IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Review On Various Factors Affecting The Community Participation In Water Resource Management Development Program In Rural Odisha

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Abstract:

The purpose of the study was to investigate the factors influencing effective community participation on water project. The study employed a descriptive survey research design. The target population for the study included management committee and the local community members. Data was collected using semi-structured questionnaires and interview schedule. Data was analyzed using Statistical Package for Social Sciences. The Research has been conducted in the Year 2022 in Odisha for the partial fulfillment of award of Doctoral Degree.

Keywords: Community participation, Socio-economic, institutional

Introduction:

Water is a natural resource that is necessary for sustenance of life, ecological systems and a key resource to social and economic development. Governments, Non-governmental organizations, local and international organizations from all over the world have implemented water projects to promote safe rural water supply and sanitation over the years. The levels of participation in either of the Non-Govt Organization and Govt Organization implemented Water Resource Management areas are not satisfactory, because of some socio-cultural, economic, institutional and physical, technical factors. However, the NGO made Water Resource Management performed comparatively, well. In this regard, several variables are identified for determining the reasons for non-participation. Even though there have been many policy changes in the implementation

of Water Resource Management programmes alongwith the decentralization of power and resource management, there is little awareness about the causes affecting the level and collective action to manage Water Resource Management resources. Under a diverse socio-economic condition, setting up any new institution and have people's involvement is a very challenging task. It is not easy to convince allthe beneficiaries to participate within a given period. If the community participation isto be institutionalized, especially over the long run it is essential to rationally analyzed the variables affecting community participation.

In the present study based on the literature review and beneficiaries' perception, the variables are selected which influence the participation. The descriptive statisticsmethod is used to identify the average response (mean value) regarding the average influence of each variable. Further, the factors and regression analysis is found to be appropriate to consider the influence of independent factors (socio-cultural, economic, intuitional and physical and technical) on dependent factors (community participation).

Literature Review:

Review:1 In the year 2020, Ananga, E. O. and et. al. in their study "Examining the effect of community participation on beneficiary satisfaction with the work of water management committee in urban community-based operated water schemes" reviewed that relationship between community participation and beneficiary satisfaction with the work of the water management committee. Four urban-based community operated water schemes in the city of Kisumu, Kenya, are used as empirical referent. The decision-making and implementation of water management practices is expected to increase efficiency and equity through the proper involvement of active beneficiaries. The results indicated that five participatory variables correlate with beneficiary satisfaction with the work of the water management committees including provision of labor ($p < .05$), willingness to intervene against vandalism ($p < .05$), meeting attendance ($p < .05$), financial contribution ($p < .05$) and payments of water bills on time ($p < .05$). So, the managers of community water supplies projects together with development partners need to encourage the identified participatory variables as a means of augmenting beneficiary satisfaction with improving the effectiveness and sustainability.

Review:2 In the year 2018, Agidew, A. A. and Singh, K. N. in their study "Factors affecting farmers' participation in watershed management programs in the Northeastern highlands of Ethiopia: a case study in the Teleyayen sub-watershed" revealed that the farmer's perception has a strong positive correlation ($r = 0.612$, $P = 0.000$) with the farmer's decision to participate in the watershed management programs followed by government support ($r = 0.163$, $P = 0.017$), while the slope of the farmland and the gender of the household head have shown significant and negative associations. The binary logistic regression analysis also revealed that six independent variables were significant in explaining the factors affecting the farmers' decision to participate in watershed management programs. These variables were land redistribution, gender, agricultural labor force, extension service, farm size, and slope. Of these, land redistribution, gender, agricultural labor force, extension service, and slope of the farmland indicated a negative influence, while farm size of a

household exerted a positive impact. The study also reviewed the role of discrete variables in explaining variations of variables in affecting the farmers' decision to participate in the programs. Thus, two variables found to be significant. These variables are the gender of the household head and land tenure security. Accordingly, the chi-square result of the variable (X2 = 9.052) of gender was found to be statistically significant at the 95% level of significance. Similarly, the chi-square result (X2 = 8.792) of land tenure security was found to be statistically significant at the 95% level of significance. Finally, the study suggested to work on raising the awareness of farmers' about the long-term benefits of the watershed programs and to design a strategy to diversify their livelihoods.

Review:3 In the year 2016, Miruka, S. O. in his research paper "Factors influencing Community participation in Rural water supply projects funded by the County Government in Gesusu ward, Kisii county, Kenya" signifies that the majority of the community members did not participate in planning, implementation and monitoring of water supply projects. The level of education attainment is the social factor that has the highest influence on the effectiveness of community participation in rural water supply projects funded by county government of Kisii. Again, this was concluded that age, gender and level of income have minimal influence on community participation in rural water supply projects. Majority of the respondents argued on the poor attendance of the key stakeholders and community beneficiaries in capacity building workshops whereas a few county government officers were attended because, they are given allowances on participation. These findings implied that the training workshops have not provided opportunities for community members to acquire enough technical skills. Majority of the rural community members were not aware about the water supply projects funded by the county government of Kisii. The county government community development projects undertaken in their ward had not been implemented through participation of all. The low level of awareness could be attributed to inability to access relevant information and limited interaction between the county government officials and community members on issues related to water supply projects. The study recommended that the local community should be empowered through education so that they fully participate in development projects. There is need to sensitize the beneficiary households through civic education to participate in the project cycle process as a way of checking excesses on the part of the county officials and MCAs. Training (capacity building) on project planning, implementation and monitoring be undertaken within the Kisii County and Gesusu ward to enable them properly participate in the water supply projects and development process.

Review:4 In the year 2017, Ng'ania, M. M. and et. al. in their study "Factors Influencing Effective Community Participation in Water Projects: A Survey of Water Mission Funded Projects in West Pokot County-Kenya" found that a significant number of the respondents 57.8 percent agreed that language barrier during project discussion forums hindered effective participation of community, 63.8 percent agreed that nomadism among the Pokots affected effective community participation, 61.8 percent agreed that education level of the community members determined the level of community participation, 74.4 percent agreed that there was proper and effective community leadership that promoted community participation, 71.0 percent agreed that majority of the active community members were economically challenged and 85.8 percent agreed

that water project had positively transformed health, water and sanitation practices in the region while 81.8 percent agreed that the level of community awareness on the importance of water projects influenced effective community participation. Pearson Correlation coefficient (r-value) is 0.544, which represented a positive but average relationship between socioeconomic factors and effective community participation. So, it was concluded that socio-economic factors had a significant effect on effective community participation in water funded projects in West Pokot.

Review:5 In the year 2005, Teklehaimanot, A. and Beshah, T. in their paper "Social, economic and institutional factors affecting utilization of rainwater harvesting technology, Eastern Tigray, Ethiopia" highlighted that the users on average have large farm size, better adult equivalent of active labour force, educational status, labour used for farm, use of input, resource categories in the better off, TLU, oxen ownership, land tenure in terms of years operated of users of Rain Water Harvest Technology (RWHT) by far exceeds that of the nonusers of RWHT. The attitude scale result indicates that RWHT demand of labour, cost, skill and knowledge found to be highly important items affecting RWHT. The econometric result show that, training, market distance, farm size, location of the farm land, extension contact, income from animal product, cash availability had a positive and significant influence on the utilization of the RWHT. The finding of this study implies that even if they operate under or less similar conditions the social, psychological and economic performance differ from farmer to farmer. This implies that difference in perception, opinion; attitude and decision are among the major finding of this study. Therefore, the study underlined the needs for understanding social, economic, institutional, psychological and physical-technical factors that influences farmers decision-making in relation to utilization of rainwater harvesting technology.

Research Methodology:

In the Year 2021-22, the Researcher namely Priyaranjan Sahoo, et.al has taken this study purposively to integrate various factors with community participation in Aquacultural system. Here the Descriptive Statistics used for analyzing the fundamental database in the said research.

Statistical Tools Used in Research:

Descriptive statistics of participation variables

Table 4.1 and 4.2 reports the average collective response of Water Resource Management beneficiaries about their participation. Descriptive statistics summarizes the data in a meaningful and suitable way using quantitative analysis. Descriptive statistics helps in the interpretation of raw data in a more straight forward and precise manner. The mean value shows in Table, 4.1 and 4.2, mainly represents the mean and standard deviation each variable included in the study. The mean values of the variables show their impact ranking. The value of each variable identifies the influence of that variable on the participation.

Result & Discussion:

Community participation in different phases of Water Resource Management:

Variable one stands for the community participation in various phases of the Water Resource Management project (Table.4.1 and 4.2). Participation has become essential to make Water Resource Management development programme successful. However, variations in community participation are found

in different phases of the Water Resource Management project (from pre- planning, planning, implementation, post-implementation and participation in meetings and decision-making). To involve the community in pre-planning and post implementation phase of Water Resource Management is the biggest challenge for the Planning Implementation Agency (PIA). The participation in pre-planning phase is found to be less as it needs serious efforts of PIA to involve the community (discussed in detail in third chapter). In initial phase of implementation of Water Resource Management project people are not very much interested to participate. As they are in dilemma whether they are going to get any benefit or not. In post implementation phase the number of Water Resource Management meetings are less therefore community participation is affected. The table (4.1) and (4.2) shows that, the mean value of pre-planning and post implementation phase of Water Resource Management project is 4.06 and 4.09 in NGO implemented and GO implemented Water Resource Management, respectively. The mean value of variable post-implementation of NGO and GO implemented Water Resource Managements are 4.46 and 4.47 respectively. Apart from different phases of the Water Resource Management implementation project, two crucial activities in which they participate are Water Resource Management meetings and decision-making process. In NGO implemented Water Resource Management area, the mean = 4.46 is associated with the participation in meetings and mean value = 4.40 with decision-making participation. While in case of GO implemented Water Resource Management, the mean value of participation in meeting is 4.30 and mean value of decision making is 4.20.

Socio-cultural variables

Variable two stands for the perception of NGO and GO implemented Water Resource Management beneficiaries towards the socio-cultural variables that influence their participation (Table 4.1, 4.2). The mean and standard deviations in beneficiaries' responses towards many socio-cultural drivers of participation in the Water Resource Management project are analyzed. In NGO implemented Water Resource Management areas, conflict (variable) among different stakeholders has been perceived as the most significant variable of participation in theWater Resource Management project (mean = 4.29). Awareness of the Water Resource Management programme follows thiswith a mean value of 4.28. In case of GO implemented Water Resource Management both the variables, conflict (mean = 4.28) and awareness (mean value = 4.28) are found to be important determinants of participation.

Institutional variables

The institutional variables influencing the participation in Water Resource Management programme are associated with implementing agency (NGO or Government), property rights (whether private, central, state and common property regime), natural resource treatment works (like soil and water conservation activities, contour bunding, check dams, farm ponds, village pasture land.), level of participation in previous rural development project, the size of Water Resource Management user groups, trust and misconception orno clarity over the meaning of participation among the external agents. The beneficiaries' perceptions about the institutional factors affecting participation inWater Resource Management development programme are presented in Tables 4.1 and 4.2. In NGO made Water Resource Management the variables, type of PIA

(mean = 4.19) and property rights (mean = 4.15) were found to be the significant variables influencing the participation. However, in GO implemented Water Resource Management, the variable, type of PIA (mean = 4.25)was found to be significant followed by variable property rights (mean = 3.83).

Economic variables

The economic benefit is one of the manifested outcomes of any Water Resource Management project that is why it is viewed as an important variable that may have a direct impact on participation. The leading economic variables of community participation in the Water Resource Management project include livelihood sources, equal distribution of Water Resource Management project benefits, poverty and market linkages. It is observed that livelihood is the important economic variable with the mean score of 4.03, in NGO and 4.04 in GO implemented Water Resource Managements.

Physical and technical variables

The result of descriptive statistics depicted that, among all the studied variables the physical and technical variables have a comparatively minor impact on participation. However, it was found that the interaction with the technical officials and other PIA officials is one of the critical variables that affect the participation.This variable secured the highest ranking (mean = 3.93 in NGO and mean = 3.95 in GO implemented Water Resource Management). After the descriptive statistics analysis, the reliability test was carried out to measure the internal consistency of the scale. For this purpose, Cronbach alpha coefficient was used. A value greater than 0.7 for Cronbach alpha (coefficient α) is used to ensure the internal consistency**.** Then the factor analysis is conducted to detect and remove the highly correlated variables from the empirical data and to restrict the variables within a certain number.

Table 4.1: Descriptive statistics of participation variables(NGO implemented Water Resource Management area)

Sl no.	Variables	Mean	Std. Deviation	Number of ouseholds
	V1) Participated in pre-planning phase	.06	.004	67
	V2) Participation in planning phase	.32	761	67
	V3) Participation in implementation phase	.46	674	67
	V4) Participation in post implementationphase	.46	628	67
	V5) Participation in meetings	.46	751	67
	V6) Participation in decision making in Vater Resource Management activities	.40	757	67
	V7) Participation in maintaining the Vater Resource Management structures	.43	749	67
	V8) Conflict among differ stakeholders(between PIA nd beneficiaries r between land holders and landless)	.29	739	67
	V9) Awareness about the Water Resource Management rogramme	.28	735	67
	V10) Promotion of traditional and historicalpractices evised by local communities to onserve the natural resources	.69	.170	67
	V11) Gender of the Water Resource Management eneficiaries	.89	.141	67
	V12) Village politics	.29	356	67
	V13) Power differential among the different ast and class people	.72	.085	67
	V14) Level of social solidarity among the eneficiaries	.67	.205	67
	V15) Heterogeneity in terms of cast and land olding	.64	.272	67
	V16) Local leadership to mobilize the ommunity for participation	.49	.251	67
	V17) Illiteracy of the beneficiaries	.59	.267	67
	V18) Type of planning implementing agency PIA) of Water Resource Management Project	.19	382	67
	V19) Property rights over the Water Resource Management esources	.15	750	67
	V20) Natural resource treatment work under taken uring the implementation of Water Resource Management roject	.90	.209	67
	V21) Water availability	.68	701	67
	V22) Level of people's participation inprevious roject	.82	.142	67
	V23) The size of Water Resource Management user roup	.81	.124	67
	V24) Trust between PIA and communities	.77	.216	67
	V25) Misconception over the meaning of articipation	.93	.183	67
	V26) Sustainability of livelihoods provided by he Water Resource Management	.03	.174	67
	V27) Unequal distribution of the benefits by Vater Resource Management to landless and land wning ouseholds	.87	.037	67
	V28) Poverty of the beneficiaries	.84	.032	67

	V29) Number of family members working	.35	.026	67
	V30) Good market linkages to sell theagricultural roducts	.74	.163	67
	(V31) Land tenure system, whether it istemporary r permanent land Ownership	.83	.024	67
	V32) Interaction with the technical officials nd other PIA officials	.93	.154	67
	V33) The percentage of land under village ommons or open access	.89	.227	67
	V34) The available infrastructure to access the Water Resource Management resources	.72	.101	67
	V35) Environmental condition	.69	.312	67

le 4.2: Descriptive statistics of participation variables(GO implemented Water Resource Management area)

l o.	Variables	Mean	td. Deviation	Number of ouseholds
	V1)Participation in pre-planning phase	.09	993	36
	V2) Participation in planning phase	.28	353	36
	V3) Participation in implementation phase	.49	555	36
	V4) Participation in post implementation phase	.47	686	36
	V5) Participation in meetings	.30	740	36
	V6) Participation in decision making in Water Resource Management ctivities	.20	750	36
	V7) Participation in maintaining the Water Resource Management tructures	.30	687	36
	V8) Conflict among differ stakeholders (between PIA and beneficiaries or between land holders and andless)	.28	753	36
	V9)Awareness about the Water Resource Management programme	.28	754	36
	V10) Promotion of traditional and historical ractices devised by local communities	.50	.201	36
	V11) Gender of the Water Resource Management eneficiaries	.85	.153	36
	V12) Village politics	.74	.134	36
	V13) Power differential among the different cast nd class people	.66	.113	36
	V14) Level of social solidarity among the eneficiaries	.56	.242	36
	V15) Heterogeneity in terms of cast and land olding	.69	.183	36
	V16)Local leadership to mobilize the community or participation	.63	.219	36
	V17) Illiteracy of the beneficiaries	.64	.262	36
	V18) Type of planning implementing agency(PIA) of Water Resource Management roject	.25	365	36
	V19)Property rights over the Water Resource Management resources	.83	.218	36
	(V20) Natural resource treatment work undertaken during he implementation of Water Resource Management roject	.97	.148	36
	V21) Water availability	.87	.150	36

	V22)Level of people's participation in previous roject	.69	.249	36
	V23) The size of Water Resource Management user roup	.77	.134	36
	V24) Trust between PIA and communities	.82	.127	36
	V25) Misconception over the meaning of articipation	.12	797	36
	V26) Sustainability of livelihoods provided by the Vater Resource Management	.04	.127	36
	V27) Unequal distribution of the benefits by Vater Resource Management to landless and land owning ouseholds	.75	.150	36
	V28) Poverty of the beneficiaries	.88	.005	36
	V29) Number of family members working	.76	.009	36
	V30) Good market linkages to sell the agricultural roducts	.88	.014	36
	V31) Land tenure system, whether it is temporary r permanent land Ownership	.91	.213	36
	V32) Interaction with the technical officials and ther PIA officials	.95	.121	36
	V33) The percentage of land under villagecommons or pen access	.81	.053	36
	V34) The available infrastructure to access the Vater Resource Management resources	.74	.086	36
	V35) Environmental condition	.68	.073	36

Reliability test

Reliability test is carried out in research, to understand whether the questions in the questionnaire reliably measure the same latent variable (Rao, 2015). It helps in finding reliable cases for the analysis. In the present study, after collecting the data through a questionnaire survey, a reliability test was carried out on 35 variables using the Cronbach alpha coefficient method (Table, 4.3). The Cronbach alpha is found tobe 0.936 in NGO implemented Water Resource Management area and 0.931 in GO implemented Water Resource Managements reveals the consistency among selected variables (Nunnally, 1978). These results support the validity and reliability of the questionnaire to measure the participation variables in a meaningful way.

Table 4.3: Reliability statistics

ype of PIA	ronbach alpha	of items
GO	936	5
O	931	5

Factor analysis

The purpose of factor analysis is to categorize a large number of variables or factors into small groups. These factor groups of data should be able to represent the relationships among the most considerable number of inter-related variables**.** In general, it is used to reduce a large number of variables into a few categories and group them on the basis of similar characteristics. In the present study, this technique is used to determine the groupings and reduce many variables into a few dimension/factors that affect the participation. Further, these factors are considered for the analysis. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity was carried out (Table 4.4) to check the sample adequacy (167 households of NGO and 236 households of GO made Water Resource Management) for factor analysis. The primary function of KMO test is to verify the sampling adequacy; ideally it should be more than 0.5. The values between 0.7-0.8 come under the

category of acceptable, and values thatare above 0.9 are excellent for the analysis. Bartlett's test is done to check theintensity of relationship among variables.

In view of Panda et al. (2012, p.445), "Bartlett's test of sphericity, tests whether the correlation matrix is an identity matrix, which would indicate that the factor model is inappropriate". The score of KMO and Bartlett's test of sphericity are found to be highly significant. In NGO made Water Resource Management area KMO measure was 0.874 while in GO made Water Resource Management KMO measure was 0.879. The generated scores of KMO (Table 4.4) from both the Water Resource Management areas supported the suitability of the data for the factor analysis. The Bartlett's test of sphericity is also measured and found to be significant (sig.). The value 0.000 in both the Water Resource Management areas demonstrates the importance of thestudy and show the validity and appropriateness of the responses gathered. Both the tests conducted revealed that sample size, questionnaire and data are found to be appropriate for the factor analysis of our study.

Table 4.4: Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test

NGO implemented Water Resource Management	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	874
	Bartlett's Test of Sphericity	
	Approx. Chi-Squared Sig.	249.471 35 .000
GO implemented Water Resource Management	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.879
	Bartlett's Test of Sphericity	
	Approx. Chi-Squared Sig.	318.829 35 .000

4.4.1 Communalities

The Communalities signify the total amount of variance that the original variable shares with all other variables taken for the analysis. The Communalities are considered during the analysis to assess the acceptable levels of explanation of the included variables. Table 4.5 depicts the Communalities. Table 4.5 has two columns first columns is the serial number of variables and questions (V1, V2, V11, V12….), the second one is extraction. The principal component analysis assumes initially that all the variance between all the variables is common. The proportion of the difference(variance) explained by the different variable shows Communalities. The primary function of the Communalities is to represent the quantity of variance explained in every variable with remaining variables that are found after the extraction (Table 4.5, extraction column).

While checking the Communalities or the variance, the thumb rule is that the commonalities of the variables should have a value greater than 0.50. If it is less than 0.50, then it is considered that the variable does not have sufficient explanation and is not being considered for the analysis. In this regard 5 variables have dropped from theanalysis (V7, V12, V21, V29, and V35, Table. 4.5). These variables have communalities lesser then 0.50. In the present study, all the 30 variables of NGO and GO Water Resource Managements have commonalities greater than 0.50. Therefore, all of them have taken for the further analysis. 5 variables have dropped from the analysis as they have Communalities less than 0.50. Table 4.5 shows the output of

variables extracted through principal component analysis.

4.4.2. Initial Eigen values

The output of Table 4.6 shows the Eigen values related to each linear component (factor) before extraction, after extraction and rotation. The Eigen values related to each factor demonstrates the variance described by that specific linear component[2]. The Eigen value is explained through percentage (Table 4.6, column 3, percent of variance). The first few factors are ordered according to their amount of variance and then subsequent factors. The subsequent factors do not explain greater amount of variance.

Table 4.5: Communalities

GO		NGO	
l no.	xtraction	l no.	xtraction
1	670	1	612
2	669	2	657
3	675	3	540
4	516	4	591
5	539	5	471
6	537	6	553
7	340	7	345
8	734	8	685
9	751	9	770
10	705	10	721
11	750	11	739
12	325	12	380
13	768	13	785
14	583	14	639
15	625	15	634
16	531	16	555
17	534	17	429
18	720	18	659
19	794	19	794
20	865	20	850
21	421	21	490
22	609	22	563
23	762	23	742

[2] For the further information, see the official webpage of sage publication at http://www.sagepub.com/field4e/study/smartalex/chapter17.pdf

24	725	24	688
25	678	25	763
26	876	26	825
27	657	27	811
28	578	28	869
29	290	29	847
30	745	30	780
31	823	31	830
32	846	32	789
33	735	33	756
34	678	34	834
35	875	35	280

Notes: Extraction Method: Principal Component Analysis

While running the SPSS for this purpose, it extracts all the factors having Eigen value more than 1. Factor extraction is done by calculating the Eigen values of the R-matrix.R-matrix is a correlation matrix; it shows the correlation coefficient between each pairof variables. To analyse the importance of any component (Eigenvector), the extent ofthe associated Eigen values is looked into. SPSS uses Kaiser's standard of retaining factors, having Eigen values greater than 1 (Field, 2009a). In the present study, all the variables have Eigen values greater than 1. In the NGO implemented Water Resource Management area, the five extracted factors capture 64.274 percent of the variance of the 30 items; it canbe estimated sufficient in terms of explained total variance. However, in case of GO implemented area, it is 63.082 percent of the variance. The five extracted factors are labelled as "Community participation", "Socio-cultural", "Economic", "Institutional" and "Physical-technical", respectively.

4.4.3 Extraction Sums of Squared Loadings

This section deals with the number of factors retained. The number of rows is made according to the number of factors retained. In the present study, the five rows in Table 4.6 correspond to five factors retained. The values are calculated based on theircommon variance. However, the values in this panel of table are comparativelyalways lower than the values of left panel of Table (labelled as Rotation Sums of Squared Loadings) as they are established on the common variance and are lesser than the total variance.

actors Extracted through Principal Component Analysis of sampledhouseholds of both the studied Water Resource Managements

NGO implemented Water Resource Management									
C	nitial Eigen values			Extraction Sums f Squared Loadings			Rotation Sums of Squared Loadings		
	otal	*PV	***CP	otal	*PV	**CV	otal	*PV	**CP
	.781	2.605	32.605	.781	2.605	2.605	.761	9.204	9.204
	.512	1.708	44.313	.512	1.708	4.313	.509	5.029	4.233
	.644	.814	53.127	.644	.814	3.127	.593	1.977	6.210
	.150	.165	60.292	.150	.165	0.292	.037	0.125	6.335
	.264	.213	64.505	.264	.213	4.505	.382	.939	4.274
GO implemented Water Resource Management									
C	nitial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	otal	*PV	***CP	otal	*PV	**CP	otal	*PV	**CP
	.312	1.041	31.041	.312	1.041	1.041	.673	8.911	8.911
	.282	0.940	41.980	.282	0.940	1.980	.607	5.358	4.268
	.582	.605	50.585	.582	.605	0.585	.193	0.643	4.912
	.406	.019	58.605	.406	.019	8.605	.927	.757	4.669
	.367	.555	63.160	.367	.555	3.160	.524	.413	3.082

Notes: *Component, **Percent of variance, ***Cumulative Percent

Rotation Sums of Squared Loadings

The last column of the Table 4.6 labelled as rotation sums of squared loadingsrepresents the Eigen values of the factors after rotation. Rotation enhances the factors structure and helps in equalizing the relative

importance of all the studied factors. In NGO implemented Water Resource Management, it has demonstrated that before rotation the variance of factor 1 was 32.605 percent that is higher than other four factors (11.708 percent, 8.814 percent, 7.165 percent and 4.213 percent). While after extraction the percentageof variance of factor 1 stands at only 19.204 percent of the variance. In GO made Water Resource Management, the variance of factor 1 was 31.041 percent, as higher than other four factors (10.940 percent, 8.605 percent, 8.019 percent and 4.555 percent). After extraction, the variance level of factor 1 is 18.911 percent. However, in NGO implemented Water Resource Management area, together all the components significantly explain the 64.274 percent of the variance. In case of GO implemented Water Resource Management area all the components shows the 63.082 percent of the variance (Table 4.6)

In Table 4.6, this column (Total) shows the Eigen values. It can be observed that the first component always contains most variance and has the highest Eigen value. And the next and successive components account for as lesser variance. Table 4.6 shows that in NGO implemented Water Resource Management area the first component has highest variancethe successive component 9.781, similarly in case of GO made Water Resource Management, the first component variance is 9.312.

Cumulative percent

The cumulative percentage column in Table 4.6 represents the variance accountedfor the first and all subsequent principal components.

Rotated component matrix

The rotated component matrix in factor analysis is called as Rotated factor matrix in factors analysis. Before the rotation, the factor loading the factor matrix is done. The factors loadings in factor matrix cannot be easily interpreted. In factor matrix, one variable may have high loadings on one or more than two other factors. Therefore, rotation factor matrix is done to make the factor loadings interpretable. Table 4.7 and 4.8 shows the factor loadings of the extracted factors after varimax rotation. Varimaxrotational method is used in the present study to get more simple and significant factor solutions. Generally in we find some variables corresponding to a particular factor in the rotated component matrix. Once we obtain these variables, we can assign them to a particular factor and give a suitable name to that factor.

From both the tables (Table 4.7 and 4.8), we find the number of variables that correspond to a particular factor. For example in NGO and GO implemented Water Resource Management areas, Factor 1 comprises of nine variables, conflict, awareness, traditional and historical practices to conserve the natural resources, gender, power differential, social solidarity, heterogeneity, local leadership, illiteracy. In this case, these variables can be clubbed together and termed as socio-cultural factors. Similarly, Factor 2 contains seven variables named, type of PIA, property rights, natural resource treatment work, participation in the previous project, the size of the user group, trust and misconception over meaning of participation. Together all these variables created a factor called, Institutional factor.

In case of Factor 3, the variables are participation in the pre-planning phase of Water Resource Management, planning phase, implementation phase, post-implementation phase, participation in meeting and decision

making constitutes the factor named,community participation. The variables sustainability of livelihood, unequal distribution, and poverty and market linkage suitably fit into the economic factor. However, the variables land tenure system, interaction with PIA officials, land under village commons and accessibility to infrastructure are clubbed together and termedas the physical and technical factor. Based on the results of factor analysis method, it can be concluded that firstly the 30 variables were grouped under the five dimensionsor the factors according to their factor loading value. The result of high loading of thevariable shows the strong influence of factor on the variable. The arranged rotated values of factor loading with values 0.5 have been taken for further analysis.

Table: 4.7: Rotated component matrix (NGO implemented Water Resource Management area)

oaded Items	actor Loadings				
	1	2	3	4	5
1: Community Participation					
V1) Whether participated in pre-planning phase	.795				
V2) Participation in planning phase	.788				
V3) Participation in implementation phase	.754				
V4) Participation in post implementation phase	.642				
V5) Participation in meetings	.577				
V6) Participation in decision making in Water Resource Management Activities	.559				
2: Socio-cultural factors					
V8) Conflict among differ stakeholders (between PIA and eneficiaries or between land holders and landless)		.834			
V9) Awareness about the Water Resource Management rogramme		.832			
V10) Promotion of traditional practices devised by local Communities		.822			
V11) Gender of the Water Resource Management beneficiaries		.797			
V13) Power differential among the different cast and class eople		.778			
V14) Level of social solidarity among the beneficiaries		.773			
V15) Heterogeneity in terms of cast and land holding		.732			
V16) Local leadership to mobilize the community for articipation		.514			
V17) Illiteracy of the beneficiaries		.485			
3: Institutional factors					
V18) Type of planning implementing agency (PIA) of Water Resource Management project			.841		
V19) Property rights over the Water Resource Management esources			.800		
V20) Natural resource treatment work under taken during he implementation of Water Resource Management project			.786		
V22) Level of people's participation in previous project			.741		
V23) The size of Water Resource Management user group			.712		
V24) Trust between PIA and communities			.688		
V25) Misconception over the meaning of Participation			.560		
4: Economic factors					

V26) Sustainability of livelihoods provided by the Water Resource Management				.841	
V27) Unequal distribution of the benefits by Water Resource Management to andless and land owning households				0.904	
V28) Poverty of the beneficiaries				0.831	
V30) Good market linkages to sell the agricultural roducts				0.784	
5: Physical-technical factors					
V31) Land tenure system, whether it is temporary or ermanent land ownership					0.688
V32) Interaction with the technical officials and other PIA fficials					0.659
V33) The percentage of land under village commons or pen access					0.632
V34) The available infrastructure to access the Water Resource Management esources					0.518

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with KaiserNormalization, a.Rotation converged in 5 iterations

Table: 4.8: Rotated component matrix (GO implemented Water Resource Management area)

oaded Items	actor Loadings				
	1	2	3	4	5
1: Community Participation					
V1)Whether participated in pre-planning phase	.761				
V2)Participation in planning phase	.726				
V3) Participation in implementation phase	.723				
V4) Participation in post implementation phase	.691				
V5) Participation in meetings	.602				
V6) Participation in decision making in Water Resource Management ctivities	.544				
2: Socio-cultural factors					
V8) Conflict among differ stakeholders (between PIA nd beneficiaries or between land holders and landless)		.850			
V9) Awareness about the Water Resource Management rogramme		.815			
V10) Promotion of traditional practices devised by ocal communities		.813			
V11) Gender of the Water Resource Management beneficiaries		.798			
V13) Power differential among the different cast and lass people		.784			
V14)Level of social solidarity among the eneficiaries		.775			
V15)Heterogeneity in terms of cast and land holding		.762			
V16) Local leadership to mobilize the community for articipation		.542			
V17) Illiteracy of the beneficiaries		.498			
3: Institutional factors					
V18) Type of planning implementing agency (PIA) ofWater esource Management project			.644		
V19) Property rights over the Water Resource Management esources			0.816		
V20) Natural resource treatment work under taken uring the implementation of Water Resource Management roject			0.815		
V22) Level of people's participation in previous roject			0.749		
V23) The size of Water Resource Management user group			0.749		

V24) Trust between PIA and communities			0.735		
V25) Misconception over the meaning of articipation			0.831		
4: Economic factors					
V26) Sustainability of livelihoods provided by the Vater Resource Management				0.824	
V27) Unequal distribution of the benefits by Vater Resource Management to landless and land owning ouseholds				0.909	
V28) Poverty of the beneficiaries				0.808	
V30) Good market linkages to sell the agricultural roducts				0.794	
5: Physical-technical factors					
V31) Land tenure system, whether it is temporary or ermanent land ownership					0.761
V32) Interaction with the technical officials and other IA officials					0.729
V33) The percentage of land under village commons r open access					0.640
V34) The available infrastructure to access the Vater Resource Management resources					0.614

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with KaiserNormalization, a. Rotation converged in 5 iterations.

Conclusion of the Research

Community participation in Water Resource Management project

Factor loadings in Table 4.7 and 4.8 of both the NGO and GO implemented Water Resource Managements, show that almost all the variables of community participation are on the higher side. Higher factor loading of the variables indicates that these variables influence the participation process significantly. Highest factor loading of variable pre-planning phase, (0.795) in NGO implemented and (0. 761) in GO implemented Water Resource Management shows that, it is most essential variable which the influence the overall participation. Along with the pre- planning phase of Water Resource Management project other phases of Water Resource Management project needs proper attention to involve the community.

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Acknowledgement:

I hereby acknowledge the Research which has been contributed by me is a result of the teaching of my Academic Faculty Dr. Bibhu Santosh Behera, Prof KSS Rakesh and also Hon'ble VC Patrick Kalifungwa. I am grateful and thankful to my parents, my Living Ideal and family members.