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Assessing training need through participatory rural appraisal and situational analysis with TWOS matrix

Sandeep Deshmukh and Monica Singh

Abstract
The more significant principles of Participatory Rural Appraisal (PRA) concern the behavior and attitudes of outsider facilitators, including not rushing, "handing over the stick," and being self-critically aware. The power and popularity of PRA are partly explained by the unexpected analytical abilities of local people when catalyzed by relaxed rapport, and expressed through sequences of participatory and especially visual methods. The present study was conducted in Raipatan village of Ratnagiri district in Maharashtra. The overall training need of farmers was found to high in agricultural and allied sciences. Most important thematic areas for capacity building of farmers were horticulture, agricultural engineering, animal science and plant protection. Majority of farmers were expected medium duration (3 to 5 days) of on-campus training. They required both knowledge and skill-oriented trainings for their capacity building. The capacity building agencies should organize medium duration training programmes not only for knowledge management of farmers but also for skill development in agriculture.

Keywords: PRA, training need, situation analysis, capacity building

1. Introduction
Participation is now widely advocated and documented as philosophy and mode in development, but the gap remains wide between fashionable rhetoric and field reality. One practical set of approaches which has coalesced, evolved, and spread in the early 1990s bears the label Participatory Rural Appraisal (PRA). This has been described as a growing family of approaches and methods to enable local (rural or urban) people to express, enhance, share, and analyze their knowledge of life and conditions, to plan and to act (Chambers, 1980; Carruthers and Chambers, 1981; Longhurst, 1981) [2]. PRA flows from and shares much with other approaches and traditions. These commonalities and debts include the idea that local people can and should conduct their own appraisal and analysis, found in activist participatory research (Freire, 1968) [3]; many forms of diagramming, derived from agroecosystem analysis (Gypmantasiri *et al*. 1980) [5]; the importance of rapport and of the emit-etic distinction, from applied social anthropology; and an understanding of the complexity, diversity and riskiness of farming systems and poor people's livelihoods, from farming systems research (Gilbert, Norman and Winch, 1980; Shaner, Philipp and Schmehl, 1982) [4, 7]. PRA draws on these traditions and shares much with them.
The more developed and tested methods of PRA include participatory mapping and modeling, transect walks, matrix scoring, well-being grouping and ranking, seasonal calendars, institutional diagramming, trend and change analysis, and analytical diagramming, all undertaken by local people. Among many applications, PRA has been used in natural resources management (soil and water conservation, forestry, fisheries, wildlife, village planning,), agriculture, health, nutrition, food security and programs for the poor. The more significant principles of Participatory Rural Appraisal (PRA) concern the behavior and attitudes of outsider facilitators, including not rushing, "handing over the stick," and being self-critically aware. The power and popularity of PRA are partly explained by the unexpected analytical abilities of local people when catalyzed by relaxed rapport, and expressed through sequences of participatory and especially visual methods. Evidence to date shows high validity and reliability of information shared by local people through PRA compared with data from more traditional methods. Explanations include reversals and shifts of emphasis: from etic to emit, closed to open, individual to group, verbal to visual, and measuring to comparing; and from extracting information to empowering local analysts.

In this contest, the present investigation was conducted in Ratnagiri district. Total geographical area of 8.18 lakh ha and major soil type of the district is lateritic and alluvial.
Average annual rainfall of 3500 to 4000 mm. The Ratnagiri is dominated by small landholders and about 45.00 per cent of farm families are possessing 1 to 2 ha of operational land. The KVK, Ratnagiri is fully functioned for technology assessment and refinement, to demonstrate the flagship technologies in agricultural and allied sciences, and to conduct training programmes for entrepreneurship development. It is, therefore, to assess the training need of farmers through PRA is important for designing need-based training programmes. Keeping this in view, present study was conducted with following specific objectives; to describes demographic, socio-economic, and agro-climatic condition of village; to assess the training need of farmers on different thematic areas of agricultural and allied sciences; to know the preferences of farmers about different aspects of training programs and to make situation analysis of village and design appropriate strategies for agricultural development

2. Research Methodology

The Krishi Vigyan Kendra (KVK), Lanja has adopted village-Raipatan Tal: Rajapur in Ratnagiri district. The village is situated 45 KM away from KVK, Lanja. To execute overall agricultural development programmes in the villages, participatory rural appraisal (PRA) was conducted with team of agricultural experts and extension personnel of line departments along with villagers. PRA is a growing tools and methods emphasizing local people's knowledge and enable them to make their own appraisal, analysis, and plans. The purpose of PRA is to enable development stakeholders to work in tandem with active participation of local people. The descriptive and diagnostic research design was formulated to conduct the investigation. The participatory appraisal methods viz., secondary sources, semi-structured interview (SSI), key informants (KIs), time line, resource mapping, transect-walk, wealth analysis, seasonal calendar and activity profile, direct matrix ranking and focus group discussion (FDGs) for TWOS matrix analysis was used.

Results and Discussion

In this part, detailed information was emerged out from PRA is presented as under.

Detailed background of Villages

The detailed background information of adopted village was obtained from secondary sources such as *Gram Panchayat* office, *Talathi* office and from the office of village level watershed committee. The information about population, number of households, geographical area, irrigation facility and livestock are presented as under.

Table 1: Detailed background of PRA Village

Name of Village	Raipatan
Taluka	Rajapur
District	Ratnagiri
Distance from KVK	45 KM
Total population	2569
No. of Households	625
Geographical Area	1333 ha
Cultivable Area	1109 ha
River	01
Well	20
Tube Well	22
Electric Motor Pump	165
No. of Cow	205
No. of Buffalo	126
No. of Goat	126
No. of SHGs	12

Time Line

Time line provides overview of historical milestone has been happened in the village or community and describes its relative important in present context, how things have changed, particularly focusing on relationships and trends. We had started our PAR exercise in the villages with timeline tool. The interesting results of selected villages are arranged in chronological order and presented below.

Table 2: Timeline of major milestone happened in the village-Raipatan

Particulars	Year of Timeline
Establishment of village	1880
Primary school	1904
Temple	1904
Bicycle	1957
Post office	1955
Ration shop	1958
Radio	1971
Road electricity	1979
Primary cooperative society	1979
Motor cycle	1988
First ST	1981
First Tractor	1987
First TV	1990
Spray pump	1996
Introduction of Hybrid rice	2001
First Doctor	1999
Telephone	1999
First Four-Wheeler	1999
Computer	2000
First SHG	2001
Power tiller	2004
Mobile phone	2004
First Farmers Club	2010
Internet connectivity	2010

Resource Mapping

It indicates kind of natural, agricultural, and social resources are available with peoples in the village. During the PRA exercise, facilitators guided the villagers to draw the different maps such as natural resource map, agricultural map, social map, and mobility map to understand the resource base situation of village.

Village Transect: Transect is systematic walk with key informants through the area of interest, observing, asking, listening, looking, and seeking problems and solution. The transect helps to study the soil type, natural resource base, topography, water resources, cropping pattern, flora and fauna while walking with KIs in deciding direction. In present study, team of KVK scientist took round along with villagers and KIs to conduct transect in selected two villages and data emerged out is presented in Table 3.

Table 3: Transect walk of selected villages

Particulars	Upland	Midland	Lowland
Soil type	Varkas-Lateritic	*Varkas*-Lateritic	Plain land-Lateritic
Water resources	Nil	Nala, River, Small water streams	Nala, River
Crops	Nil	Rice	Rice
		Nagali	Horse gram,
		Horse gram	*Moong*
			Cow pea
Fruit Crops	Nil	Mango	Banana
		Cashew	
		Coconut	
Vegetables	Nil	Math	Mula
		Mula	Math
			Brinjal, Chilli
Livestock's	Nil	Cow, buffalo, bullock, Goat, poultry birds	Cow, buffalo, bullock, poultry birds
Forest crop	Anjan, Teak, Shivan, Ain, Khair	Teak, Bamboo	Nil
Wild animals	Pig, Monkey, Panther, Rabit, Salinder, Fox	Pig, Monkey,	Pig, Monkey
Problems	Nil	• Water scarcity, • Crop damage due to wild animals, • Declined mango productivity	• Water scarcity, • Crop damage due to wild animals, • Declined rice productivity
Opportunities	Forest tree cultivation	• Construction of *Konkan Vijay Bandhara* • Crop diversification • Rejuvenation of old mango orchard • Collective action against wild animal during critical stage of crop	• Construction of Konkan Vijay Bandhara • Crop diversification • Varietal replacement of rice • Collective action against wild animal during critical stage of crop

Wealth Analysis

Table 4 indicated that all villagers were grouped into three categories i.e., high income group, medium income group and low-income group. It was observed from Tale 2 that out of 625 families, 37 families were from higher income group, while 226 in medium group and 362 farmers were belonged to low-income group. Farming was main livelihood option for all families among three categories.

Table 4: Wealth analysis of households in selected village-Raipatan

Particulars	High Income Group (Rs1,00,001/ to 2,00,000/-)	Medium Income Group (Rs 50,001/- to 1,00,000/-)	Low Income Group (RS Upto 50,000/-)
No. of Households	37	226	362
Income sources	Farming, Business, Service	Farming, Business	Farming, Daily wages
Landholding	>2.0 ha	1.00 to 2.00 ha	<1.00 ha
Average annual expenditure (Rs)	80,001/- to 1,50,000/-	40,001/- to 80,000/-	Upto 40,000/-

3.6 Seasonal calendar and activity profile

In order to know the information about rainfall, water availability, water scarcity, labour availability, migration, crop operations and their time, insect-pest incidence etc. seasonal calendar and activity profile was prepared by discussion with key informants and information is depicted in Table 5. It was found that rainfall occur from the month of June to September, water is available up to December. However, January and onwards villagers facing problem of water scarcity in spite of receiving high annual rainfall (3500-4000 mm). Non- availability of labour due to migration in Mumbai is another threat reported by KIs.

Table 5: Seasonal Calendar and Activity Profile

	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Rainfall						√	√	√	√			
Water availability						√	√	√	√	√	√	√
Water scarcity	√	√	√	√	√							
Crops Operation												
Rice			*Bhajawal*			Sowing	Transplanting	Pest-disease incidence		Harvesting		
Nagli							Sowing	Pest-disease incidence		Harvesting		
Horse Gram	Harvesting									Sowing		
Cow pea	Irrigation	Harvesting								Sowing		
Groundnut	Irrigation	Harvesting									Sowing	Fertilizer Irrigation
Mango	Pest-disease incidence		Harvesting and marketing					Fertilizer application			Pest-disease incidence	
Cashew	Pest-disease incidence	Harvesting, Processing, and marketing						Fertilizer application			Pest-disease incidence	
Mula	Harvesting											Sowing
Brinjal	Sowing	Harvesting										Sowing
Livestock												
Milch animals	Care and management throughout the year											
Labor availability						√	√	√	√	√	√	
Fodder availability						√	√	√	√	√	√	√
Migration	√	√									√	√

3.7 Direct matrix ranking

This method enables the participatory team to prioritize from the list of criteria for certain object. It allows understanding the farmer's preferences about different crops, agri-enterprises, and their reason behind preferences. The villager's preferences are screened against certain criteria.

Table 6: Farmers preferences about different crops

Sr. No	Crop	Preferences
1	Agronomy	Rice, Finger millet, Cow pea, Groundnut
2	Horticulture	Cashewnut, Mango, Coconut, Leafy vegetables
3	Agri-enterprises	Backyard poultry, small scale processing, dairy, vermicompost

Participatory team took efforts to know the preferences of farmers about agronomical, horticultural crops and agri-enterprises. The information revealed that farmers preferred rice, finger millet, cow pea and groundnut crop in agronomy, cashew, mango, coconut and leafy vegetables in horticulture, while, backyard poultry, small scale processing, dairy and vermicompost as agro-based enterprises. The farmers indicated good preference for ground and rice in case of agronomy, cashew in horticulture and back yard poultry as agro-based enterprise.

Table 6 (a): Matrix Ranking of Agronomical Crops

Sr. No	Criteria	Rice	Finer millet	Cow pea	Groundnut
1	Availability of improved production technology	1	2	2	1
2	Low-cost inputs	2	1	2	2
3	Labour intensive*	1	3	2	2
4	Assured yield	2	2	2	1
5	Highly profitable	1	1	2	1

Table 6 (b): Matrix Ranking of Horticultural Crops

Sr. No	Criteria	Cashew nut	Mango	Coconut	Leafy Vegetables
1	Availability of improved production technology	1	1	1	2
2	Low-cost inputs	2	3	1	3
3	Labour intensive*	2	1	2	3
4	Assured yield	2	3	2	2
5	Highly profitable	1	3	2	2

Table 6 (c): Matrix Ranking of Agri-enterprises

Sr. No	Criteria	Backyard poultry	Small scale processing	Dairy	Vermicompost
1	Availability of improved production/processing technology	1	2	2	2
2	Low-cost inputs	1	3	2	2
3	Labour intensive*	3	3	2	1
4	Assured yield	1	2	3	3
5	Highly profitable	2	1	2	2

Training Need Identification: The main objective of present study was to assess the training need of farmers on different thematic areas of agricultural and allied sciences.

Table 7: Trainings need hierarchy of farmers according to different thematic Areas

Sl. No.	Thematic Areas	Training Need Priority
1	Agronomy	V
2.	Horticulture	I
3.	Fishery Science	VIII
4.	Animal Science	III
5.	Agricultural Extension	VI
6.	Plant Protection	IV
7.	Home Science	VII
8.	Agricultural Engineering	II
9.	Natural Resource Management	IX

It is seen from Tale 7 that first priority of training need of farmers on horticulture discipline, followed by agricultural engineering (II) and animal science (III). Further, farmers training need on plant protection, agronomy, and agricultural extension. Less priority reported by farmers on home science, fishery science and natural resource management. Further, Table 8 revealed that higher priority of training need of farmers on groundnut production technology, sustainable rice production technology and, production and processing of small millets. It ranks I, II and III in their training need hierarchy.

Table 8: Training needs of farmers on different aspects of agronomy

Sl. No.	Areas	Training Need Priority
1	Sustainable rice production technology	II
2	Production and processing of small millets	III
3	Production technology of horse gram	V
4	Groundnut production technology	I
5	Cultivation of mustard	VI
6	Production and processing of turmeric	IV

From Table 9 it is observed that cultivation and marketing of watermelon (I), production and processing in mango (II), rejuvenation and management of old orchards (III) and cultivation of leafy vegetables (IV) were critical training needed areas reported by farmers in Horticulture. In addition, coconut production technology, nursery management and, cultivation of banana and its marketing were another mostly training needed areas perceived by the farmers.

Table 9: Training needs of farmers on different aspects of horticulture

Sl. No.	Thematic Areas	Training Need Priority
1	Nursery management	VI
2	Cashew production technology	IX
3	Production and processing in mango	II
4	Rejuvenation and management of old orchards	III
5	Coconut production technology	V
6	Banana cultivation and marketing	VIII
7	Cultivation and marketing of watermelon	I
8	Cultivation of vegetables	IV
9	Processing and value addition in Jamun, Kokum, Aonla and Karonda	VII
10	Protected cultivation of high value horticultural crops	X
11	Production and management of spices	XI

In case of fishery, ornamental fish farming and fresh water fish farming were two most critical areas of training need. However, backyard poultry management (I), semi-intensive goat rearing (II), livestock management (III) and fodder production (IV) were most important areas in animal science for organizing training of farmers.

Table 10: Training needs of farmers on different aspects of fishery science

Sl. No.	Areas	Training Need Priority
1	Ornamental fish farming	I
2	Fresh water fish farming	II

Table 11: Training needs of farmers on different aspects of animal science

Sl. No.	Areas	Training Need Priority
1	Semi-intensive goat rearing	II
2	Backyard poultry management	I
3	Livestock management	III
4	Diagnosis of livestock diseases and its management	VI
5	Nutrient management for livestock	VIII
6	Fodder production, conservation, and its utilization	IV
7	Low-cost feed technology (e.g., Azolla as a partial feed)	V
8	Value added milk and milk products	VII

Table 11 indicates the training need of the farmers about Agricultural Extension discipline. It is seen that opportunities in agro-tourism (I), group farming and marketing (II) and livelihood opportunities for SHGs (III) were most important three areas in extension science. With respect to Plant Protection, maximum (I) of training need was on management of mango blossom, followed by IPM in mango (II), insect-pest management in coconut (III) and integrated disease management of major fruit crops (IV). Besides, considerable training need was found on Apiculture and Mushroom cultivation viewed as agri-enterprises by the farmers.

Table 11: Training needs of farmers on different aspects of agricultural extension

Sl. No.	Areas	Training Need Priority
1	Livelihood opportunities for SHGs	III
2	Agri-entrepreneurship development	IV
3	Attracting and retaining youth in agriculture	VI
4	Group farming and marketing	II
5	Opportunities in Agro-tourism	I

Table 12: Training needs of farmers on different aspects of plant protection

Sl. No.	Areas	Training Need Priority
1	IPM in rice	V
2	IPM in mango	II
3	Insect-pest management in coconut	III
4	Integrated Disease Management of major fruit crops	IV
5	Management of mango blossom	I
6	Apiculture	VI
7	Mushroom production	VII

In case of home science, first training need on home scale food processing and value addition, followed by drudgery reduction technologies (II), kitchen gardening for nutritional security (III) and Income Generating Activities (IGAs) for SHGs (IV) were another important area for organizing training programmes.

Table 13: Training needs of farmers on different aspects of home science

Sl. No.	Areas	Training Need Priority
1	Drudgery reduction technologies	II
2	Kitchen gardening for nutritional security	III
3	Income Generating Activities (IGAs) for SHGs	IV
4	Home scale food processing and value addition	I
5	Empowering women in agriculture	V

Table 14: Training needs of farmers on different aspects of agricultural engineering

Sl. No.	Areas	Training Need Priority
1	Mechanization in rice	I
2	Drudgery reducing farm implements	V
3	Tools for harvesting of fruits crops such as cashew, arecanut	II
4	Post-harvest management	IV
5	Water conservation techniques for protective irrigation	III

Table 15: Training needs of farmers on different aspects of natural resource management

Sl. No.	Areas	Training Need Priority
1	Soil health management	III
2	INM in rice	II
3	INM in mango	I
4	Agro-forestry	IV
5	Bamboo Cultivation	V

Table 14 indicated that most critical training needed area reported by the farmer was mechanization in rice (I) and second was a tool for harvesting of fruits crops such as cashew, arecanut. Further, water conservation techniques for protective irrigation, post-harvest management and drudgery reducing farm implements were another crucial subject perceived by farmers for their capacity building in agricultural engineering. In case of natural resource management, INM in mango (I), INM in rice (II) and Soil health management (III) were important areas of training need. Considerable training need was found about Agro-forestry and Bamboo cultivation.

3.9 Farmers' preferences about different aspects of training programme

Table 16 indicates data about duration, venue and nature of training, and teaching methods to be used for organization of training programmes.

Table 16: Preferences of farmers for different aspects of training programs

Sr. No	Particulars	Preference
a)	**Duration**	
i.	Short duration (Up to 2 days)	II
ii.	Medium duration (3 to 5 days)	I
iii.	Long duration (More than 5 days)	III
b)	**Venue**	
i.	Off campus	I
ii.	On campus	II
c)	**Nature of Training**	
i.	Knowledge oriented	II
ii.	Skill oriented	III
iii.	Both knowledge and skill oriented	I
d)	**Training Methods**	
i.	Lecture	I
ii.	Demonstration	I
iii.	Group Discussion	II
iv.	Exposure visit	I
v.	Case study analysis	II
vi.	Success stories	II

It is seen that first preference of farmers for medium duration (3 to 5 days) of training programme, followed by short duration of training. In case of venue of training, farmers were ready to attend training programme at on-campus. Most interesting fact was farmers required both knowledge and skill-oriented trainings for their capacity building with integrated use of different training methods such as lecture, demonstrations, group discussion, exposure visit and case study analysis.

TWOS Matrix: Situation analysis and designing appropriate strategies

Internal Factors / External Factors	**Strength**	**Weakness**
	• High rainfall • Favorable climate for high value horticultural crops • Good biodiversity/natural resource base • Social capital-SHGs, Farmers Club • Road connectivity • Nearer to KVK	• Marginal& Small holding • Water scarcity-December & onwards • Subsistence type of farming • Youth migration to Mumbai • Decline in crop productivity-rice, mango • Limited farm mechanization due to hilly area
Opportunities • Group farming & marketing • Processing & value addition • Income Generating Activities/Agri-enterprises • Crop diversification • Attracting & retaining youth in agriculture • Attracting tourist through Agro-tourism	**SO Strategy** (Max-Max) 1 Capacity building & mobilization of SHGs for agricultural enterprises 2 Promotion of backyard poultry, small scale processing, vermicompost etc 3 Introduction of water melon, banana, vegetables, and groundnut crop with plastic mulching 4 Organizing study tour for farmers at Agro-tourism center and motivating them	**WO Strategy** (Min-Max) 1 Construction of *Konkan* Vijay/*Vanarai Bandhara* with people's participation 2 Capacity building of rural youth 3 Documentation & publication of success stories of rural youth in agriculture 4 Transfer of Improved technology 5 Demonstration of drudgery reducing implements/tools
Threats • Climate change • Market glut • Crop damage due to wild animal	**ST Strategy** (Max-Min) 1 Mulching for groundnut, watermelon etc 2 Protected cultivation of chili 3 Biodiversity conservation through tree plantation 4 Mobile based advisory & market intelligence 5 Participation in extension activities of KVK	**WT Strategy** (Min-Min) 1 Demonstration of climate resilient technology 2 Insect-pest surveillance & disease forecasting 3 Collective action against wild animal during critical stages of crop 4 Construction of fencing to field wherever possible

Conclusions and implications

The present study revealed that majorities of the households are possessing small piece of land, farming is main livelihood option and having annual income of Rs 50,000 to 1,00,000/- The water scarcity, crop damage due to wild animals, decline in productivity of rice and mango are the most severe problems, however, construction of water conservation structures, crop diversification, mango rejuvenation, varietal replacement of rice are the main opportunities observed during village transect. The seasonal calendar and activity profile revealed that selected village witnessed water scarcity from the month of December to May in spite of receiving high precipitation (3500-4000 mm) during rainy season. Heavy pest and disease incidence on rice was observed during August-September; however, pest and disease infestation on mango was critical in January during blossom stage. Non availability of labour due to migration of people to Mumbai is major problem faced by farmers during transplanting stage of rice, and, spraying and harvesting operation of mango. The matrix ranking leads to conclude that productivity and profitability of rice, finer millet and mango is declined due to severe insect-pest infestation, climate variability and high cost of inputs. The farmers preferred rice for *Kharif*, cow pea for *Rabi* and groundnut for summer. While in case of horticulture, they have preferred cashew and vegetable crops. Backyard poultry management is one of the market-led enterprises preferred by the farmers/farm women. The overall training need of farmers was found to high in agricultural and allied sciences. Most important thematic areas for capacity building of farmers are Horticulture, Agricultural Engineering, Animal Science and Plant Protection. This followed by Agronomy, Agricultural Extension, Home Science and Fishery Science. Majority of farmers expected medium duration (3 to 5 days) of training and on-campus training. They required both knowledge and skill-oriented trainings for their capacity building. The capacity building agencies should organize medium duration training programmes not only for knowledge management of farmers but also for skill development in agricultural. While designing training modules, there is need to include integrated training methods such as demonstrations, group discussion, exposure visit, case study analysis etc. rather than focusing only lecture for capacity building of farmers. There is urgent need to take research investigation to workout extent and nature of crop damage due to wild animals, and extent of agricultural loss due to wild animals in *Konkan* region as most of the farmers during PRA reported wild animal threatens crop production.

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