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The impact of funding agency on user participation: A case study on Participatory Irrigation Management

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Abstract

The Participatory Irrigation Management bodies in India vary considerably in their nature and funding sources with both the Government and donor agencies like World Bank assisting the practice financially. Thus it becomes interesting to trace the variability of the differently funded bodies in terms of participation. This paper throws light on the participatory irrigation management in the drought prone district of Purulia in the Indian state of West Bengal. It considers the government funded Users Groups and the World Bank funded Water Users Associations from the district and traces their variability in participation. The study employs the Participation Index to understand the participation level among the stakeholders and finds that World Bank funded groups have higher participation rates than the government funded ones. This variability has been confirmed for statistical significance using an Independent t test. The Factor Analysis was conducted to find that the responsibility sharing among the members is the most significant determinant of participation. Other significant factors include group size, practice of occupations other than agriculture, the participation type, role of the funding agency and financial management by the members. The study significantly contributes to understanding the community resource management and the nature of donor funded participatory bodies. Thus its applicability can be tested across similar geo-physical set ups across the globe.

Keywords: Factors of Participation, Participation Index, Participatory Irrigation Management, Stakeholders, World Bank.

Introduction

Participatory way of resource management has been popular across the globe. Across a number of sectors, communities have either voluntarily participated or have been persuaded to participate to provide for a more decentralised and community centered resource management. Irrigation management has been one such sector that has been managed by communities for almost over half a century now. The shift in the role of the communities and farmers from 'users' to 'managers' have been propelled by the failure of the state managed irrigation systems.[32] The failures have ranged from poor water supply to tail end deprivations to low recovery of project costs, poor maintenance of irrigation structures, skewed water rights and over consumption among others.[1, 7, 11, 20] This called for greater involvement of the farmers themselves in managing the irrigation system. Thus 1970s onwards there was a general trend to organise the communities at grassroot level of irrigation management. The PIM led to evolution of participatory bodies like Water Users associations, User Groups, Water Users Community, Farmers Clubs and many others who are responsible for the proper management and functioning of the irrigation structures.

India being predominantly an agrarian economy with the largest population of the world has focused a lot on irrigation and has emerged as the world's most intensively irrigated country.[4,16, 19] The irrigated lands produce about 70% of India's agricultural

output. Interestingly the variability of monsoon is higher in the drier regions and this makes irrigation crucial for these regions. Following the global trend of involving the stakeholders themselves in resource management, India too introduced community participation in water management as early as in 1952 under her Community Development Programme. In 1985, the Ministry of Water Resources introduced the concept of Participatory Irrigation Management or PIM. Since then the state governments have been working towards the greater involvement of farmers in irrigation management.

With the rising popularity of the practice, PIM across the world saw inclusion of external actors like the World Bank and Asian Development Bank in irrigation management. These actors emerged as the funding agencies promoting greater community participation in return for the financial aid they provide. Bernardino (2012) finds that the major share of World Bank's loans in the 1960s and 70s was provided for installation of large scale irrigation infrastructures. This led to the beginning of the multi actor approach in the management of irrigation with communities and stakeholders at the core of the practice. The PIM in India has been no different. The PIM here has been taken up under various projects funded both the central and state governments as well as by the donor agencies like World Bank. The bodies formed under the various funding mechanisms vary in their operation and organisation.

Several studies have revealed that participation as a process gets affected by several factors.[2, 3] These factors may be broadly grouped as internal and external factors. The internal factors relate to the socio-psychological traits of the participants while external ones relate to the bureaucratic set up, policies and funding status that are mainly related to the implementing and funding agencies.[1, 8, 29, 35] Among the various factors, most literatures have focused on the impact of the donor agencies like World Bank in the PIM practice and have attached great importance to it.[20, 35] The participatory groups have often been seen failing once the funds are withdrawn by the donor agencies and the bodies are left to their own survival.[20, 23]

A huge array of literatures has focused on the working and nature of the PIM bodies. These variously focused on the institutional set up and the outcome study from such a practice.[27, 11] Studies have also compared and contrasted the participatory and non participatory farmer households to understand whether PIM was successful in improving the crop and water related situations.[26] The 'before-after' analysis has also been taken up to understand the impact of this change in approach in irrigation management.[13, 33] But very few studies have focused on understanding how the differently funded participatory bodies vary in nature and participation. To bridge this gap, this study tries to understand whether there exists any difference in the extent and nature of participation of the differently funded PIM bodies. For this, the study considers two different sets of PIM bodies which have variable funding sources, a) The nationally funded User groups (UGs) b) The World Bank funded Water User Associations (WUAs).

To critically analyse the extent of participation and its variation between the two kinds of groups, the study follows a systematic pattern from- a) studying the extent of participation among the groups b) then bringing out the major factors affecting the participation process and c) statistically signifying the variability of participation between the donor funded and nationally funded bodies. The study has been split into three more sections where section 2 deals with the study area, methods and data in detail; section 3 analyses the results and section 4 brings out the discussion and conclusion.

Materials and Methods

Study Area: The study focuses on the extent of PIM in a drought prone district of Purulia from the state of West Bengal, India (Map 1). The district receives the lowest rainfall in the state ranging between 1100mm to 1500mm annually. It has one of the highest evapotranspiration rates. This makes the study area drought prone and irrigation indispensible for crop production. The district has a high preponderance of small and marginal farmers who form 73 per cent of the total agricultural households (District Profile Purulia, 2023) and mainly practice subsistence agriculture. Traditionally the area mainly is a rice growing mono-cropped

region where major portion of the agricultural land is rain fed. Wherever there is irrigation, there is predominance of surface irrigation. In the recent years, with improved irrigation, horticultural crops are grown in the pre and post paddy seasons. PIM has been practiced in the district for around a decade under two programmes – a) Accelerated Development of Minor Irrigation Project or ADMIP funded by the World Bank and b) Integrated Watershed Management Programme or IWMP funded jointly by the central and the state governments. WUAs have been formed under the ADMIP while UGs have been formed under IWMP.

Data: The study is based on primary data obtained from the field survey conducted between 2018 and 2020. The study was taken up at the blocks level (administrative units above village level) from which 19 participatory bodies from five blocks have been chosen for the study (Map 1) using purposive sampling technique (the presence or absence of PIM bodies in the block has been the major determinant for sampling). From the 19 bodies, there are eight UGs and eleven WUAs. From each participatory body, 10 members have been chosen as respondents. Thus a total of 190 respondents have been interviewed for the study. Focused group discussion and direct interviews have been the methods of data collection.

Methods

Measuring Participation: For measuring the participation level, the Participation Index has been calculated.[12] This index has been calculated by considering the variables implying the institutional set up, the awareness among the participants, the role of the implementing and funding agencies and the financial overview of the process. To evaluate the aforementioned criterion, four Indicators have been considered to measure the level of participation among the users that include – a) Responsibility sharing among the members- related to the institutional organisation and cooperation among the users b) Role played by the government/ financial agency- related to the satisfaction with the project level and field level officials among the users c) Mobilization of the participants for participation- related to the awareness generation and capacity building among the users/ participants d) Financial management by the members- relates to the fund regularity and management. Each Indicator has a number of variables under it to measure the degree of participation that totals to 17 variables (Table 1).The variables are dichotomous in nature that is they take only two answers 1 for every positive response by the respondent and 0 for every negative response. The Participation index is a summation of the positive responses for each Indicator. The Index is a proportion of the actual positive responses to the maximum possible positive responses under each Indicator.

Thus the Participation Index (PI) is given by,

PI = (Mean participation score/ Maximum participation score) 100*

Where,

Mean participation score = Σ Pi /N & Pi = Σ PPj

PPj = Total score of farmer's participation

i = 1,2,……,N & j= 1,2,3,….,K

N= Total number of respondents

K = Total number of statements

The PI has been calculated at the group level and the Block level. While at the group level it indicates variation in participation at the organisational level, at the Block level, it is an indicator of the spatial variability of the participation.

Significance of the Indicators: To understand the statistical significance of the indicators in explaining the PI, a Multiple Regression Analysis was conducted using the SPSS software. Here the PI has been the dependent variable while the four indicators explained in the preceding paragraph are the dependent variables.

Factors affecting Participation: A factor analysis using Principal Component Analysis has been conducted to study the impact of the nine factors on the participation of the stakeholders. In the present study, a total of nine internal and external factors associated with the participation process have been considered which have been variously cited across the available literatures.[18,31] While the

external factors include the ones which relate to actors other than the participants, the internal factors relate to the socio-psychological traits of the participants The external factors include 1) Funding Agency's role 2)Mobilization for participation 3)Funds available with the participants 4) Type of participation (WUA or UG). The internal factors include: 1) Group-type (participatory groups are tribal or non tribal) 2) Average educational level of the participants (high school and above high school) 3) Group size 4) Whether participants practice any occupation other than agriculture 5) Responsibility sharing among participants. The correlation among the factors has been calculated using the Pearson's Correlation Coefficient.

Variability of Participation between the groups: The Independent t test has been deployed to understand whether there is a variation if the extent of participation between the UGs and WUAs. Two kinds of variables are utilized for this test- independent variables and a dependent variable that is conditioned by the independent variables. The independent variables for the measurement have been same as used in the correlation and factor analysis while the dependent variable is the Participation index obtained as a measure for participation.

Result

Extent of Participation and its spatial variation

Indicator Wise Performance of groups: When considered at the indicator level, the overall performance of both the groups has been excellent in terms of responsibility sharing where the UGs have secured a higher score than the WUAs (Table 2). While the average score has been least in terms of the Funding Status, individual performance of the groups in this section has been starkly different. While WUAs have a commendable Funding status, the UGs have recorded an extremely poor score.

Participation at group Level: The participation level of the respondents across 19 participatory groups has been obtained using the Participation index. Broadly, the World Bank funded WUAs have outperformed the nationally funded UGs in terms of participation (Fig 3). Shyambandh WUA has the highest participation with an OI value of 91.74 percent while Ma Shitala UG has the lowest participation with an OI score of only 54.42 per cent. Among the UGs, Telihid has the highest participation (OI 73.02 per cent). Lapahari Chaube Bandh WUA has the lowest participation among the WUAs which is only 77.23 per cent. Interestingly, the WUA with lowest participation score has a value higher than that of the UG with the highest participation score. This disparity is a clear indicator of the difference in the participation level of the WUAs and the UGs.

Significance of Indicators: A Multiple Regression Analysis was conducted to test whether the indicators explaining participation are statistically significant. Table 3 indicates that all the four indicators are significant in explaining the level of participation with the p value significant at <0.05. With a Beta value of 0.708, the financial management indicator explains most of the PI while Responsibility Sharing Among the members explains the least with a value of 0.115.

Spatial Variation of Participation: To understand the spatial variance of participation, the Participation index has been considered at the Block level. The 19 groups have been chosen from across five blocks and the mean Participation index score for each block has been studied. Balarampur block, which houses World Bank funded participatory bodies, has attained the maximum score. It is followed by Raghunathpur I block and Saturi block which again have World Bank funded groups. The lowest score has been recorded by Purulia I block, which has government funded participatory bodies. The Arsha block with government funded participatory groups, has the second lowest score. Thus it is clear that even at the block level, the World Bank funded groups have better participatory scores than the government funded ones (Map 2).

Factors affecting Participation: The previous section indicated a disparity in the participation level of the groups. This was both at the inter group and intra group level. These disparities are a function of various factors which significantly affect the way people participate in managing their resources. Thus analysing the factors and their correlation becomes important to understand

such disparities in participation (Table 4). Factor Analysis using Principal Component Analysis was conducted to identify the major factors affecting participation .Group size, Any other Occupation, Role of funding agency / government, Financial management and Participation Type form the first component and explain about 48% of the variance in participation. Group Type, Average education Level and Mobilisation for Participation form the second component and explain about 16% of the variance in participation. Responsibility Sharing among the members alone forms the third component and explains 12% of the variance in participation.

Correlation among the variables: The study considers the correlation among the nine variables affecting participation (Table 5). The significance of relationship has been considered at a confidence interval of 95 per cent and above. The strongest positive relationship is seen between the financial management and type of participation. Thus WUAs have greater financial management than UGs. The strongest negative correlation is between the average educational level and group type. Thus tribal groups tend to less educated. The weakest link is between the participation type and any other occupation practiced. The Role of funding agency has a very strong relation with the type of participation. This brings out the reason why donor funded bodies or WUAs have performed better. Again mobilisation for participation doesn't affect the responsibility sharing among people. Thus even without institutional mobilisation, the participants shoulder the responsibility of managing their own resources. Considering the type of participation variable viz. whether the body is a WUA or UG, we find the internal factors of average educational level and group size to be significant and among the external ones all the three factors, role of government, mobilisation for participation and availability of funds to have significant correlation.

Variability of Participation: The independent sample test result indicates that the participation level for the UGs is significantly lower than that of the WUAs at 1% significance level (Table 6). A t-value of more than10 indicates that the two groups are 10 times as significantly different from each other. A negative mean difference indicates that the mean Participation of the WUAs is higher than the UGs. Thus the donor funded groups or WUAs have a better participation score than the nationally funded group.

Discussion

Participatory way of irrigation management has received lot of importance globally in the recent years. This case study tries to bring out the extent of participation and factors that affect the participation by the water users. It also takes a note of the variability in participation between two different PIM bodies working under the same geophysical set up but with different financial and institutional set up. Doubts about the success rate of the donor funded PIM bodies have surfaced time and again.[17, 20, 30] Yami (2013) for instance found that the inability of the donor funded project staffs to understand the crux of participation and institutional development has lowered the performance of the WUAs. Again it was found that often the transfer of the irrigation schemes was made before properly empowering the communities to manage the same (ibid). But in the case study area, World Bank funded WUAs have outperformed the nationally funded UGs. This has been because of the proper amalgamation of the community's knowledge and managerial capabilities with that of the funding/implementing agencies' guidelines on management of the structures and responsibility sharing. The proper awareness generation and instilling a sense of ownership among the users could be achieved by the project officials. This made more people to participate and manage their resources. Again reason for the success has been the taking over of the project by the State Government of west Bengal once the funds were withdrawn by the World Bank in 2020. Thus a perfect collaboration could be attained between the funding sources that saved the life of PIM in the study area. For the UGs wholly maintained out of Government funds from the very beginning, the initiation itself has been faced by problems of funds and loose organisation of the users. Thus though there is a significant amount of participation among the UG members, yet they lag a little behind the WUAs Thus on the whole, the results lie in contradiction with the previous works hinting at the short lived nature of the donor funded bodies.

Lei et al. (2013) studied the impact of various factors on the working of PIM. They found the group characterstics and external environment to have a significant negative impact on PIM, while governance had a significant positive impact. Ahmad et al.2020 have focused on the importance of the institutional factors in the success of PIM projects and found that factors like 'compliance, adaptiveness, clarity of objectives and scale' had significant impact. Maleza and Nishimura, 2007 have regarded the inability to mobilise farmers, lack of funds and bias against the institutional development have been the major factors hindering the PIM process. The significance of the factors like education level and training access to the participants has also been indicated in the study by Daru et al.2023. Thus most of the literatures have considered the characterstics of the participants, the training received by them and the funding status as important determinants of participation.

The study tried to include the above mentioned factors and figure the contribution of each in explaining the participation level. The Factor analysis conducted for the study reveals that internal factors are more crucial in predicting the nature and extent of participation. The Component 1 that explains about 48% of the variance in participation is comprises of two internal (Group size and any other occupation) and three external factors (Role of funding agency/ government, financial management and type of participation). Among the five factors, the external factor 'Type of Participation' secured the highest value. Thus most of the variance in the participation could well be explained by the external factors especially the one related to whether a group is a WUA or an UG. The factor implies the importance of the funding type in explaining participation as the basis of the grouping has been the source of fund. Again, Responsibility sharing among the members alone forms component 3 and explains about 11.7% of the variance in participation. This highlights the zeal of the participants to organise themselves into groups to manage irrigation.

The correlation among the factors shows an interesting trend. Surprisingly, mobilisation for participation in terms of training and awareness generation doesn't affect the tendency to share responsibility by the members. This indicates that the rate of participation is guided by the personal zeal of the participants that goes beyond persuasion and training. It also reveals why donor funded WUAs have outperformed the UGs. Among the factors, group type (indicating whether a group is tribal or non tribal), has a moderately positive significant relation with mobilisation for participation and financial management. This indicates that tribal groups have greater cooperation and better management of their finances than the non tribal groups. The average educational level of the groups has a significant negative correlation with mobilisation for participation, financial management and type of participation. Thus lesser education tends to promote greater cooperation and financial management as per this case study. Group size shares significant positive correlation with role of funding agency, mobilisation for participation, financial management and type of participation, the strongest one being with the participation type. Thus WUAs tend to have larger sizes and this size affects participation significantly. Members' alternate occupation has moderately negative but significant relation with role of funding agency, financial management and type of participation. Thus members who are engaged in alternative occupations other than farming are not quite into participation for irrigation management. Responsibility sharing factor doesn't share any significant relation with any other factor. Role of funding agency shares a very strong significant relationship with the type of participation. Thus WUAs funded by World Bank have performed better. Mobilisation for participation shares a strong positive relationship with financial management and a moderately positive relationship with participation type. Thus groups with better mobilisation have greater participation. Financial management shares a very strong relationship with the participation type. This shows that WUAs have better financial management.

The study finally hints at the differences between the two differently funded participatory bodies in terms of participation. It shows that the nationally funded groups are significantly weaker in terms of participation scores than the donor funded ones.

The study brings out the importance of participation in bringing together the communities faced by scarcity of resources. Thus given the dearth of irrigation water in the study area and the willingness of the communities to work together as a group, it can be safely concluded that the 'tragedy of commons' will apply in areas of abundance while scarcity will wield communities to work towards the common welfare.[25,33]

Conclusion

The results thus bring out the status of PIM in the study area across two differently funded groups. The study upholds that if propelled in the correct way, donor funded PIM bodies can continue smoothly without further external aid after the initial "take off". It also highlights the importance of the actors at the apex of the hierarchy in institution development and capacity building of the participants to achieve greater participation levels. It is an example of perfect collaboration between the external and internal donor agencies where the takeover by the domestic government once the World Bank withdrew its funds, infused a new life into the WUAs. For the domestically funded UGs the participation has been quite satisfactory except that they lag behind the WUAs. The case study provides a perfect example of how the external donors can prepare the pitch for the participation to begin with and which later may extend with internal financial support and in the capacity of the participants themselves. Thus apart from highlighting the extent and factors of participation, this study is a take on better community empowerment and willingness of "resource starved" communities to work towards the common good. The results can be achieved across regions from around the globe with proper funding, mobilisation and zeal for participation. Thus PIM should emerge as a solution towards the problem of growing water disparity in the face of global water crisis. What calls for the success of PIM is little efforts from all the actors- government, NGOs, Donors like World Bank and the stakeholders themselves to work towards a new era of lesser water disputes and greater water cooperation.

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List of Tables

Table 1: Indicators and Variables under them for Measuring Participation

Indicators	**Variables under each Indicator***
Responsibility Sharing Among Members	i) Willingness to join groups ii) Sharing of water among members iii) Taking care of the irrigation structures iv) Follow group command v) Crop selection as per group consensus vi) Conflict resolution is smooth
Role Of The Funding Agency	i) Regular monitoring of programme by officials ii) Any help from local government iii) Needs taken care by the government/ donor iv) Stakeholders satisfied with the role of Project Implementing Agencies/ officials
Mobilisation Of Participants For Participation	i) Awareness about the aims, objectives and tiers of the programme ii) Training for capacity building iii) Sensitization for better participation iv) Whether farmers decide and plan v) Farmers solve the problems internally
Funding Status	i) Regularity of funds ii) Funds are received as per aid
***Each Variable has been assigned equal weightage**	

Table 2: Indicator wise performance of Groups

Indicators	**UG**	**WUA**	**Average**
Responsibility sharing	94.52	93.52	94.02
Role of Government	54.56	72.56	63.56
Mobilisation for Participation	80.23	87.25	83.74
Funding Status	18.12	91.27	54.69

Table 3: Multiple Regression Analysis validating the significance of the indicators in explaining participation

Model		B	Std. Error	Beta	t	Sig*
1	(Constant)	-20.892	9.217		-2.267	.040
	Financial Management	.234	.016	.708	14.259	.000

	Responsibility Sharing	.438	.099	.115	4.436	.001
	Role Of Government	.281	.040	.281	7.011	.000
	Mobilisation For Participation	.272	.061	.141	4.483	.001
a. Dependent Variable: **Participation Index** R=0.996 R2= 0.992						

*** Significant at p<0.05** Source: Compiled by the authors using SPSS

Table 4: Rotated Component Matrix

	Component		
	1	2	3
Variance (%)	47.746	15.927	11.706
Group-Type	-.002	.861	-.185
Avg Educational level	-.205	-.838	.100
Group size	.734	.284	-.168
Any other occupation	-.772	.106	-.008
Responsibility Sharing	-.138	-.053	.943
Role Of Govt/ Funding Agency	.738	.169	-.137
Mobilisation For Participation	.338	.738	.267
Financial Management	.691	.598	.151
Participation Type	.882	.358	-.022
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			

Source: Compiled by the authors using SPSS

Table 5: Correlation among the Variables affecting Participation

	1	2	3	4	5	6	7	8	9
Group-Type	1.00	-.675 (<.001)**	.251 (.150)	.031 (.449)	-.123 (.309)	.272 (.130)	.445 (.028)**	.424 (.035)**	.321 (.090)
Average Educational Level		1.00	-.267 (.134)	.215 (.188)	.146 (.276)	-.329 (.085)	-.563 (.006)**	-.604 (.003)**	-.454 (.026)**
Group Size			1.00	-.308 (.100)	-.251 (.149)	.525 (.011)**	.453 (.026)**	.642 (.002)**	.759 (.000)**
Any Other Occupation				1.00	.120 (.313)	-.427 (.034)**	-.151 (.269)	-.474 (.020)**	-.567 (.006)**
Responsibility Sharing					1.00	-.121 (.311)	.040 (.435)	-.047 (.424)	-.150 (.270)
Role Of Funding Agency						1.00	.228 (.173)	.462 (.023)**	.710 (.000)**
Mobilisation For Participation							1.00	.732 (.000)**	.530 (.010)**
Financial Management								1.00	.810 (.000)*
Type Of Participation									1.00

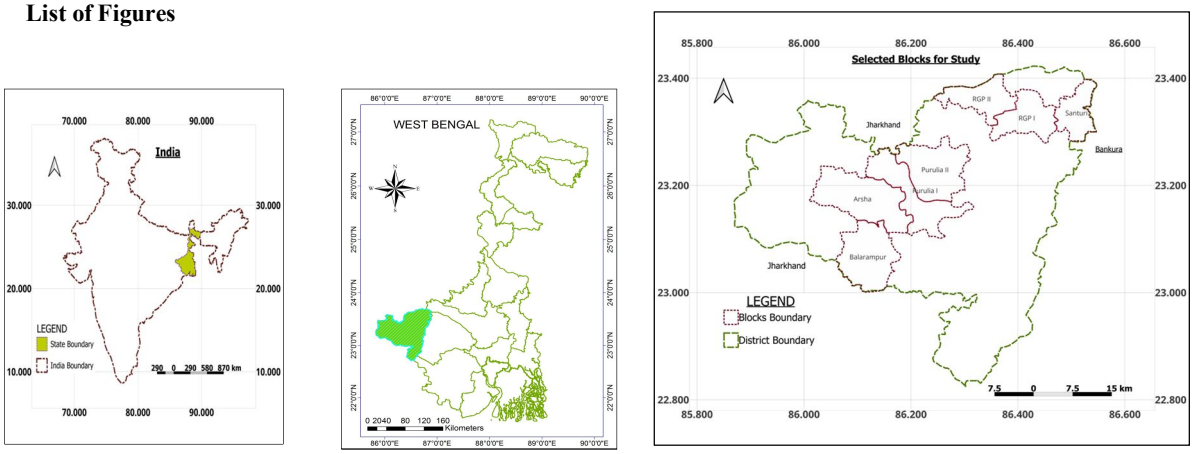
Numbers in ( ) indicate the p-values; p<0.05**, p<0.01* Source: Compiled by the authors using SPSS

Table 6: Variability of participation among the groups using Independent T-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Participation Index	Equal variances assumed	.056	.816	-10.452	17	<.001	-23.65026	2.26283	-28.42442	-18.87609
	Equal variances not assumed			-10.080	11.356	<.001	-23.65026	2.34617	-28.79448	-18.50603

Source: Prepared by the authors from field survey data using SPSS

List of Figures



Map 1: Hierarchical Location of the Study Area

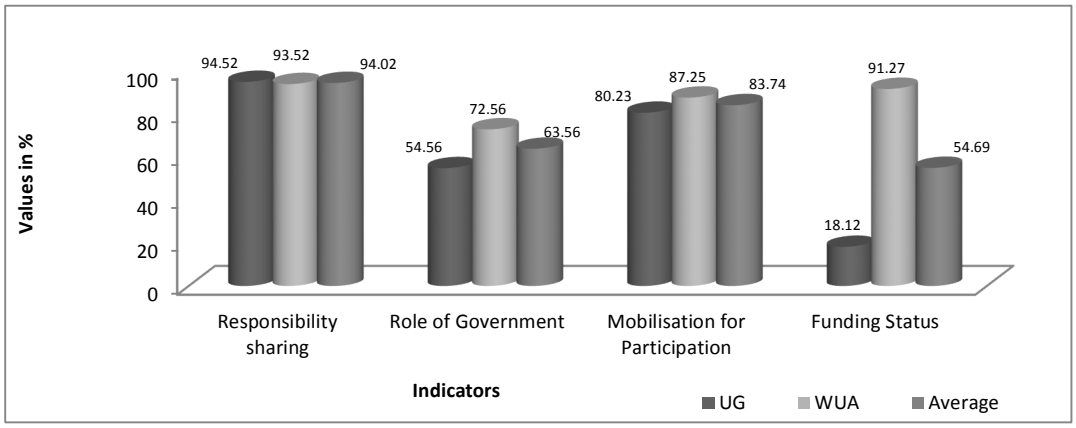


Fig 1: Indicator wise Performance of groups where the value of the indicators for measuring PI have been taken up for the two groups and the mean value for each has been shown. The values are indicated as proportions.

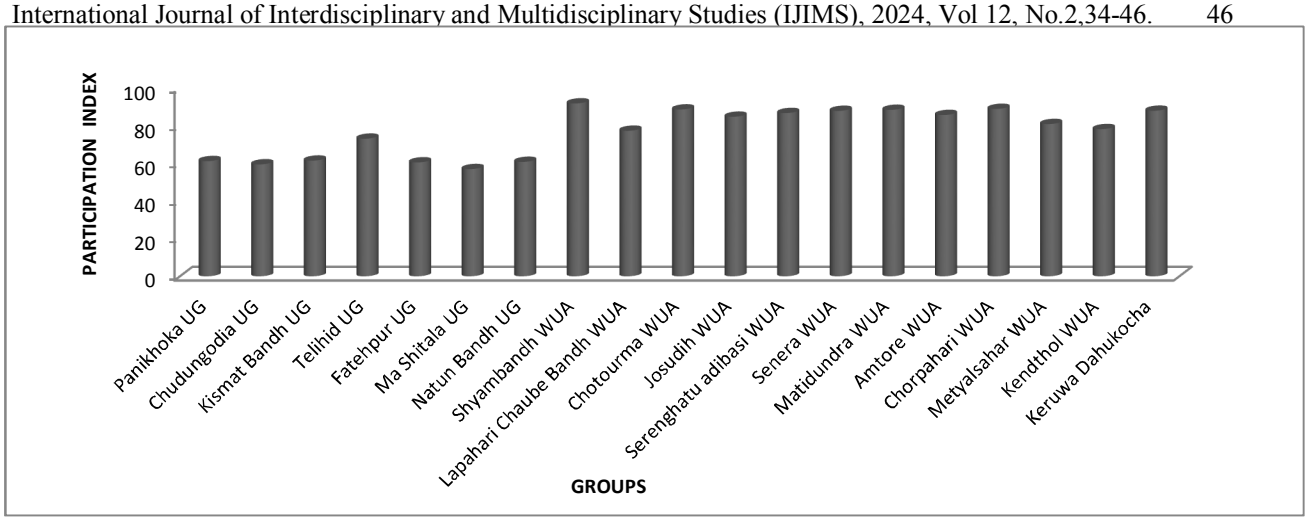
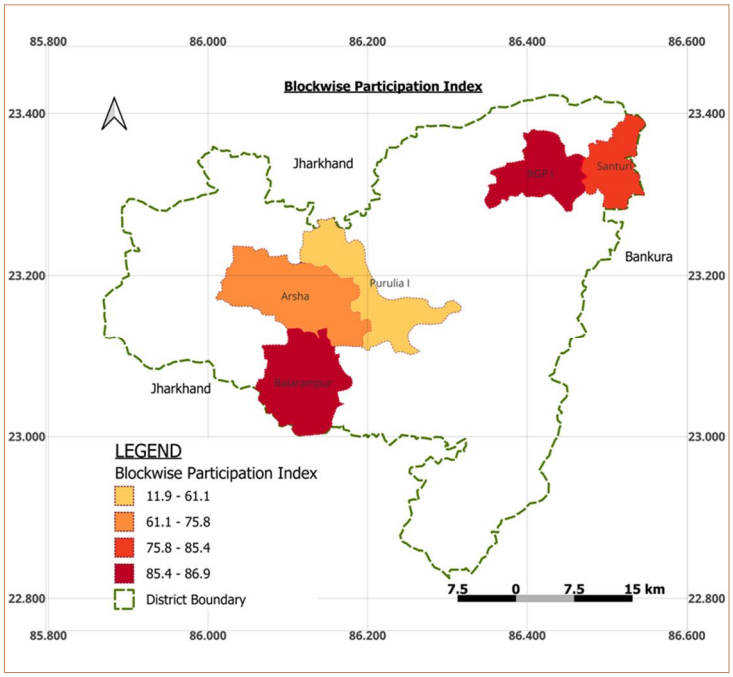


Fig 2: Group Wise Participation Index indicating the variation in Participation across the PIM groups



Map 2: The Spatial Variability of Participation