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CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	KNOWLEDGE MANAGEMENT: STRATEGY FOR SUSTAINABLE COMPETITIVE ADVANTAGE <i>DR. HARESH BAROT</i>	1
2.	NON GOVERNMENTAL ORGANISATIONS AS AGENTS OF DEVELOPMENT: THE CASE OF LAPO IN BENIN METROPOLIS OF EDO STATE, NIGERIA <i>ONUGU, CHARLES UCHENNA & TAIWO ABDULAHI OLABISI</i>	4
3.	DETERMINANTS FOR COMMERCIAL BANKS IN FINANCING SME (WITH SPECIAL REFERENCE TO MEERUT DISTRICT, U.P., INDIA) <i>KALI RAM GOLA & P. K. AGARWAL</i>	9
4.	INVESTIGATING THE IMPACT OF ECONOMIC VARIABLES ON INTERNATIONAL TOURIST ARRIVALS <i>CHENG-WEN LEE, WEN-CHUAN FU, KUO-SUNG HSIEH & YI-CHANG LEE</i>	14
5.	A STUDY ON THE IMPACT OF PERSONAL EFFICACY ON JOB MOTIVATION AND JOB SATISFACTION AMONG WORKING WOMEN WITH SPECIAL REFERENCE TO THOSE WHO ARE STAYING AWAY FROM HOME <i>JAYASRI INDIRAN</i>	20
6.	EMERGING PROFILE OF WOMEN IN INFORMATION TECHNOLOGY SECTOR IN GOA <i>DR. SHARMILA BORKAR</i>	27
7.	INDIAN CAPITAL MARKET: AN OVERVIEW <i>DR. SHANKAR T. BATTASE & SUNANDA SHANKAR</i>	34
8.	CORPORATE GOVERNANCE AND CORPORATE SOCIAL RESPONSIBILITY: A REVIEW <i>KOMAL CHAUDHARY</i>	37
9.	AUDIT PLANNING: MATERIALITY CONCEPT <i>CHANDRA KANT PARMAR</i>	41
10.	EMPOWERING WOMEN THROUGH PROACTIVE NATIONAL INITIATIVES: A CATALYST FOR HUMAN DEVELOPMENT <i>MANBIR KAUR DHALIWAL</i>	44
11.	NATIONAL FOOD SECURITY ACT OF INDIA AND RELATED CONCERNS <i>SWAPNAMOEYEE PRIYABHASINI PALIT & MAMITA DASH</i>	49
12.	ECONOMIC AND ECOLOGICAL ANALYSIS OF LEATHER SOLID WASTES IN VELLORE DISTRICT, TAMIL NADU <i>T. AASIF AHMED & DR. B. MOHAMED RAFEEQ</i>	55
13.	A STUDY ON CUSTOMER SATISFACTION TOWARDS SAKTHI MASALA IN COIMBATORE CITY <i>S. THANGAMANI & E. ARTHI</i>	57
14.	CUSTOMER SATISFACTION OF SMALL SCALE RETAIL OUTLETS IN COIMBATORE CITY <i>J. SAMUEL CAESER PICKENS & P. STARMINI</i>	61
15.	MICRO FINANCE, SELF HELP GROUPS AND ECONOMIC EMPOWERMENT OF WOMEN IN ODISHA <i>DR. BANDANA PATHAK</i>	66
16.	FACTORS OF SPECIFIC JOB SATISFACTION AND GENERAL JOB SATISFACTION <i>TRUONG HONGNGOC & MARIA KATHRINA DIAZ</i>	71
17.	THE CURRENT SCENARIO OF GOLDEN FIBRE: A SPECIAL STUDY ON JUTE IN THE CONTEXT OF INDIA <i>RUSHA SARKAR</i>	77
18.	WOMEN EMPOWERMENT AND ITS IMPACT ON AGRICULTURAL PRODUCTIVITY: THE CASE OF KERSA DISTRICT IN EASTERN HARARGHE ZONE, ETHIOPIA <i>TADELE MELAKU CHALLA</i>	85
19.	IMPACT OF FDI ON INDIAN ECONOMY: AN INTER- COMPARATIVE STUDY BETWEEN CHINA AND USA <i>IRAM KHAN</i>	89
20.	GEOGRAPHICAL ASSESSMENT OF FINANCIAL INCLUSION IN INDIA <i>PURUSHOTTAM KUMAR ARYA, HIMANSHU MISHRA & AAKASH UPADHYAY</i>	93
	REQUEST FOR FEEDBACK & DISCLAIMER	99

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WOMEN EMPOWERMENT AND ITS IMPACT ON AGRICULTURAL PRODUCTIVITY: THE CASE OF KERSA DISTRICT IN EASTERN HARARGHE ZONE, ETHIOPIA

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ABSTRACT

The objective of the study was to analyze the impact of women empowerment on agricultural productivity. Cross sectional data were collected from a total of 150 randomly selected respondents. Seven key indicators of empowerment combining both quantitative and qualitative data and four dimensions of empowerment were chosen for this study. A cumulative empowerment index (CEI) was developed by adding the obtained weighted scores of the seven empowerment indicators based on which the respondents were classified into empowered and non-empowered women. The distribution of CEI demonstrates that 38.7% of women were empowered at varied levels of empowerment whereas, 61.3% of the women were concentrated in non-empowerment category. Cobb-Douglas (CD) production function was applied to estimate the agricultural productivity difference in between the two groups. Results of the study show that empowered women farmer (EWF) own more productive resources such as land, oxen, labor and other agricultural inputs as compared to non-empowered women farmer (NEWF). The estimate of CD production function show that oxen, herbicide use, land size, male and female labor was statistically significant for both EWF and NEWF. The comparison of the Marginal Value Product (MVP) with the factor cost shows that EWF and NEWF could increase productivity using more herbicides, male and female labor. The agricultural productivity difference between EWF and NEWF was about 68.83% in the study area. However, if NEWF had equal access to the input as EWF, gross value of the output would be higher by 23.58% for NEWF. Land size, oxen and seed difference between EWF and NEWF made about 9.1%, 7.73% and 6.6% productivity difference in agriculture, respectively.

KEYWORDS

Women empowerment, Agricultural productivity, Household, Ethiopia.

INTRODUCTION

Though agriculture is the largest contributor to overall economic growth in Ethiopia, it is dominated by small scale farmer with subsistence farming system in low productive and highly degraded lands (AGP, 2010). Ethiopia accounts about 88% of the country's women live in the rural area, and nearly 85% women work in agricultural activities like food processing, storage, weeding, harvesting, marketing, preparing threshing field and caring for animals (Bogalech, 2000). In general, women's contributions in rural Ethiopia have remained invisible, especially the female headed households are more invisible to research, donors and policy makers (Tiruwork 1998; Addis, 2000). These situations have put women at a disadvantageous position with respect to agricultural resources. Low participation of women in economic activities has a negative impact on the realization of the Plan for Accelerated and Sustained Development to End Poverty (PASDEP). The objectives of this study are to analyze the impact of women empowerment on agricultural productivity in Kersa district of East Hararghe zone of Oromiya Regional State, Ethiopia.

STUDY AREA AND DATA COLLECTION

Kersa district of Oromiya Regional State, located at 475km east of Addis Ababa, the capital city of Ethiopia. The district has three major crops production, these are cereal, vegetable and Khat based products. Both primary and secondary data collected from Kersa district were used in the study. Primary data was collected from sample households through structured survey questionnaire covered information on women empowerment, demographic and farm characteristics, crop and livestock production, household income and ownership of farm inputs. The secondary data collected from Agriculture and Rural Development Office, Education Bureau, Women Affairs Office, and Administration Office of the district. The participatory assessment methods such as Focus Group Discussions, case studies and key informant interviews were applied to gather information pertinent to the research problem.

A two stage random sampling technique was used to select the sample households in the study area. The first stage was simple random sampling of 6 FAs from the 35 FAs found in the district. Then from these 6 FAs 150 households were randomly selected and interviewed. Equal proportion of female headed and male headed households were included in the sample.

Both descriptive and econometric analyses were employed to meet the specific objectives of the study. In this study descriptive statistics such as mean, frequency, percentage, t-test, chi-square were used to analyze the collected data and compare the empowered and non-empowered women.

MEASUREMENT OF EMPOWERMENT

Cumulative Empowerment Index (CEI)

The CEI is a composite of seven empowerment indicators combining, both quantitative and qualitative data in order to get a comprehensive feature of women's empowerment. The quantitative part represents six categories (e.g., 0=No, 1=very low, 5=very high) which has been done on the basis of total obtained score for each empowerment indicator from the survey. The qualitative dimension stems out of the total weighted scores indicated by the six enumerators (where 7 denotes very important and 1 denotes less important). Thus, a total of 77 specific attributes were added together to develop CEI in order to understand the economic, socio-cultural, legal and political dimensions of women's empowerment (Table 1).

Cobb-Douglas Production Function

Cobb-Douglas (CD) production function was used to examine the agricultural productivity difference between the empowered and non-empowered women farmers. According to Gujarati (1995), the generalized form of the CD production function can be specified as:

$$Y = AX_1^{B_1} X_2^{B_2} X_3^{B_3} \dots X_n^{B_n} e^{U_i}$$

Where, Y is gross value of farm outputs in Birr per ha, X_i 's are explanatory variables such as land size, oxen, seed, fertilizer use, herbicides use, male or female labor and capital. B_i 's are coefficients or elasticities of output and indicates how strongly each input affects output. A is efficiency parameter and represents the level/state of technology and U_i is disturbance term.

Production function for Empowered Women Farmer represented as:

$$\ln Y_e = \ln A_e + B_{1e} \ln X_{1e} + B_{2e} \ln X_{2e} + B_{3e} \ln X_{3e} + \dots + B_{7e} \ln X_{7e} + U_e$$

Production function for Non-Empowered Women Farmer represented as:

$$\ln Y_{ne} = \ln A_{ne} + B_{1ne} \ln X_{1ne} + B_{2ne} \ln X_{2ne} + B_{3ne} \ln X_{3ne} + \dots + B_{7ne} \ln X_{7ne} + U_{ne}$$

Production function using pooled data represented as:

$$\ln Y_p = \ln A_p + B_{1p} \ln X_{1p} + B_{2p} \ln X_{2p} + B_{3p} \ln X_{3p} + \dots + B_{7p} \ln X_{7p} + U_p$$

Production function using pooled data with dummy empowerment variable is:

$$\ln Y_p = \ln A_p + B_{1p} \ln X_{1p} + B_{2p} \ln X_{2p} + B_{3p} \ln X_{3p} + \dots + B_{7p} \ln X_{7p} + DE + U_p$$

Where,

e = EWF, ne = NEWF, p = pooled data set, E = Empowerment dummy variable (E = 1 for empowered women; E = 0 otherwise) and D is the regression coefficient

for the dummy variable and it indicates productivity difference in technical efficiency. B_{ie} , B_{ine} and B_{ip} (i = 1, 2, 3, ..., 7) are output elasticities of i^{th} input under EWF, NEWF and pooled data sets, respectively.

The MVP of the factor can be computed as follows;

$$MVP = b_i \cdot \frac{Y}{X_i}$$

Where, b_i is the regression coefficient (output elasticity), Y is the gross value of farm output (geometric mean) and X_i the geometric mean value for factor i (Ellis, 1988).

Finally, Oaxaca decomposition model (Oaxaca, 1973) of the productivity differential between empowered and non-empowered women farmers were used to decompose the productivity difference. Although, this approach was used to decompose the income gap, it can also be applied to decompose productivity difference between, say, men and women farmers (Quisumbing, 1995). The decomposition model adopted was presented as follows:

$$\ln \left(\frac{Y_e}{Y_{ne}} \right) = [(B_{ie} - B_{ine}) \ln X_{ine}] + \left[B_{ie} \ln \left(\frac{X_{ie}}{X_{ine}} \right) \right]$$

Where, Y_e and Y_{ne} represent mean output (geometric mean) of empowered and non-empowered women farmer respectively, X_{ie} and X_{ine} are geometric mean levels of inputs of empowered and non-empowered women farmer, B_{ie} and B_{ine} are estimated output elasticities of empowered and non-empowered women farmer as defined earlier.

Estimation Technique and Testing Procedures

The Variance Inflation Factor (VIF) was estimated by following the method of Gujarati (1995), which is:

$$VIF_i = \left(\frac{1}{1 - R_i^2} \right)$$

Where, R_i^2 is the coefficient of determination that is obtained when the continuous explanatory variable is regressed against all the other explanatory variables. As R_i^2 approaches 1, the VIF approaches infinity. That is, as the existence of collinearity increases, the variance of the estimator increases and in the limit it can be infinity. If there is no collinearity between regressors, the value of VIF will be 1. As a rule thumb, if VIF of a variable exceeds 10, that variable is said to be highly collinear (Gujarati, 1995).

RESULTS AND DISCUSSION

WOMEN EMPOWERMENT ANALYSIS

Extent of Women's Empowerment

Although the highest CEI could reach 140, the CEI computed for the sample varied from 0-79, where 0 indicates no empowerment and 79 indicates the highest level of empowerment. The distribution of CEI reveals that 61.3% of the total sample households fall under no empowerment category, 1.4% very low, 10.7% low, 21.3% medium and, 5.3% high. There is no very high empowerment category. The finding of the survey shows that out of the total sample 92 households (61.3%) were concentrated in non-empowerment category while 58 households (38.7%) empowered at varying level of empowerment. Due to low level of empowerment, poor women were acutely powerless and insecure, they were vulnerable and lack dignity within the household.

Dimensions of Women's Empowerment

Economic Empowerment of Women

The finding of the survey shows that 80 % of the empowered women farmers have access to credit service at least sometimes, whereas 94% of the non-empowered women farmers have no access to credit service in the district. The women farmers utilized loans for various purposes such as purchase of agricultural inputs, livestock, home consumption, medication, children education, clothing, trade, wedding and festivals. About 60.7% of the empowered women farmer reported that they used credit for purchase of livestock. Therefore, their livestock ownership dramatically increased. Similarly, about 34% of empowered women farmers used the credit for purchase of agricultural inputs. Hence, having access to complementary inputs and resources resulted in increased productivity through increased soil fertility.

The saving culture of the women farmers was also assessed. The average amount of saving was 158 and 66 birr for the empowered and non-empowered women farmers respectively. As the t-test indicated that the mean difference among the empowered and non-empowered women was statistically significant (t=3.4, P=0.001). This implies that those empowered women farmer have better saving than the non-empowered one. The results on the dependency of women on others indicated that the 16.3 % of the empowered women farmers depend always on their husbands for food consumption, clothing and medication, 39.8% of the non-empowered women farmer depend always on their husbands. Whereas, 45 % of the empowered women farmers never depend on their husbands.

Land holding: The total area of land owned by the sample farmers was about 127 ha with the average of 0.91 ha per household compared to the regional average of 1.13 ha. The average land owned by EWF and NEWF was 1.06 and 0.72 ha respectively, which is statistically different at 1% probability level (t = 3.35). This indicates that the land holding of the NEWF is smaller by about 47% than that of EWF.

Livestock holding: The mean livestock size owned by the sample farmers was 2.19 TLU. Comparison of the livestock ownership between EWF and NEWF shows that EWF on average own 2.69 TLU while NEWF own 1.61 TLU, which is significantly different at 1% probability level (t = 3.38). This implies that EWF are relatively wealthier than NEWF, since livestock is considered as one of the indicator of wealth status in the study area.

Labor Utilization: Respondents were also asked to quantify the amount of labour they put on major activities of crops production. Accordingly, the average man-days of family labour used to produce crops on a hectare of land was reported to be 147 and 88 for EWF and NEWF, respectively (t = 3.4, P = 0.001). On the other hand, the average man-day of hired labour for EWF and NEWF was 10 and 12, respectively, which is not significantly different. About 41% of EWF and 68% NEWF reported that labor shortage constrains effective undertaking of their agricultural activities. The chi-square test shows the existence of significant difference in labor shortage for different activities between EWF and NEWF ($\chi^2 = 9.73$, P = 0.002). This means that NEWF has been more constrained by labor compared to EWF. The average wage rate and working hours for all activities were 20 Birr and 8 hours per day, respectively. The major strategies used by EWF towards over-coming labor shortage were hiring labor (32%), assistance from relatives (29%) and through social support such as *Guz* and *Marro* (39%). The corresponding figures for NEWF were 34%, 34% and 14% respectively and about 18% of the NEWF were not able to overcome the problem at all.

Use of fertilizer, herbicides and improved seed: About 88% of EWF and 54% of NEWF applied commercial fertilizer, while 15% of EWF and only 5% of NEWF used improved seeds of maize, sorghum, potatoes and onion. The average amount of fertilizer used by EWF and NEWF was 120 and 51 kg/ha, respectively. These figures show that there were significant differences in the amount of fertilizer used by the two groups at 1% probability level (t = 5.14). With regard to

herbicides, about 23% of EWF and 11% of NEWF used herbicides to control weeds. The mean amount used by EWF and NEWF was about 0.26 and 0.19 liter respectively.

Crop yield: The average yield of sorghum for EWF and NEWF was about 9.2 and 4.1 Qt/ha, respectively, which was statistically significant at 10% ($t=7.0$). The average yield of sorghum, maize, and bean was about 9.2, 5.1, 5.6 Qt/ha for empowered women ($N=58$), respectively and for non-empowered women farmer ($N=92$) the respective yield of these crops was 4.1, 4.25 and 4.94 Qt/ha. This indicates that empowered women produced higher yield per ha of land compared to the non-empowered women farmers.

Composition of farm income: About 76% of EWF and 52% of NEWF reported that they earned cash income from sales of cash crop where as about 43% of EWF and 49% of NEWF earned cash income from sales of live- stock and /or livestock by- products. The average cash income from different crops was about Birr 345 for EWF and Birr 150 for NEWF, the difference is significant at 1% probability level.

Access to and control over productive resources

Land: The land used for cultivation is about 96% of EWF and 86% of NEWF. That means about 14% of NEWF and 4% of EWF have no land. The others access land through renting and borrowing. Moreover, about 3% of NEWF have no access to land at all while the entire sample of EWF accessed to land through renting, borrowing or share cropping.

Oxen: On the average, EWF had about 0.85 oxen while NEWF had 0.5 oxen, which was significant at 5% probability level ($t = 2.59$). The survey indicates that about 45% of EWF and 55% of NEWF did not possess any oxen, while those owning only one Ox constitute 27% of EWF and 38% of NEWF.

Institutional services: The findings of the survey indicated that 37.3% of the women have access to credit service. From EWF and NEWF only 86% exercised their land access and control right properly. The total land owned and put under cultivation was 77% and 52% for empowered and non-empowered women farmers respectively, which is statistically different at 1% probability level ($t = 3.35$).

Econometric Analysis

Estimation of the Production Function: In this seven explanatory variables were included among which four variables namely, Oxen, herbicides use, land size, male and female labor were statistically significant for EWF and NEWF production function.

TABLE 1: PARAMETERS OF COBB DOUGLAS PRODUCTION FUNCTION

Variables	Unit	Pooled (N=150)		EWF (N=58)		NEWF (N=92)	
		Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant		4.654	21.052***	5.271	17.798***	4.122	11.75***
Oxen	TLU	0.137	1.871*	0.213	2.077**	0.179	1.702*
Land size	Ha	0.336	4.381***	0.383	4.047***	0.306	2.588**
Seed	Kg/ha	0.061	0.953	0.115	1.385	0.106	1.033
Fertilizer use	Kg/ha	0.030	0.401	0.015	0.154	0.003	0.032
Herbicide use	Liter/ha	0.153	2.549**	0.156	1.799*	0.156	1.025*
Male labor	Man-day	0.166	2.386**	0.352	3.587***	0.281	2.049*
Female labor	Man-day	0.275	4.337***	0.228	2.074**	0.338	3.264***
Adjusted R ²			57.2%		55.5%		55.6%
F-value			27.52***		14.19***		12.44***
Durbin Watson			2.01				

Source: Model Output

NB: *, ** and *** indicate statistically significant at 10%, 5% and 1% probability level, respectively.

Source of Productivity Difference

The total sources of productivity difference were decomposed into output elasticities and inputs endowments. Total decomposition of productivity difference between EWF and NEWF showed in the table below.

TABLE 2

Source of productivity difference	Percentage Contribution	
	Due to output elasticities	Due to input endowments
Total estimated difference (68.83%)	-23.58	92.41
oxen	2.70	7.73
Land size	3.88	9.10
Seed	1.04	6.60
Fertilizer use	2.31	3.74
Herbicide use	0.01	0.84
Male labor	51.82	68.92
Female labor	78.69	41.98

Source: Own computation

From table above, it can be seen that the total productivity difference in agriculture between the two groups was about 68.83% (overall productivity difference between EWF and NEWF due to output elasticity and input endowments). However, they have different human capital endowment and different access to factors and inputs as discussed in the descriptive part. Inputs use differentials accounted for 92.41% of the difference between EWF and NEWF. This implies that the productivity could be increased by 92.41%, if the NEWF could adjust the inputs to the same level of EWF. On the other hand, the difference in output elasticities was -23.58%. This indicates that productivity difference as the result of difference in outputs elasticities is greater for NEWF as compared to that of EWF.

POLICY IMPLICATION

Based on empirical results and discussion, the following points need to be considered as a possible policy implication in order to increase the productivity of farmers;

Raising the productivity of land by utilizing herbicides and pesticides

Increase in the application of improved seed

Increase income due to the microcredit intervention to self-reliance and economic empowerment.

Since ox is one of the significant factors influencing agricultural productivity, intervention to improve agricultural sector should be encouraged through empowering farmers to own oxen through provision of livestock credit or improved hybrid of oxen.

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