ORIGINAL SCIENTIFIC PAPER

WOMEN EMPOWERMENT THROUGH AGRICULTURAL TECHNOLOGY: CASE STUDY OF MYMENSINGH-BANGLADESH

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ABSTRACT

In Bangladesh, attention to women empowerment through agricultural technology adoption is not new, but it has not always been acted upon accordingly. This study attempts to carry out an investigation through using both quantitative and qualitative research tools to examine the extent of women's technology adoption in agriculture and their consequent empowerment attainment in selected villages of Mymensingh sadar. To achieve the objectives of the present study, necessary data were collected by using simple random sampling technique, the study selected total of 60 women respondents. The quantitative analytical tools employed to attain the specific objectives included various descriptive statistical measures, perception index and women empowerment index by adoption technology. The results of perception index analysis indicated that majority had moderate to high favorable perception on greater extent of women's engagement in adoption agricultural technology among which may had low to moderate favorable perception on consequent empowerment attainment. The findings show that almost in all cases, decision was taken jointly by male and female. It is very satisfactory case that decision is taken by female alone particularly in the cases purchase of agricultural equipment, maintenance of agricultural equipment, motivating to use agricultural technologies, selling of old machineries. The value of average women empowerment score is 1.81, which is below from the average empowerment score 2.

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INTRODUCTION

The ways of women empowerment and reducing gender disparity regarding the adoption of modern agricultural technologies has been widely investigated in the literature [1]. Bangladesh is an agro-based third world developing country endowed with a vast range of natural resources. It encompasses an area of 1, 47,570 square kilometers with a total population of 159.24 million of which 80.11 million are males and 79.13 million are females [2]. Women comprise almost half of its total population is specified by the demographic structure of Bangladesh and significant gender differences exist in all spheres of rural Bangladesh. In Bangladesh about 81% of women live in rural areas [2] and its rural social structure is plagued with many problems such as poverty, inequality, unemployment, disempowerment, and underdevelopment [3]. Rural women also comprise the largest work force in the informal sector of Bangladesh and are concentrated in the more erratic and lowest paying jobs, such as household help. In addition, rural women in Bangladesh generally earn less than the minimum wage and less than men, even when they have similar occupations. As a result, the income differences between women and men in Bangladesh are larger in the informal sector than in the formal one [4]. For the last two decades, domestic work by women has increased in

Bangladesh, where women generally work longer days and put in more time than men do. In Bangladesh, the number of female-headed households has been growing in both rural and urban areas [5]. Although women in Bangladesh take the major responsibilities of the family, they are faced with several vulnerabilities and suffering with severe disempowerment at both household and community level. Agricultural technologies have direct and indirect impacts on women's access to income, including technologies, improving their quality of life through increase of production and productivity [6] [7]. Main challenges women face in access and adopting of agricultural technologies include socio-economic constraints, limited information, knowledge and skills, beliefs about gender roles, time constraints, etc. Different preferences for technologies stemming from different tasks and responsibilities also greatly affect the process of the adoption of technology [8].

Agricultural technology, based on indigenous knowledge, traditional farming practices and local value systems, which has been accumulating among generations and over the years should also be considered. Technologies and techniques used by farmers, including a source of their leadership as well as methods of the most appropriate way of farming are also included [9]. Moreover, the availability of information is an important resource for women with potential for empowering them in terms of new attitudes [10]. The journey to ensure women empowerment in Bangladesh began since the independence in 1971 by ensuring equal rights for both men and women in all spheres of state and public life in the constitution. Since then, the Gob has been proactively adopting policies and strategies for accelerating the implementation process in achieving the goal of women empowerment in Bangladesh [11]. Notable actions have been taken by the government to protect women's legal rights and improve their social status through empowerment.

The contribution of women in agriculture, one fourth of women of the total population is directly and indirectly involved in it. Keeping behind them from agriculture development is not possible. The government of Bangladesh has given special attention to the agricultural machinery for field operation. Women play a vital role in agricultural machinery beside men. But the sector is deprived of the benefits due to social perfection of women as week in this work and not giving them proper value. If they are given proper technical training and respect and given fair wages, they will show more interest in this work and overall agriculture sector will move forward. Adopting agricultural technology is not only an important step in improving agricultural work for rural women in the new era, but also a powerful way to promote women empowerment.

OBJECTIVES OF THE STUDY

The overall objective of this study is to assess the level of empowerment attainment by the women considering their changed roles and extent of engagement as economically active participants in agriculture of the study area. In order to do so, this study focuses on attaining the following specific objectives.1. To identify the socioeconomic characteristics of the sample households' respondents; 2. To assess the perception of the respondents on women's empowerment attainment in adoption of agricultural technology; 3. To analyze women empowerment through agricultural technology adoption; 4. To find the problem and strategic policy recommendation for empowerment of women in adoption agricultural technology.

CONCEPTUALIZING WOMEN EMPOWERMENT

Many conceptualizations of empowerment for development projects exist [12], but here we present one from Longwe [13]. Longwe's framework includes five levels of women's empowerment: welfare, access, conscientiousness and awareness raising, participation and mobilization, and control. These are in hierarchical order and serve to analyze projects' objectives from a women's empowerment perspective. For the purpose of a gender analyses through practitioners, the five levels are listed and checked off if project objectives meet these aspects of empowerment. The framework suggests that these levels of empowerment follow a linear process and that women are a homogenous group throughout these levels, while men and institutions involved are excluded from the framework. Hence specific factors that make empowerment as relational concept are not included in the framework and may lead to a decontextualized perspective on women's empowerment.

KABEER'S FRAMEWORK FOR WOMEN EMPOWERMENT ANALYSIS

Empowerment denotes the prolongation of people's ability to make strategic life choice in a context where this ability was previously denied to them. Changes in the ability to exercise choice can be thought of in terms of changes in their inter-related dimensions which make up choice: resources, which form the conditions under which choices are made; agency which is at the heart of the process by which choices are made; agency which is at the heart of the process by which choices are made; and achievement, which are the outcomes of choices. These dimensions have reciprocity because changes in each contributes to, and benefits from, changes in the others.

METHODOLOGY OF THE STUDY

Research design is the blueprint portraying conceptual structure within which a particular research is conducted and constitutes the blue print for collection, measurement and analysis of data. The aim of the research design is to give a strategy that enables reliable assessment of the variables and to respond to the open-ended research questions. The purpose of designing the research is to provide a plan that permits accurate assessment of the variables and to answer the research questions being investigated.

DATA COLLECTION AND ANALYSIS

The study conducted a series of activities to collect effective and consistent data using both quantitative and qualitative research approaches. In general, the quantitative research approach is used to quantify the attitudes, opinions, behaviors, and other defined variables from a larger sample population. That's why, quantitative data collection methods are much more structured than the qualitative data collection methods. Quantitative data collection methods include various forms of surveys like online, paper, mobile and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, systematic observation and so on. The respondents were available during the period of data collection and primary data have been collected during the period of 20 August to 04 September, 2022.

The obtained data were then compiled on a master sheet and then tabulated and analyzed, keeping the objectives of the study in mind. Data entry was done by researcher herself. Different computer software packages like Microsoft Excel, SPSS Package 20 etc. were used for analyzing the data.

Perception analysis on women empowerment in adoption agricultural technology

Women's engagement with agriculture as economically active participants is very much helpful for their own development. For measuring the perceptions of the respondents, a 5- point Likert Scale was used[14] . There were 14 statements including only the favor judgments against the 5- point scale. All the statements were arranged randomly under four headings i.e., women in agriculture, women's extent of engagement in agriculture, asset and skill orientation and women's empowerment attainment. Perception score for each respondent was calculated by perception Index [9] using following formula:

Perception Index (PI) = 5×SA+4×A+3×U+2×DA+1×SDA (in favor)

Where,

SA= Total number of respondents expressing their perception 'strongly agree' for the statement;

A= Total number of respondents expressing their perception 'agree' for the statement;

U= Total number of respondents expressing their perception 'undecided' for the statement

DA= Total number of respondents expressing their perception 'disagree' for the statement

SDA= Total number of respondents expressing their perception 'strongly disagree' for the statement.

ANALYSIS OF WOMEN EMPOWERMENT INDEX (WEI) IN ADOPTION AGRICULTURAL TECHNOLOGY

The methodology was used by Bose [15]. WEI was calculated for small agricultural activities, by dividing the total value of the scores with the number of indicators. Since the score ranges from 1 to 3, the average value was 2 for each of the indicators. Therefore, to assess the individual empowerment status and position, women with average score 2 or more than 2 were labeled empowered.

$WEI_{currently}=\sum WEI_{currently}$ /N

$WEI_{before\ being\ involved}=\sum WEI$ /N

WEI= ($WEI_{currently}+WEI_{before\ being\ involved}$) /2

Women empowerment index= (WEI currently. = WEI before being involved.) /2

Decision making criteria: Less empowered, if WEI≤2 and Highly empowered, if WEI≥2

COMPUTATION OF THE PROBLEM CONFRONTATION INDEX (PCI)

The Problem Confrontation Index (PCI) is a measure of determining problems and constraints where problems are shown in tabulated form according to their severity. By using a structured questionnaire, the respondents were asked to give their opinion on some selected problems during data collection [16]. Following the methodology, a four-point rating scale was used for computing the problem score of a respondent. The respondents were given four alternative responses as “high”, “medium”, “low”, and “not at all” against each of the eight selected problems. Scores were assigned to those alternative responses as: “High” = 3, “Medium” = 2, “Low” = 1 and “Not at all” = 0, respectively. The Problem Confrontation Index (PCI) was computed by using this formula:

Problem Confrontation Index (PCI) = Ph × 3 + Pm × 2 + Pl × 1 + Pn × 0,

Where,

Ph = total number of char area’s farmers that expressed “high” problems;

Pm = total number char area’s farmers of the expressed “medium” problem;

Pl = total number of rural women that expressed “low” problems;

Pn = total number of char area’s farmers that expressed “not at all” problems.

SOCOECONOMIC CHARACTERISTICS OF THE RESPONDENTS

AGE STRUCTURE OF THE RESPONDENTS

Because the central focus of the study was women’s participation in agriculture as economically active participants and their empowerment status, all the sampled and selected respondents were women. It is quite likely that the age of a person plays a critical role in determining various factors of his/her livelihood in a society and such livelihood is said to be valid in a nation like Bangladesh. Hafiza et al., (2015) revealed that younger people and swiftly improving their own livelihood condition Keeping all these facts in mind, the study selected three categories of unlike aged women respondents, i.e., young, middle-aged and old-aged.

AGE OF THE RESPONDENTS

Age of the respondents in the study area ranged from 17 to 60 years. The mean age was 34.78 years and standard deviation was 9.457 years. The findings indicate that the highest proportion of the respondents (71.66 percent) was middle age category compared to 18.33 percent old age category and 10 percent belonged to young age category. Thus, the large proportion of the respondents (71.66percent) was middle age category. Old aged respondent might have valuable opinions in management practices. Moreover, middle aged people are generally receptive to new ideas and thought. They would have possessed high knowledge on agricultural technologies if the necessary steps are taken to dissemination new technologies and practices by the extension personnel. Almost similar findings were found by Kausar [17][18] and [19] in the respective studies.

HOUSEHOLD SIZE OF THE RESPONDENTS

A household consists of persons living together and taking meals from the same kitchen under the administration of the same head of the family [16]. In general, the larger is the household size, the greater will be the pressure upon the head of the family as well as upon all other earning members in the household as the household maintenance costs gets higher. The household size of the respondents based on the number of total members in a household as of following three types:

- Small (up to 4 members);
- Medium (5-7 members); and
- Large (8+ members)

Household size of the respondents in the study area ranged from2 to 8. The mean household size was 5.68 and standard deviation was 1.214. The respondents were classified into three categories, such as 'small', 'medium' and 'large' on the basis of their household size The findings indicate that the highest proportion of the respondent's household size (80 percent) was medium category compared to 15 percent small category and 5 percent belonged to large size household category. Thus, the large proportion of the respondents (80 percent) was medium household size which is supportive to the average household size (4.6 members) in Bangladesh.

LEVEL OF EDUCATION

In analyzing people's livelihood, Katz [20] has highlighted the significance of higher educational attainment in achieving superior positions in society. The study made attempt to identify the level of education of the respondents in the study area.

The level of education of the respondents based on following categories.

- Illiterate
- Primary (up to Class 5)
- Secondary (6 to SSC) and
- Higher Secondary (HSC passed)

The level of formal education of respondents in the study area ranged from 0 to 14. The mean was 3.92 and standard deviation was 3.832. The level of education of the respondents was classified into four categories based on illiterate, primary, secondary and above higher secondary. Results indicate that the percentage of respondents was 31.67 as illiterate. Primary level of education (43.33%) was higher than the secondary level of education (16.67%) in the study area. A very insignificant portion of respondents were found to pass the higher secondary level of education (8.33%) in the study area. Compare to national average literacy rate (53 percent) it is visible that the respondents education level is acceptable because the literacy rate seems to be higher than that of national average. Thus, it is clear enough to note that higher educational attainment was one of the key determinants in withstanding higher occupation by women and it was largely responsible for the enhanced occupancy of women's economically active participation in agriculture and their tendency to adopt agricultural technologies.

FARM SIZE OF THE RESPONDENTS

Household farm size is the total farm land owned by the household measured in hectare. The size of the land in agriculture largely influences household livelihood patterns in that the larger the farmlands the higher the production which leads to higher standard of living. Families with larger farms are wealthier and have more options to make money in rural Bangladesh than are those with smaller farms. Therefore, expanding the area of the farm will finally result in increased production, which will provide a high income and higher level of life. The farm size of the respondents ranged from 0.23 to 1.00 ha, with an average of 0.5 ha and a standard deviation of 0.25. The small-scale farm leaders constantly strive to raise their production by utilizing their local farming resources and putting more effort into enhancing their farmland through the adoption of new agricultural technologies. They discuss their farming issues with extension personnel and other progressive farmers.

HOUSEHOLD LANDHOLDING OF THE RESPONDENTS

In the South Asian societies, size of landholding by people is one of the key determinants of achieving high economic status in both the rural and urban areas [21] The common landholding prototype in rural Bangladesh indicates that land s mostly owned by men whereas women hardly get any ownership of land. The best way of accessing land by any women in Bangladesh is through having the use right of land if permitted by the owner of land [6].

The five categories based on land ownership are;

- No land (Only own homestead area);
- Minor (0.5 to 1.00 acres of land);
- Little (1.01 to 2.00 acres of land);
- Intermediate (2.01 to 3.00 acres of land); and
- Big (3.01 acres and above land).

Among the landowners, 16.67% households of the respondents were holding land in the range of 0.05 to 1.00 acres and thus enjoyed the status of marginal land owners. Then again, 33.33% households of the respondents were holding land in the range of 1.01 to 2.00 acres and thus enjoyed the status of small landowners. Yet again, 36.67% households of the respondents were holding land in the range of 2.01 to 3.00 acres and thus enjoyed the status of medium or intermediary landowners. Finally, only 3.33% households of the respondents were holding land in the range of 3.01 and above acres of land and thus enjoyed the status of large landowners in the study area.

AVERAGE ANNUAL HOUSEHOLD INCOME OF THE RESPONDENTS

Average annual household income is also an important determination of economic status and livelihood diversification of people residing in a society [22].

PERCEPTION ON WOMEN EMPOWERMENT IN ADOPTION AGRICULTURAL TECHNOLOGY

The perception index score ranked 1st in the 7th statement with a total score of 262 as the judgments of the respondents is favorably positive on ‘training is essential for women’. Majority of the respondents involved with agriculture as economically active participants have significantly agreed on their high requirement of training facilities in the study area. From this, this study affirms the fact that respondents in the study area having conscious sense in becoming evolved as skilled and efficient participants in agriculture by participating in training which agrees with the pathway pointed by Kabeer [4] in the human resource domain under the women empowerment framework used by her. The 2nd rank of the perception index score is occupied by the 8th statement with a total score of 253 as the judgments of the respondents is favorably positive on ‘lack of land rights by women’. A large number of the respondents significantly agreed in this matter and responded that in many cases, women from rich economic background do own both, homestead area and cultivable land but women from poor economic background hardly own any homestead area, let alone the chance of owning cultivable land in the study area. As a consequence, there is severe landlessness among the low- and middle-class respondents which is an absolute barrier to women empowerment attainment as noted by Okin [23] and Young [24] in liberal feminist approach by the statement that without equal access and control over land by men and women, attainment of empowerment by women is hard to imagine. The 4th rank of the perception index score is occupied by the 9th statement with total score 249 as the judgments of the respondents is favorably positive on ‘lack of technology operating skill’ is high. A large number of the respondents significantly agreed in this matter and responded that there is highly lack of technology operating skill for men and women in the study area which is also an absolute barrier to women empowerment attainment. Regarding women’s roles and extent of involvement in agriculture sector of the study area, the perception index scores indicate that a large number of respondents positively agreed on selecting the crops to be produced in a particular season which has scored 209 and is ranked 7th among all the statements. The 5th rank of the perception index score is occupied by the 6th statement with a total score of 228 as the judgments of the respondents is favorably

positive on 'Selection of machineries used for crop production'. Regarding women's consequent empowerment attainment, the 8th rank of the perception index score is occupied by the 11th statement with total score 195 as the judgments of the respondents is favorably positive on 'women access to control over earnings'. Other four statements, 10th,12th,13th and 14th under this heading is ranked 10th ,13th ,9th and 12th respectively which indicates to the point that respondents have very limited scope in having access and control over land and technology, having autonomy in production, capacity of using technology and having

ANALYSIS OF WOMEN EMPOWERMENT THROUGH AGRICULTURAL TECHNOLOGY ADOPTION

Table 1: Women Empowerment Index (WEI) by Adoption Agricultural Technology

Empowerment parameters	Currently				5 Years Before			
	Women	Men	Both		Women	Men	Both	
	3	1	2	WEI	3	1	2	WEI
Purchase of agricultural equipment	17	8	35	2.15	13	32	15	1.68
Maintenance of agricultural equipment	17	13	30	2.06	12	36	12	1.60
Capital management for agricultural machineries	14	15	31	1.98	11	34	15	1.61
Motivating to use agricultural technologies	19	14	27	2.08	10	39	11	1.51
Operating agricultural machineries in the farm	15	18	27	1.95	12	37	11	1.58
Selling of old machineries	20	17	23	2.05	9	39	12	1.50
Empowerment	2.04				1.58			

No. of respondent, N=60

WEIcurrently=∑WEIcurrently /N

=2.04

WEIbefore being involved=∑WEI /N

=1.58

WEI= (WEIcurrently+WEIbefore being involved) /2

= (2.04+1.58)/2

=1.81

Decision making criteria: Less empowered, if WEI≤2 and highly empowered, if WEI≥2

The findings show that almost in all cases, decision was taken jointly by male and female. It is very satisfactory case that decision is taken by female alone particularly in the cases purchase of agricultural equipment, maintenance of agricultural equipment, motivating to use agricultural technologies, selling of old machineries. Finally, empowerment index has been calculated to know the overall empowerment status of all the 60 respondents. The value of average women empowerment score is 1.81, which is below from the average empowerment score 2. The WEI as presented in Table 3 clearly describes that women are less empowered since the WEI scores are less than the average level.

PROBLEM CONFRONTATION INDEX (PCI)

The Problem Confrontation Index (PCI) is a measure of determining problems and constraints where problems are shown in tabulated form according to their severity. By using a structured questionnaire, the respondents were asked to give their opinion on some selected problems during data collection. Following the methodology, a four-point rating scale was used for computing the problem score of a respondent. The respondents were given four alternative responses as "high", "medium", "low", and "not at all" against each of the eight selected problems. Scores were assigned to those alternative responses as: "High" = 3, "Medium" = 2, "Low" = 1 and "Not at all" = 0, respectively. The Problem Confrontation Index (PCI) was computed by using this formula:

Problem Confrontation Index (PCI) = Ph × 3 + Pm × 2 + Pl × 1 + Pn × 0,

Ph = total number of char area's farmers that expressed "high" problems;

Pm = total number char area's farmers of the expressed "medium" problem;

Pl = total number of rural women that expressed “low” problems;

Pn = total number of char area’s farmers that expressed “not at all” problems.

Cash capital and investment are an important input for the enlargement of any farm. It is very difficult for the rural women to collect capital. Majority of the respondents pointed out that lack of capital is one of the major problems in the study area. Out of 60 respondents, 25 women faced this problem at high extent, 18 women faced this problem at a medium extent, and 17 women confronted this problem at low extent. So that they could not large their farming as they needed. Availability of farm machineries is a key factor for successful farming. Majority of the respondents pointed out that lack of farm machinery is the major problem in the study area. Out of 60 respondents, 26 women faced this problem at high extent, 20 women faced this problem at a medium extent, 14 women confronted this problem at low extent and there was no one who said that lack of farm machinery was not a problem. In this case the compound value of PCI 132. The supply of adequate tools, equipment and machinery need to be ensured at block level so that assured availability is ensured to the farm women as per their requirement.Due to cultural norms in Bangladesh, men generally have closer relationships to those knowledgeable about agricultural machinery, such as NGO, extension, and research institute staff and machine dealers, and can ask those questions about the machine, whereas women are restricted from spending time with strangers and in public places, where they could otherwise be exposed to new technologies. A lack of extension service is holding many women back from investing in new agricultural technology in the study area. Its PCI value is 120 which scored 6th largest value in the problem index. A lack of technical knowledge is holding many farmers back from investing in new agricultural technology. Majority of the respondents pointed out that lack of technical knowledge on farm equipment and machine is the major problem in the study area. Out of 60 respondents, 26 women faced this problem at high extent, 24 women faced this problem at a medium extent, and 10 women confronted this problem at low extent. In this case the computed value of PCI was 136.

CONCLUSIONS

Overall development of the socio-economic situation of Bangladesh fully depends upon the development of the rural areas. Bangladesh’s rural women experiences unfavorable social discrimination and economic inequalities [25] .Namely, they are deprived of many human rights. In the socio-economic context of Bangladesh, men make all the decisions. On the other hand, women are given the opportunity to take the decisions on very few issues. The use and adoption of various agricultural technologies in the context of women empowerment issues and access to these technologies are closely linked. Compared to men, rural women have limited access to advanced agricultural technologies in farming and consequentially use more traditional technologies. Furthermore, it has been confirmed by the study that rural women face physical and economic constraints in terms of access to modern techniques of farming. Attention to women empowerment through agricultural technology adoption is not new, but it has not always been acted upon accordingly. In the outset, the study revealed that majority of the respondents had moderate to high favorable perception on greater extent of women’s adoption agricultural technology but many of them had low to moderate favorable perception on their consequent empowerment attainment in the study area. This led to the conclusion that though the respondents had favorable perception on greater extent of women’s adoption agricultural technology but, on an average, their perceptions on the consequent empowerment attainment were not that much favorable in study area. Later on, the quantitative analysis done by this study brought into being that the overall women empowerment status was not satisfactory in the study areas, where there is huge scope to work. Various problems such as insufficient capital, lack of profit, inadequate training facilities, lack of adequate farm machinery etc. problems are faced by the respondents in those areas. These problems are barrier to the attainment of women empowerment.

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