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Impact Assessment of Development Project: A Case Study of Small and Marginal Farmers Poverty Alleviation through the Post-Harvest Support Program of Grains Trading Projects in Bangladesh

Sujan Chandra Bhowmiik[1]
Assistant Director, IMED,
Ministry of Planning, Dhaka, Bangladesh

Md. Monarul Islam[2]
Joint Director (Rtd.), Dept. of Policy and Planning
PDBF, Dhaka, Bangladesh

Mohammad Nazmul Haque Bhuiyan[3]
Sr. Assistant Secretary, General Economic Division
Planning Commission, Dhaka, Bangladesh

Md. Selim Reza[4]
Senior Officer, Production
Hop Lun Apparel Ltd (Unit-2), Gazipur, Bangladesh

Mohshi-U-Nahidy Islam [5]
Senior Officer, Quality Control
Hop Lun Apparel Ltd (Unit-2), Gazipur, Bangladesh

Abstract:- The primary goal of this research is to assess the impact of the Grains Trading Projects' Post-Harvest Support Program on farmers' income. The research took place in districts of Mymensingh, Natore, Bogura & Dinajpur. Through the use of stratified random sampling, a total of 374 recipients were selected to constitute the study's sample. The research analyzed eleven distinct characteristics of the recipients as independent factors, unaffected by other variables, with the respondents income change during project activities being the dependent variable. Data was gathered from the participants through a meeting conducted in person. More than half (54.28%) of beneficiaries belonged to medium and high income change compared to 45.19% belong to low change income categories respectively. The research results indicated that out of the 11 variables examined, a total of 6 independent variables including land size, savings deposit, loan received, loan utilization, training received, and project participation, were found to have significant correlations (at the 0.5% and 1% level) with the dependent variable. The study revealed that six out of the 11 variables including land size, savings deposit, loan received, loan utilization, training received, and project participation showed significant correlation (0.5% and 1%) with the dependent variable. The correlation coefficient (r) is 0.370 and the coefficient of determination (R2) is 0.173 indicating that the combination of independent variables contributes to 17.30% of the total income change among respondents.

Keywords:- *Post-Harvest Farmer, Chang Income; Development; Project; Beneficiaries, Proverty Alleviation.*

I. INTRODUCTION

In 2023, Bangladesh has a per capita gross national income (GNI) of $2,793, making it one of the world's least developed countries. With a population accounting for 2.2% of the global total, Bangladesh is the eighth most populous country [2]. The post-harvest support programs targeting small and marginal farmers have proven effective in reducing poverty in rural Bangladesh. By minimizing post-harvest losses and improving market access, these programs help farmers increase their income, thereby lifting many out of poverty. Improved post-harvest practices also contribute to enhanced food security and economic stability in rural areas [3]. Bangladesh economy is heavily reliant on agriculture with approximately 40% of its population involved in farming, especially in rural areas [4]. Among these farmers, marginal and small farmers-who own less than 1.5 hectares of land-constitute a large proportion of the agricultural workforce [5]. These farmers face significant economic challenges particularly during the post-harvest stage, which can lead to substantial income losses and perpetuate poverty [6]. Bangladesh loses between 10% and 30% of its total grain production due to poor post-harvest handling lack of storage facilities and inadequate drying and transportation. These losses are particularly burdensome for small farmers, who rely heavily on their limited production for income and sustenance [7]. Marginal and small farmers in Bangladesh face significant barriers to accessing profitable markets due to geographical isolation, poor transportation infrastructure, and the prevalence of middlemen. These intermediaries often purchase grains at low prices preventing farmers from receiving fair compensation for their produce [8]. Many small farmers lack access to affordable credit and financing

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options. As a result, they struggle to invest in post-harvest technologies or improve their storage facilities, making it difficult to reduce losses and maximize profits [9]. The agricultural value chain in Bangladesh is often disorganized and inefficient making it difficult for small farmers to connect with larger buyers and export markets. This fragmentation limits their ability to add value to their products and hinders income growth [10].

The Grains Trading Post-Harvest Support Program in Bangladesh is crucial for helping marginal and small-scale farmers overcome barriers they face. These projects have made significant progress in reducing poverty and empowering rural farmers by addressing post-harvest losses, enhancing market access and offering financial support. The Government of Bangladesh has started a project called the Palli Daridro Bimochon Foundation (PDBF) aimed at reducing farmer poverty, known as the "Poverty Alleviation of Marginal and Small Farmers through Post-Harvest Support Program of Grains Trading Projects in Bangladesh". The project was implemented between July 2016 and June 2021. The goal of this research is to evaluate how the project has benefited recipients by improving their quality of life.

II. MATERIALS AND METHODS

This research took place from February 1, 2024, to March 30, 2024, across 50 Upazilas in 9 Districts as part of the initiative "Poverty Alleviation of Marginal and Small Farmers through Post-Harvest Support Program of Grains Trading Projects in Bangladesh". The study population consisted of a grand 13,740 project participants. A statistical calculator that was accessible was utilized to calculate the necessary sample size at a 95% confidence level with a 5% margin of error. [11]. As a result, the sample size for the study was 374. A hold rundown of 37 (about 10% of the example) was prepared for this evaluation. Eleven selected characteristics such as age, education, family member, land size, savings deposit, savings repayment behavior, loan received, loan utilization, loan repayment behavior, training received and participation with project were the independent variables of this study. Where, change in income was the dependent variable of this study. Data from project respondents was collected using an interview schedule that also included direct questions and scales. The respondent's information was gathered through close and personal discussions with the project staff at the selected area. Analyzed data was processed using software such as SPSS and Excel. The research results were based on both descriptive (range, observed range, mean, standard deviation, and coefficient of variation) and inferential (correlation) statistics.

III. RESULT AND DISCUSSION

A. *Beneficiaries of the project had the following selective characteristics:*

Table 1 shows the range, observed range, mean, standard deviation (SD), and coefficient of variation (CV%) of eleven (11) individual characteristics (age, education, family member, land size, savings deposit, savings repayment behavior, loan received, loan utilization, loan repayment behavior, training received, project participation).

Table 1: Possible Range, Observed Range, Mean, Standard Deviation, and Coefficient of Variation of the Performance Characteristics of the Respondent Beneficiaries

Selected Characteristics	Unit	Range	Min.	Max.	Mean	SD*	CV *
Age	No. of years	35	20	55	38.97	8.26	21.21
Education	Schooling years	11	0	11	6.01	2.71	45.08
Family Member	No. of person	4	3	7	4.81	1.45	30.20
Land Size	Decimal	342	8	350	97.38	64.17	65.90
Savings Deposit	000' Taka	10	2	12	6.10	2.92	47.82
Savings Repayment Behavior	Score	2	1	3	2.64	0.74	28.23
Loan Received	000' Taka	110	20	130	87.81	28.61	32.58
Loan Utilization	Score	60	40	100	82.48	20.30	24.61
Loan Repayment Behavior	Score	2	1	3	2.60	0.78	30.12
Training Received	No. of days	30	0	30	1.95	2.13	108.91
Participation with Project	No. of years	3	1	4	2.49	0.98	39.50

SD* = Standard deviation, CV*= Coefficient of variation

B. *Change in Income:*

The respondent's disposable income has improved due to their engagement in the project. The beneficiary dimensions primary attributes are displayed in Table 2, along with their means, standard deviations (SD), coefficients of variation (CV), and potential and observed ranges.

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Table 2: Change in Income after Engaging in Projects: Possible Range, Observed Range, Mean, Standard Deviation, and Coefficient of Variation (CV).

Characteristics	Possible range	Ob. range	Categories of Characteristics	Percent	Mean	SD	CV %
Change in Income	0-40	0-40	No Change (0) Low Change (1-9) Medium Change (10-19) High Change (>19)	0.535 45.19 40.91 13.37	10.48	7.009	66.879

The respondent's income changed due to the project activities in a range of 0 to 40 with an average of 10.48, a standard deviation of 7.009 and a coefficient of variation of 66.87. According to the statistical data, more over half (54.28%) of respondents realized a medium to high change in economic development, while 45.19% reported a modest change in income. Interestingly, the majority of respondents had the option of changing their income after engaging in various project activities.

According to data in Table 3, 16.58 percent and 64.97 percent, respectively of the recipients were young and middle-aged, while 18.45 percent fell into the old-age category. The results show that middle and young age groups made up a significant percentage (96.73 percent) of the beneficiaries. These kinds of participants and their family members were more interested in participating in in project activities.

Table 3: Distribution of Project Beneficiaries by Age

Categories (Age)	Respondents		Mean	SD	CV%
	Frequency	Percent			
Young (≤30)	62.00	16.58	38.97	8.26	21.21
Middle Aged (31-50)	243.00	64.97			
Old (>50)	69.00	18.45			
Total	374	100.00			

Table 4 displayed the breakdown of respondents based on their educational qualifications. Statistics showed that 83.95 percent of respondents had primary education (36.36) or secondary education (47.59). This indicates that the education level in the area is no better or worse than in other parts of the country. The educational level of the recipients played a crucial role in enhancing their livelihood.

Table 4: Distribution of Project Beneficiaries by Educational Background

Categories (Schooling Years)	Respondents		Mean	SD	CV%
	Frequency	Percent			
Primary education (≤5)	36.36	36.36	6.01	2.71	45.08
Secondary education (6-10)	47.59	47.59			
Above secondary education (>10)	16.04	16.04			
Total	374	100.00			

The information in Table 5 indicates that most of the project recipients (46.52 percent) came from households of medium size. Nevertheless, slightly less than a third of the individuals who benefited from the project (31.55 percent) came from small households. The findings indicate that most of the project recipients (78.07 percent) came from small to medium-sized families while a smaller percentage (21.93 percent) came from large families.

Table 5: Distribution of Project Beneficiaries by Family Size

Categories	Respondents		Mean	Standard deviation	CV%
	Frequency	Percent			
Small family (≤3)	118	31.55	4.81	1.45	30.20
Medium family (4-5)	174	46.52			
Large family (>5)	82	21.93			
Total	374	100.00			

In Table 6, the data indicated that just under two-thirds (64.97 percent) of the project recipients were categorized as marginal and small, while only 6.68 percent of them were classified as landless. Approximately 28.34 percent of the recipients of the project were classified as medium-sized farmers.

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Table 6: Distribution of Project Beneficiaries by Land Size

Categories	Respondents		Mean	Standard Deviation	CV%
	Frequency	Percent			
Land less (≤20)	25	6.68	97.38	64.17	65.90
Marginal (21-50)	83	22.19			
Small (51-100)	160	42.78			
Medium (>100)	106	28.34			
Total	374	100.00			

The information displayed in Table 7 indicated that the majority of project beneficiaries (91.71 percent) had small and medium savings, while only 8.29 percent had large savings. Results show that income and saving are directly correlated, meaning saving rises when income rises but not as much as income does. This implies that as one's income rises, the amount saved as a percentage of income also increases.

Table 7: Distribution of Project Beneficiaries by Savings Deposit

Categories (Thousand tk.)	Respondents		Mean	SD	CV%
	Frequency	Percent			
Small savings ≤5000)	184	49.20	6.10	2.92	47.82
Medium savings (5001-10000)	159	42.51			
Large savings (>10000)	31	8.29			
Total	374	100.00			

Information provided in Table 8 showed that approximately 79.68 percent of the participants exhibited consistent saving habits, with 4.28 percent exhibiting inconsistent saving habits and only 16.04 percent being defaulters. This research demonstrates that the project aimed to increase capital formation among disadvantaged rural individuals in Bangladesh, leading to a higher amount of capital for the borrowers.

Table 8: Distribution of Project Beneficiaries by Savings Repayment Behavior

Categories	Respondents		Mean	SD	CV%
	Frequency	Percent			
Regular	298	79.68	2.64	0.74	28.23
Irregular	16	4.28			
Default	60	16.04			
Total	374	100			

The data presented in Table 9 shows that the vast majority of the respondents (79.68 percent) were repayment their saving regularly, while only 4.28 percent of them were classified as irregular and 16.04 percent of the respondents of the project were classified default savings repayment behavior. This showed that the research groups were very heterogeneous in terms of the savings repayment behavior.

Table 9: Distribution of Project Beneficiaries by Loan Received

Categories (Thousand tk.)	Respondents		Mean	SD	CV%
	Frequency	Percent			
Small credit recipients (≤ 30000)	25	6.68	87.81	28.61	32.58
Medium credit recipients (30001 - 80000)	100	26.74			
large credit recipients (>80000)	249	66.58			
Total	367	100			

Information provided in Table 10 shows that the majority of participants (77.00 percent) demonstrated moderate to high credit utilization, with 22.99 percent displaying low credit utilization habits. Examination indicates that the respondents' income was positively impacted by their access to credit. Receiving a loan implies that the borrower will experience increased earnings after facing financial difficulties with the venture.

Table 10: Distribution of Project Beneficiaries by Loan Utilization

Categories	Respondents		Mean	SD	CV%
	Frequency	Percent			
Low credit utilization (≤ 70%)	86	22.99	82.48	20.30	24.61
Medium credit utilization (71% - 90%)	110	29.41			
High credit utilization (>90%)	178	47.59			
Total	374	100			

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Information presented in Table 11 showed that over three quarters (78.07 percent) of the participants exhibited consistent credit habits, whereas 18.45 percent were defaulters and only 8.60 percent demonstrated erratic credit behavior. Although income is not directly used to calculate credit utilization, it does affect the respondent's ability to manage credit. This makes it easier to pay off higher income balances and can keep your credit utilization low. The study thus concluded that creating more employment opportunities for rural people and helping to promote economic empowerment.

Table 11: Distribution of Project Beneficiaries by Loan Repayment Behavior

Categories	Respondents		Mean	SD	CV%
	Frequency	Percent			
Defaulter	69	18.45	2.60	0.78	30.12
Irregular	13	3.48			
Regular	292	78.07			
Total	374	100.00			

Data shown in Table 12 indicated that most of the participants (88.83 percent) were given either low or moderate level of training, while 7.63 percent did not receive any training. Just 3.54 percent of the participants underwent extensive training. Results showed that a large number of project recipients have received training in law. Training specifically plays a significant role in generating income. It seems project beneficiaries have not been able to enhance credit management due to lack of training opportunities.

Table 12: Distribution of Project Beneficiaries by Training Received

Categories	Respondents		Mean	SD	CV%
	Frequency	Percent			
No training received (0)	47	12.57	1.95	2.13	108.91
Law training received (1-3)	288	77.01			
Medium training received (4-6)	38	10.16			
High training received (< 6)	1	0.27			
Total	374	100.00			

Data presented in Table 13 indicated that about 74.60 per cent respondents had low participation with project, while 18.90 per cent was medium and only 6.50 per cent of the respondents was highly participation with project. Organizational participation broadened outlook of an individual and created favorable attitude towards improved socio-economic development.

Table 13: Distribution of Project Beneficiaries by Participation with Project

Categories	Respondents		Mean	SD	CV%
	Frequency	Percent			
Low participation with project (1-2)	89	24.25	2.49	0.98	39.50
Medium participation with project (3-4)	152	41.42			
High participation with project (<4)	126	34.33			
Total	367	100.00			

The association between the characteristics of the selected 11 beneficiaries and income fluctuation was as reported. The traits of the respondents included age, education, family size, land area, savings, repayment habits, loans taken, credit utilization, repayment habits, training received, participation in the project, etc. Pearson correlation coefficient (r) was used to examine the association between the characteristics of the 11 selected participants and income fluctuation. A significance level of 1% (0.01) or 5% (0.05) was used to decide whether to accept or reject the hypothesis.

Table 14: Correlation between Specific Traits of the Recipients and Fluctuations in their Earnings

Selected Characteristics	Correlation co-efficient (r)
Age	-0.027(NS)
Education	-0.004(NS)
Family Member	0.010
Land Size	0.110*
Savings Deposit	0.124*
Savings Repayment Behavior	0.044
Loan Received	-0.167**

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Loan Utilization	-0.106*
Loan Repayment Behavior	0.014
Training Received	-0.114*
Participation with Project	0.110*
NS= Not significant * = Significant at 0.05% level ** = Significant at 1% level	

This research included evaluating the impact of 11 various independent variables through testing. Data in Table 15 indicates that the R and R2 values for the complete model regression were 0.270 and 0.073 respectively. The previously stated information indicates that the chosen independent variables had a combined multiple correlation of R = 0.270 and an R2 value of 0.073, demonstrating that the independent variables as a whole explained 7.30% of the variance in income changes among the respondents.

Table 15: Regression Analysis Showing Standardized Regression Coefficients, Which Indicate the Contribution of Each Independent Variable to the Dependent Variable.

Selected Characteristics	**Unstandardized Coefficients (B)**	**Standardized Coefficients (Beta)**	**t**	**Sig.**
Age	-0.054	-0.059	-1.099	0.272
Education	0.048	0.017	0.282	0.778
Family Member	0.245	0.047	0.800	0.424
Land Size	0.009	0.078	1.478	0.140
Savings Deposit	0.236	0.092	1.704	0.089
Savings Repayment Behavior	0.468	0.046	0.904	0.366
Loan Received	-0.044	-0.167	-3.264	0.001
Loan Utilization	-0.017	-0.046	-0.811	0.418
Loan Repayment Behavior	-0.001	0.000	-0.003	0.998
Training Received	-0.28	-0.079	-1.497	0.135
Participation with Project	0.513	0.067	1.233	0.218
Multiple R =	0.370			
R Square =	0.173			
Adjusted R Square =	0.055			
Std. Error of the Estimate =	7.33201			
F Value =	2.593			
P =	0.000			

IV. CONCLUSION AND RECOMMENDATION

Improving rural areas plays a crucial role in combatting poverty. The most ambitious goal of Agenda 2030 is to eliminate poverty in all its forms worldwide. Bangladesh is committed to achieving the goal and has even incorporated it in its eight-year plan (July 2020 to June 2025). Bangladesh has pledged to reach the SDGs and has incorporated them into its Eight Five Year Plan (8FYP) (July 2020 - June 2025). Therefore, the government's primary focus for development is poverty alleviation (since poverty eradication" is unrealistically ambitious). The study's results suggest that over half (54.28%) of the participants experienced a significant change in their income, feeling either medium or high levels of impact. This is the reason why the government must put in a lot of effort and focus on creating various development projects to improve the lives of underprivileged rural people and implement rural development policies to ensure the success and effectiveness of their development plans.

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