (15.3 percent) had low and high commercialization of crops, respectively.

7.1.3 The Contribution of the selected determinants of the women to their I nvolvement in agricultural commercialization

Education, farm size, market orientation and farming engagement of women had significant positive contributions with their involvement in commercial farming whereas marketing problems had a significant but negative contribution. On the other hand, age, annual income, market distance had no contribution to involvement in agricultural commercialization.

7.2 Conclusions

Conclusions drawn based on the findings of this study and their logical interpretations in the light of the other relevant factors are furnished below:

i. The findings revealed that an overwhelming majority (89.9 percent) of the respondents had medium to high involvement of rural women in agricultural commercialization at the study area. Therefore, the findings indicate that still there is a huge scope to involve in agricultural commercialization.

ii. Education of the women had a significant positive contribution to their involvement in agricultural commercialization. The women who were more educated had higher involvement with agricultural commercialization than those who had lower education.

iii. Farm size of the respondents had a significant positive contributionto their involvement in agricultural commercialization. Larger farm size increases the capabilities of involving of rural women in agricultural commercialization.

iv. Market orientation and involvement in agricultural commercialization had significant positive contribution, which indicates higher the market orientation more the involvement of rural women in agricultural commercialization.

v. Higher the farming engagement of women increases the capabilities of involving rural women in agricultural commercialization. Farming engagement of women enhances the abilities of the women that enabled them to involve in agricultural commercialization.

vi. Lower the marketing problems increases the capabilities of involvingrural women in agricultural commercialization. Marketing problems decrease the abilities of the women that enabled them to involve in agricultural commercialization.

7.3 Recommendations

7.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations are presented below:

i. The roles of women in agricultural commercialization were found moderate. Therefore, there is a need to take various efforts and programs such as women's corner in local markets, develop facilities for women sellers in local markets to increase women's participation in agricultural commercialization.

ii. Education of the farm women had a significant positive contribution with their involvement in agricultural commercialization. It indicates the importance of education of the respondent groups for rapid taking decisions in favor of agricultural commercialization. It may be recommended that arrangements should be made for increasing the literacy level of the farm women by the concerned authorities through the adult education programs and training institutes.

iii. The relationship between farm size of the respondents and their involvement in agriculturalcommercialization indicates larger the farm size more the involvement of farm women in agricultural commercialization.

iv. Market orientation was positively contributed to agricultural commercialization that indicates higher the market orientation more the involvement of rural women in agricultural commercialization. Agricultural training facilities, credit access, available transport facilities etc. play a vital

for the involvement of market orientation in the crops commercialization process.

v. High farming engagement of women enhanced their abilities and enabled them to involve in agricultural commercialization.A collaborative actions between private and public agencies, particularly the Department of Agricultural Extension (DAE) and Department of Agricultural Marketing (DAM) can initiate steps to increase rural women's ability for commercial farming through regulartraining and workshop. Besides, motivational and awareness campaigns need to be organized to broaden their knowledge in favor of women's direct participation in rural markets.

7.3.2 Recommendations for further study

A small and limited research work cannot provide unique and universal information related to the actual impact of improving the socio-economic status of farm women. Further studies should be undertaken, covering more dimensions of involvement of rural women in agricultural commercialization.

1. The present study was conducted in Thakurgaon Sadar upazila under Thakurgaon district. It is recommended that similar studies should be conducted in other areas of Bangladesh.
2. This study investigated the contribution of eight characteristics of the farm women with their involvement in agricultural commercialization. Therefore, it is recommended that further study be conducted with other independent and dependent variables.
3. In the present study age, annual income and market distance had no significant contribution to women's involvement inagricultural commercialization. Moreover, education, farm size, market orientation and farming engagement and marketing problems had significant contribution to women's involvement inagricultural commercialization. In this connection, further verification is necessary.
4. Research should also be undertaken to identify the factors causing hindrance towards the involvement of farm women in agricultural commercialization.

REFERENCES

Adams, M.E. (1982). Agricultural Extension in Developing Countries. Longman Group Ltd. Singapore, pp: 108.

Ani, A.O. (2004). Women in agriculture and rural development.Priscaquila Press Maiduguri, Nigeria, pp.7-14.

Amin, H., Ali, T. and Zafar, M. I. (2009). Participation of rural women regarding postharvest activities in Pakistan. *Pakistan Journal Life Social Science.* 7(2):136-139.

Akhter, S. M. (2010). The Role of Women in Traditional Farming Systems as Practiced in Home Gardens: A case Study in Sylhet Sadar Upazila, Bangladesh. Tropical Conservation Science, 3(1):17-30.

Asfaw, S., Shiferaw, B., Simtowe, F. and Lipper, L. (2012). Impact of modern agricultural technologies on smallholder welfare evidence from Tanzania and Ethiopia. *Food policy journal*. 37(1): 283–295.

Afolabi, M. M. (2012). Shifting gender power dynamics: Agricultural commercialization and its impacts on gender relations in Yekemi. Retrieved from https://www.aeaweb.org/conference/2014/retrieve.php? Pdf id = 958.

Agricultural Diary (2012). Agricultural Information Services. Department of Agricultural Extension, Ministry of Agriculture, Government of the People's Republic of Bangladesh, Dhaka.

Agwu, N.M. and Ibeabuchi, J. O. (2011). Socio-Economic Analysis of Wholesale Rice Marketers in Abia State, Nigeria. *International Journal of Social Science and Humanity.*1(4): 285-288.

Agwu, N. M., Anyanwu, C. I., and Mendie, E. I. (2012). Socio-Economic Determinants of Commercialization among Small Holder Farmers in Abia State, Nigeria. *Greener Journal of Agricultural Sciences*. 2 (8): 392-397.

Agwu, N. M. and Anyanwu, C. I. (2014). Determinants of women participation in food crop marketing in Abia State, Nigeria. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development.* 14(4): 2285-3952.

Akinlade, R. J., Balogun, O. L. and Obisesan, A. A. (2013). Commercialization of Urban Vegetable Farming: The Case of Vegetable Farmers in Southwest Nigeria, Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia.

Aderemi, E. O., Omonona, B. T., Yusuf, S. A. and Oni, O. A. (2014). Determinants of Output Commercialization among Crop Farming Households in South Western Nigeria, *American Journal of Food Science and Nutrition Research.*1(4): 23-27.

Azad, M.J., Ali, M.S., and Islam, M. R., 2014. Farmers knowledge on postharvest practice of vegetables. *International Journal of Experimental Agriculture*. 4(3):7-11.

Ahmed, M. T. (2017). Impacts Of Agricultural Commercialization On Smallholder Farmers In South-Western Region Of Bangladesh. *International Journal of Economics.* 7(2): 33-40.

Abdullah, A., Rabbi, F. and Ahamad, R. (2017). Determinants of commercialization and its impact on the welfare ofsmallholder rice farmers by using Heckman's two-stage approach. *Journal of the Saudi Society of Agricultural Sciences.*

ARSS (2017). Report on Agriculture and Rural Statistics: Bangladesh Bureau of Statistics.

Begum, S. (2002). In role of rural women in food security in Asia and the Pacific. Asian Productivity Organization, Tokyo.

Bhopal, M. P. (2004). Storage Facilities in Agriculture. Retrieved from www. mpkrishi.org/EngDocs/AgriLeft/agriStorage.aspx.

Benjamin, A., Yaw Bonsu, O. and Seini, W. (2014). Market participation of smallholder maize farmers in the Upper West Region of Ghana. *African Journal of Agricultural Research*, 9(31): 2427-2435.

Bernard, T. and Spielman, D. (2008). Mobilizing rural institutions for sustainable livelihoods and equitable development: A case study of agricultural marketing and smallholder cooperatives in Ethiopia.

Berhanu, G. and Moti, J. (2010). Commercialization of smallholders: Is market participation enough? Contributed Paper presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010.

BBS (2011; 2012; 2014). Bangladesh Economic Review Ministry of Finance, Bangladesh Bureau of Statistics.

Brown, L. R. (2015). Women and food sucurity: Roles, constraints, and missed opportunities. World Bank, Washington DC, USA.

Bekele, A. and Dawait, A. (2015). Farm-level determinants of output commercialization: In Haricot Bean based farming systems, Ethiopia. Journal of Agricultural Science. 25: 61-69.

BBS (2016). Labor Force Survey 2016-17. Dhaka: Bangladesh Bureau of Statistics.

Biswas, J. K. (2017). Women make a change in agriculture sector. Retrieved from https://www.daily-sun.com/printversion/details/277579/Women-make-a-change-in-agri-sector.

Dorsey, B. (1999). Agricultural intensification, diversification, and commercial production among smallholder coffee growers in central Kenya. Econ. Geogr. 75 (2): 178-19

Doss, C. (2002). Men's crops? Women's crops? The gender patterns of cropping in Ghana. *World Development.* 30 (11): 1987-2000.

Dawn (2004). Rural women at work. The Daily Dawn, Islamabad, Pakistan.

Doss, C. and Team, S. (2011). The role of women in agriculture. Retrieved from http://www.fao.org/docrep/013/am307e/am307e00.pdf.

Djurfeldt, A. A. (2018). Gender and rural livelihoods: Agricultural commercialisation and farm non-farm diversification.Retrieved from http://portal.research.lu.se/ws/files/36163256/APRA_W.P_number_4_web.pdf a_RI_Country_Study.pdf.

Dube, L. and Guveya, E. (2013). Land Tenure Security and Farm Investments Amongst Small Scale Commercial Farmers in Zimbabwe, *Journal of Sustainable Development in Africa,* 15(5): 107-121.

Dube, L. and Emmanuel Guveya, E. (2016). Determinants of agriculture commercialization among smallholder farmers in Manicaland and Masvingo Provinces of Zimbabwe.Agricultural Science Research Journal. 6(8): 182 - 190.

Ele, I. E., Omini, G. E. and Adinya, B. I. (2013). Assessing the Extent of Commercialization of Smallholding Farming Households in Cross River State, Nigeria. *Journal of Agriculture and Veterinary Science. 4(2): 49-55.*

Emilola, O., Kemisola A.O. and Alawode, O. O. (2016).Assessment of crop commercialization among smallholder farming households in Southwest Nigeria. *International Journal of Scientific Research in Science and Technology*.2(6): 2395-6011.

Economic Survey (2018).Growing Migration by Men is Causing 'Feminization' of Agriculture Sector, Says Economic Survey. Press Information Bureau Government of India Ministry of Finance. Retrieved from https://pib.gov.in/pressreleaseshare.aspx?prid=1518099.

FAO (2007). Gender mainstreaming in forestry in Africa. Regional Report. Rome: FAO.

FAO (2009). FAO's programme for gender equality. Retrieved from http://www.fao.org/3/a-i1243e.pdf.

Fabiyi, E.F., Danladi, B.B. and Akande, K.E. (2007). Role of women in agricultural development and their constraints: A case study of Biliri Local Government Area, Gombe State, Nigeria. *Pakistan Journal of Nutrition.* 6 (6): 676-680.

Gebre-ab, N. (2006). Commercialization of smallholder agriculture in Ethiopia. Note and Paper Series, 3.

Gebreselassie, S., and Sharp, K. (2007). Commercialization of smallholder Agriculture In Selected Tef-Growing Areas Of Ethiopia. *Ethiopian Journal of Econom*. 16(1):55-86.

Gebreselassie, S. and Sharp, K. (2007). Commercialization of Smallholder Agriculture in Selected Tea-Growing Areas of Ethiopia. *Ethiopian Journal of Economics*. 6(4):144-160.

Gustavsson, J., Cederberg, C., Sonesson, U., Van Otterdijk, R. and Meybeck, A. (2011). Swedish Institute for Food Global food losses and food waste. Retrieved from http://www.fao.org/docrep/014/mb060e/mb060e.pdf.

Gebremedhin, B. and Jaleta, M. (2010). Commercialization of Smallholders: Does Market Orientation Translate into Market Participation? Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project Working Paper 22.Nairobi, Kenya, ILRI.

Gani, B. S., and Adeoti, A. I. (2011). Analysis of Market Participation and Rural Poverty among Farmers in Northern part of Taraba State, Nigeria. *Journal of Economics*. 2(1): 23–36.

Hazell, P., Poulton, C., Wiggins, S. and Dorward, A. (2007).The future of small farms for poverty reduction and growth. Discussion Paper No. 42. IFPRI, Washington, D.C.

Hailua, G. and Manjureb, K. (2015). Crop commercialization and smallholder farmers` livelihood in Tigray region, Ethiopia. *Journal of Development and Agricultural Economics.*7(9): 314-322.

ILRI (2009). Smallholder commercialization: Processes, determinants and impact. Discussion Paper No. 18.

Ironkwe, A.G. and Ekwe, K.C. (2005). Rural women's participation in agricultural production in Abia State. Proceeding of the 33rd Annual Conference of the Agricultural Society of Nigeria, held at Cereal Research Institute, Badegi, Niger State, pp. 147-157.

Jari, B., (2009). Institutional and technical factors influencing Agricultural marketing channel choices amongst Smallholder and emerging farmers in the Kat River Valley. Department of Agricultural Economics and Extension, University of Fort Hare, Alice.

Jaim W.H.M, M. H. (2011). Women's participation in agriculture in Bangladesh 1988-2008: Changes and determinants. 7th Asian Society of Agricultural Economists (ASAE) International Conference, Hanoi, Vietnam.

Jiggins, J., R.K. Samanta and Olawoye, J. E. (1998). Improving women farmers' access to extension services: A reference manual. Food and Agriculture Organization of the United Nations, Rome, pp: 73-82.

Kapsoss, S. (2008). The Gender Wage Gap in Bangladesh.ILO-Asia-Pacific Working Paper series, Regional Office for Asia and pacific, Bangkok.

Khatri, A. (2013). Technological needs of farm women regarding post-harvest practices of Kinnow (Citrus Deliciosa) in Sri Ganganagar district of Rajasthan. An unpublished thesis submitted to Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan.

Kirui, K.O. and Njiraini, G. W. (2013). Determinants of agricultural commercialization. Retrieved from https://ageconsearch.umn.edu/bitstream/161618/2/Oliver%20K.%20Kirui%20et%20al.pdf.

Kirui, O. K. and Njiraini, G. W. (2014). Determinants of agricultural commercialization among the rural poor: Role of ICT and Collective Action Initiatives and gender perspective in Kenya.

Kabiti, H. M., Raidimi, N. E. and Pfumayaramba, T. K. and Chauke, P. K. (2016). Determinants of agricultural commercialization among smallholder farmers in Munyati Resettlement Area,Chikomba District, Zimbabwe.*Journal of Human Ecology*. 53(1): 10-19.

Lawanson, O.I. (2008). Female Labor Force Participation in Nigeria: Determinants and Trends: Oxford business and economic programme. United kingdom June 22-24 2008.

Liwengae, T. and Chitimbel A. B. (2015). Agricultural commercialization and adaptation to climate change and variability in Semi-Arid Central Tanzania.

Makhura, M. N. and Mokoena, M. (2003). Market access for small-scale farmers in South Africa. The challenge of change: agriculture land and the South African economy. University of Natal Press, Scottsville, South Africa.

Mkhabela, T. S. (2005). Technical efficiency in a vegetable.Agrekon44 (2), pp. 187-204.

Mehra, R. and Rojas, M.H. (2008). A significant shift: Women, food security and agriculture in a global marketplace. International Center for Research on Women (ICWR), p.2.citing FAO Focus on Women and Food Security. FAO.

Mohammed, B. T. (2012). Comparative analysis of gender involvement in agricultural production in Nigeria. *Journal of Development and Agricultural Economics.* 4(8): 240-244.

Martey, E., Al-Hassan, R. M. and Kuwornu, J. (2012). Commercialization of smallholder agriculture in Ghana: A Tobit regression analysis. *African Journal of Agricultural Research.* 7(14): 2131-2141.

Mabuza, M. L., Ortmann, G., and Wale, E., (2013). Effects of transaction costs on mushroom producer's choice of marketing channels: implications for access to agricultural markets in Swaziland. South African *Journal of Economic and Management Sciences* 17 (1), pp. 99-111.

Mulwafu, A. O., Krishnankutty, J. and Krishnan, S. (2013). Commercialization of Agro-business Enterprises in Malawi: An Analysis, *Indian Research Journal of Extension. Education*, 13 (3): 71-74.

Muhammad-Lawal, A., Amolegbe, K. B., and Lawal, O. M. (2014). Assessment of Commercialization of Food Crops among Farming Households in Southwest Nigeria, *Journal of Applied Business Research*, 7(5): 520 – 531.

Mazengia, Y. (2016). Smallholders commercialization of maize production in Guangua district, northwestern Ethiopia. Pawe Agricultural Research Center, Ethiopian Institute of Agricultural Research, Pawe, Ethiopia. 58: 65-83

Nazli, H. and Hamid, S. (2007). Concerns of Food Security, Role of Gender, and Intrahousehold Dynamics in Pakistan.

Naher, K. (2000). Participation of Rural Women in Homestead Agriculture in a Selected Area of Gazipur District.*M.S. (Ag. Ext. Ed.)* Thesis, Dept. of

Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Onyenechere, E. C. (2008). The effect on women informal economic activities of reduction on poverty in Imo State. *Journal of Applied Sciences.*7 (3): 99-110.

Olawoye, J.A. (2000). Difficulties for Rural African Women to Secure Access to Resources for Agricultural Production; Two case studies from Oyo State, Nigeria.vol. 3, (2) pp.60-75.

Omiti, J., Otieno, D., McCullogh, E. and Nyanamba, T. (2007). Strategies to promote market-oriented smallholder agriculture in developing countries: A Case of Kenya. AAAE Conference Proceedings (2007), 259-264.

Okezie, C.A., Nwosu, A.C. and Okezie, C.R. (2008). An assessment of the extent of the Commercialization of agriculture in Abia State, Nigeria. *Agricultural Journal*. 3: 129-133.

Olwande, J. and Mathenge, M. (2010). Market participation among the poor rural households in Kenya. Tegemeo Institute of Agricultural Policy and Development.

Osmani, M. A. G., Khairul, I., Bikash, C.G. and Hossain, M.E. (2015). Commercialization of smallholder farmers and its welfare outcomes. Evidence from Durgapur Upazila of Rajshahi District, Bangladesh. *Journal of world economic research.* PP : 119-126.

Pingali, P. and Rosegrant, M. (1995). Agricultural commercialization and diversification: processes and policies. Food Policy 20: 171-185.

Pingai, P. (1997). From subsistence to commercial production systems: the transformation of Asian agriculture. Am. J. Agri. Econ. 79:628-634.

Pender, J. and Alemu, D. (2007). Determinants of smallholder commercialization of Food crops: Theory and evidence from Ethiopia. Discussion Paper No. 75.

Pandict, J. C., and Basak, N. C., (2013).Constraints faced by the farmer in commercial cultivation of vegetables. *Bangladesh Journal of Agricultural Economics*. 11(2): 193-198.

Randolph, T. F. (1992). The Impact of Agricultural Commercialization on Child Nutrition: A Case Study of Smallholder Households in Malawi, PhD dissertation, Cornell University, Ithaca, New York, USA.

Rahman, S. (2000). Women's employment in Bangladesh agriculture: Composition, determinants and scope. *Journal of Rural Studies*. 16(4): 497-507.

Rahman, MD. and Manprasert, S. (2006). Landlessness and its impact on economic development: A case study on Bangladesh. J. Soc. Sci. 2(2):54-60.

Randela, R. (2003). The incidence of post-harvest problems among small farmers surveyed in three regions of the Limpopo province, Agrekon. 42 (2), pp.163-180.

Randela, R., Alemu, Z. G. and Groenewald, J. A. (2008). Factors enhancing market participation by small-scale cotton farmers, Agrekon. 47(4): 451-469.

Rahut, D. B., Castellanos, I. V. and Sahoo, P. (2010). Commercialization of Agriculture in the Himalayas. Institute of Developing Economies, JETRO.

Strasberg, P. J., Jayne, T. S., Yamano, T., Nyoro, J. K., Karanja, D. D., and Strauss, J. (1999). Effects of agricultural commercialization on food crop input use and productivity in Kenya. Retrieved from https://pdfs.semanticscholar.org/447e/2d694a51cbb19bd151fbb86ca2888dd0c5ff.pdf.

Supekar, S. (2002). Country Papers: India. In Role of Rural Women in Food Security in Asia and the Pacific.Asian Productivity Organization. Tokyo.

Saghir, A., Hassan, M. Z.Y. and Javed, A. (2005). Gender Participation in Crop Production Activities. *Journal of Agriculture & Social Sciences.* 4(1): 343-345.

Sharon, B.H. (2008). Rural women and food security. FAO participation in Panel Discussion on the Occasion of the International Day of Rural Women held in New York; 15th October pp. 70-78.

Sraboni, E. H. (2013). The Women's Empowerment in Agriculture Index: Results from the 2011-2012 Bangladesh Integrated Household Survey. Project report submitted to the U.S. Agency for International Development. International Food Policy Research Institute (IFPRI), Dhaka.

Shewaye, Abera (2014). Determinants of Haricot bean commercialization: The case of East Badawacho District, South Nations Nationalities and Peoples Regional State, Ethiopia. An MSc Thesis Presented to the Haramaya University, Haramaya, Ethiopia.

Sharma, PV. and Wardhan, H. (2015). Assessment of marketed and marketable surplus of major food grains in India. Centre for Management in Agriculture (CMA) Indian Institute of Management. Retrieved from<http://www.iimahd.ernet.in/users/webrequest/files/cmareports/cma-17.pdf.

Solomon, A., Bekele, S. and Franklin, S. (2010). Does technology adoption promote commercialization? Evidence from Chickpea Technologies in Ethiopia.

Siziba, S., Nyikahadzoi, K., Diagne, A., Fatunbi, A.O. and Adekunle, A.A. (2011). Determinants of cereal market participation by Sub-Saharan Africa smallholder farmer. *Learning Publics Journal of Agriculture and Environmental Studies*. 2(1):180-193.

Sebatta, C., Mugisha, J., Katungi, E., Kashaaru, A. and Kyomugisha, H. (2014). Smallholder farmer's decision and level of participation in the potato market in Uganda, *Modern Economy.* 5: 895-906.

Sylvester, D., Mashapa, C., Dube, L. and Mrema M. (2014). Socio-economic determinants of commercialization of smallholder rabbit production in Mt Darwin District of Zimbabwe. *Greener Journal of Agricultural Sciences*. 4(8): 346-353.

Thapa, G. and Gaiha, R. (2011). Smallholder farming in Asia and the Pacific: Challenges and Opportunities, paper presented at the IFAD conference on new directions for smallholder agriculture.

Tufa, A., Bekele, A. and Zemedu, L. (2014). Determinants of smallholder commercialization of horticultural crops in Gemechis District, West Hararghe Zone, Ethiopia.*African Journal of Agricultural Research*. 9(3): 310-319.

Tolno, E., Kobayashi, H., Ichizen, M., Esham, M.and Balde, BS.(2015). Economic analysis of the role of farmer organizations in enhancing smallholder potato

farmer's income in Middle Guinea.*Journal of Agricultural Science*, 7(3): 123-127.

Ukoha, O., Mejeha, R. and Nten, I. N. (2007). Determinants of farmers' welfare in Ebonyi state Nigeria. *Pakistan Journal of Social Science.* 4 (3):351-354.

United Republic of Tanzania (URT) (2009*).* Poverty and human development report. National strategy for growth and reduction of poverty. Ministry of finance. Dar es Salaam,Tanzania.

Von Braun, J., Bouis, H. and Kennedy, E. (1994). Conceptual framework. In: von Braun J and Kennedy E (eds), *Agricultural commercialization, economic development, and nutrition.* Johns Hopkins University Press, Baltimore, Maryland, USA. pp. 9–33.

Von Braun, J. (1995). Agricultural commercialization: Impacts on income and Nutrition.

World Bank, (2007). Awakening Africa's sleeping giant: Prospects for commercial agriculture in the Guinea Savannah zone and beyond. Agriculture and Rural Development Notes: Issue 48.

World Bank, (2014). Bangladesh country snapshot, World Bank Group.

Zaman, D. S. (2002). Women's role and status in Bangladesh agriculture. Retrieved fromhttp://bsmrau.edu.bd/seminar/wpcontent/uploads/sites/318/2018/04/Seminar-Paper-Sharmin.pdf.

Appendix-A

An English Version of Interview Schedule

Department of Development &Poverty Studies

Sher-e-Bangla Agricultural University, Dhaka-1207

An Interview schedule for a research study entitled:

WOMEN'S ROLES IN AGRICULTURAL COMMERCIALIZATION: AN EMPIRICAL STUDY IN RURAL BANGLADESH

(This interview schedule is entitled to a research study. Collected data will be used for research purpose and will be published aggregately)

Serial no……

Name of respondent…….

Village…… Union…….

Upazila…….. District……

Mobile no:

(Please provide the following information. Give tick (√) marks if necessary. Your information will be used for research purposes only.)

1. Age
Please mention your age……..years.

2. Marital status
Please mention your marital status:

a) Married b)Unmarried c)Separated d) Divorced

e) Widowed

3. Education
Please mention your level of education:

a) Can't read and write
b) Can sign only
c) I read up to class……..

4. Farm size

Please indicate area of your lands according to the following items:

Sl. No.	Use of land	Measuring unit	
		Local unit	Hectare
1.	Homestead area (A1)		
2.	Own land under own cultivation (A2)		
3.	Land taken from others on Borga system (A3)		
4.	Land given to others on Borga system (A4)		
5.	Land taken from others on lease (A5)		

Total farm size = A1+A2+1/2 (A3+A4) +A5=……

5. Annual family income

Please indicate your annual family income (in BDT):

Sl. No.	Sources of income	Items	Amount of income (in BDT)
1.	Farm	Crop	
2.		Livestock (cattle, goat, etc.)	
3.		Poultry (duck, poultry, etc.)	
4.		Fisheries	
Sub-total (a)			
5.	Non-farm	Service	
6.		Business/handicraft	
7		Day laborer	
8		Remittance	
9		Others (Please specify)	
Sub-total (b)			
Total (Sub-total (a) + Sub-total (b))			

6. Market orientation

How long have you been involved in agricultural commercialization/ marketing.....years?

7. Market distance

Please mention the market distance from your farm

Sl. No.	Market	Market distance (km)
1.	Local market	
2.	Regional market	
Total		

8. Women engagement in farming

Sl. No.	Items	Types of work done by female in (0-100) percent	
		Female	Male
1.	Land preparation		
2.	Sowing/ Transplanting		
3.	Application of fertilizers		
4.	Application of herbicides		
5.	Weeding		
6.	Irrigation water management		
7.	Harvesting		
8.	Threshing		
9.	Storing and processing		
10	Transporting		
11.	Sale of crops and seed to local/ regional markets		
12.	Poultry rearing		
13.	Livestock rearing		
14.	Fish culture		

9. Calculation of HCI (Household Commercialization Index)

Sl. No.	Major Crops	Total production (Tk)	Total sales (Tk)
1.	Rice		
2.	Wheat		
3.	Maize		
4.	Vegetables		
5.	Poultry		
6.	Livestock		
7.	Fisheries		
Total			

$$HCI_i = \left[\frac{\text{Gross value of crop sales}_{hhi',\ year\ j}}{\text{Gross value of all crop production}_{hhi',\ year\ j}}\right] \times 100$$

10. Marketing problems in agricultural commercialization

Please mention the problems in agricultural marketing.

Sl. No.	**Problems**	**Regularly (4)**	**Often (3)**	**Occasionally (2)**	**Rarely (1)**	**Not at all (0)**
1.	Lack of cleaning and drying facilities					
2	Lack of advanced processing and preservation knowledge and skills					
3.	Lack of transport facilities					
4.	Absence of storage facilities (e.g. cold storage)					
5.	Lack of market information					
6.	Price fluctuation					
7.	Lack of co-operative marketing					

Thanks for your co-operation

……
Signature of the Interview