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Matrix Ranking- An important PRA tool to assess farmers preferences and priorities

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ABSTRACT

Matrix ranking is an important PRA tool to assess and study the preferences of farmers for a particular technology over others, with respect to crop or animal based technologies. The preferences and criteria for the same are also studied in the process. The following study gives a first-hand idea of farmers' relative preferences for different varieties of rice, mustard, tomato, chilli, garden pea, fish and lac hosts. The results of the matrix ranking for different varieties of rice revealed that, the variety "*Arize 6444"* was the most preferred one followed by "*Abhishek"*. "*Pusa Mahak"* was the leading variety of mustard followed by *Pusa Bold*. *Swarna Sampada* is more preferred tomato variety among the farmers. Among fish, "Rohu" was widely preferred by the respondents due to its higher yield, more market demand, resistance to water quality and higher market price.

Key words: Crops, Criteria, Matrix Ranking, Preferences, PRA.

INTRODUCTION

Participatory Rural Appraisal (PRA) is a set of tools and techniques used with households to gather and analyze information on community resources, problems, potential and needs. One of the important tools of analysis is matrix ranking, which is done to know about the preferences of households for different activities, resources or items and reasons or criteria for preferences. PRA brings together on the one hand, development needs defined by the community members and on the other, skills of Government, donor agencies and NGOs. It integrates traditional knowledge systems and external technical knowledge in the development process. (Simon, 2000)

PRA is a way of learning from, and with community members to investigate, analyse and evaluate constraints and opportunities and make informed and timely decisions regarding development projects. By PRA, one can quickly and systematically collect information for the general analysis of a specific topic, question or problem, conduct need assessment, feasibility studies identify and prioritise projects or undertake project or programme evaluation. Chambers (1992) defined Participatory Rural Appraisal as a growing family of approaches and methods to enable local people to share, enhance and analyse their knowledge of life and conditions to plan and to act. Matrix ranking is an important PRA technique wherein researchers use this method for various planning puposes, ranking of institutions, livestock preferences fodder preferences problem and solution ranking. Direct matrix ranking for technology decision behavior refers to placing different technologies in the order of importance like I,II,III *etc.* according to their worthiness with regard to a specific criterion or reason related to a specific behavioural decision such as adoption, discontinuance etc.

MATERIALS AND METHODS

The matrix ranking was undertaken by a multidisciplinary team of scientists in Burhakocha village of Ranchi district of Jharkhand State. From Burhakocha village, 3-5 key informants were selected for the conduct of matrix ranking. Semi structured interview schedules were used to facilitate interaction with key informants and to elicit information from them. Matrices enable a range of different items to be assessed against selected criteria. The resultant criteria used for making preferences were used to formulate the action plan.

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The following steps were involved in doing Direct Matrix Ranking:

- ·Before initiation of matrix ranking, technology map was completed.
- All technologies found in the technology map were included in direct matrix ranking

Separate matrices were prepared for each technology decision behavior. The various technologies found in the technology map were placed in various columns for a specific behavior in a table. Recall data of the key informants who were responsible for a specific behavior (say adoption) following his discussion with the PRA practitioner during the course of making technology map, was used. These key informants were requested to indicate the reasons for their behavior. The reasons were listed as criteria in the rows for preparation of the matrix. Each key informant was asked to indicate the technology which he ranked as the foremost one for the first criterion listed. He further is asked to indicate the technology which he considered as second important for the same criterion. This step was repeated for other indicators or criteria. Scoring was given for the ranks in such a way that the first rank for an indicator got the highest score and the last rank got the lowest score. This process is repeated for 3-5 key informants for each behavior.

The pooled matrix table is prepared for each technology decision behavior for technology adoption. The scores were added up for each column. The overall rank for all the scores in the columns was given as I,II,III, IV etc. The final rank was used to infer which technology got the maximum score for a particular criterion as perceived by the farmers.

Individuals or groups vote on the items from most important to least important item. The choices could be between crop varieties, water points, food diets, livestock species, problems, solutions and many different issues, which require preferences. It is more useful for exploring the reasons why people prefer one possibility over another. The moment a preference is made lots of criteria are explored to compare items using a group of criteria before a choice. Direct matrix ranking is used to list items to be compared along horizontal line and criteria on the vertical line to rank choices from most important to least important (i.e. 1st, 2nd, 3rd, 4th etc.) In this case, frequency of the items valued as the 1st choice helps to make up the final decision. Direct matrix scoring helps to attach a score to comparable items against each criteria listed before a choice Matrix ranking was done for the rice varieties namely, Lalat, Mansuri (MTU 7069), Abhishek, and Arize 6444. For a particular criteria say, yield, the key informants were asked to rank the rice

Table 1: Matrix ranking of rice varieties

Parameters	KIs	Lalat		Mansuri (MTU 7069)		Abhishek		Arize 6444	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	IV	1	III	2	II	3	I	4
	KI-2	III	2	IV	1	II	3	I	4
	KI-3	IV	1	III	2	I	4	II	3
	Sub – Total		**4**		**5**		**10**		**11**
Disease resistance	KI-1	IV	1	III	2	I	4	II	3
	KI-2	IV	1	III	2	II	3	I	4
	KI-3	III	2	IV	1	I	4	II	3
	Sub-Total		**4**		**5**		**11**		**10**
Straw yield	KI-1	II	3	III	2	IV	1	I	4
	KI-2	II	3	III	2	IV	1	I	4
	KI-3	I	4	IV	1	III	2	II	3
	Sub-Total		**10**		**5**		**4**		**11**
Tillering capacity	KI-1	IV	1	III	2	II	3	I	4
	KI-2	IV	1	III	2	II	3	I	4
	KI-3	III	2	IV	1	II	3	I	4
	Sub-Total		**4**		**5**		**9**		**12**
Quality of grain	KI-1	II	3	I	4	III	2	IV	1
	KI-2	II	3	I	4	IV	1	III	2
	KI-3	I	4	II	3	III	2	IV	1
	Sub-Total		**10**		**11**		**5**		**4**
Profit	KI-1	IV	1	III	2	I	4	II	3
	KI-2	IV	1	III	2	II	3	I	4
	KI-3	III	2	IV	1	II	3	I	4
	Sub-Total		**4**		**5**		**10**		**11**
FINAL SCORE			36		36		49		59
FINAL RANK			**III**		**III**		**II**		**I**

Table 2: Matrix ranking of mustard varieties

Parameters	KIs	Laxmi 5005		Amrutha		US 440		Swarna Sampada	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	III	2	IV	1	II	3	I	4
	KI-2	III	2	IV	1	I	4	II	3
	KI-3	IV	1	III	2	I	4	II	3
	Sub-Total		**5**		**4**		**11**		**10**
Disease resistance	KI-1	I	4	III	2	IV	1	II	3
	KI-2	I	4	III	2	IV	1	II	3
	KI-3	II	3	III	2	IV	1	I	4
	Sub-Total		**11**		**6**		**3**		**10**
Profit	KI-1	IV	1	III	2	I	4	II	3
	KI-2	III	2	IV	1	I	4	II	3
	KI-3	III	2	IV	1	II	3	I	4
	Sub-Total		**5**		**4**		**11**		**10**
FINAL SCORE			21		14		25		30
FINAL RANK			**III**		**IV**		**II**		**I**

varieties in order of importance. The ranks were then given scores (from 1-4) the lowest score of 1 being given for the last rank and the highest score of 4 for the fourth rank. For the rice varieties, the criteria studied were yield, disease resistance, straw yield, tillering capacity, quality of grain, and profitability of a particular strain. The same procedure was repeated for ranking of mustard varieties namely, Pusa bold, Pusa Mahak, Dhanya 555 and Verna. Besides paddy and mustard crop, matrix ranking was used to rank tomato, chilli, garden pea, Kusumi lac Rangini lac host varieties and fish varieties Catla, Rohu, Mrigal and Mahur.

RESULTS AND DISCUSSION

Matrix ranking is a PRA tool which facilitates prioritization of technologies with respect to certain identified criteria, based upon users perception. This PRA tool was administered at Burhakocha village of Ranchi district of Jharkhand State for getting a first hand idea of farmers' relative preference for different varieties of rice, mustard, tomato, chilli, garden pea, fish and Lac hosts. The results of the matrix ranking for different varieties of rice (Table 1) revealed that the variety Arize 6444 was the most preferred one followed by Abhishek. Arize rice variety scored over other varieties by virtue of its grain yield, straw yield, profitability and tillering capacity. Pusa Mahak is the leading variety of mustard followed by Pusa Bold.(Table 2). The criteria for which Pusa Mahak was preferred over other varieties were profitability, yield and disease resistance. Swarna Sampada, as could be inferred from Table 3, was a more preferred tomato variety among the farmers for its criteria such as yield, disease resistance and profit.. Chili cultivation is ruled by VNR 305 variety. (Table 4) VNR 305 scored over other chilli varieties by its high yield, pungency and disease resistance. PSM 11 variety garden pea leads among pulses as could be observed form Table 5. It was preferred mainly for its high yield, pod size and disease resistance. A study of the lac hosts revealed interesting results. (Table 6). Whereas Ber scored first with respect to yield, climate tolerance and profit, the lac host namely Kusum scored over others with respect to quality of resin. Lac hosts were ranked based on yield, resin quality, climatic

Table 3: Matrix ranking of tomato varieties

Parameters	KIs	Pusa Bold		Pusa Mahak		Dhanya 555		Verna	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	II	3	I	4	IV	1	III	2
	KI-2	II	3	I	4	III	2	IV	1
	KI-3	II	3	I	4	IV	1	III	2
	Sub-Total		**9**		**12**		**4**		**5**
Disease resistance	KI-1	II	3	I	4	III	2	IV	1
	KI-2	II	3	I	4	IV	1	III	2
	KI-3	I	4	II	3	III	2	IV	1
	Sub-Total		**10**		**11**		**5**		**4**
Profit	KI-1	II	3	I	4	III	2	IV	1
	KI-2	II	3	I	4	III	2	IV	1
	KI-3	II	3	I	4	III	2	IV	1
	Sub-Total		**9**		**12**		**6**		**3**
FINAL SCORE			28		35		15		12
FINAL RANK			**II**		**I**		**III**		**IV**

Table 4: Matrix ranking of chilli varieties

Parameters	KIs	VNR 305		Megha Hot		Durga		Pusa Sadarath	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	I	4	II	3	IV	1	III	2
	KI-2	I	4	II	3	III	2	IV	1
	KI-3	II	3	I	4	IV	1	III	2
	Sub-Total		**11**		**10**		**3**		**5**
Pungent	KI-1	I	4	II	3	IV	1	III	2
	KI-2	I	4	II	3	IV	1	III	2
	KI-3	I	4	II	3	IV	1	III	2
	Sub-Total		**12**		**9**		**3**		**6**
Disease resistance	KI-1	I	4	II	3	III	2	IV	1
	KI-2	II	3	I	4	IV	1	III	2
	KI-3	I	4	II	3	IV	1	III	2
	Sub-Total		**11**		**10**		**4**		**5**
Profit	KI-1	II	3	I	4	III	2	IV	1
	KI-2	I	4	II	3	IV	1	III	2
	KI-3	I	4	II	3	IV	1	III	2
	Sub-Total		**11**		**10**		**4**		**5**
FINAL SCORE			45		39		14		21
FINAL RANK			**I**		**II**		**IV**		**III**

tolerance and profit. Ber plant (*Zizyphus spp*) is considered as best for KUSUMI strain and Palas (*Butea monosperma*) for RANGINI strain. (Table 7) The choice of fish could be inferred from Table 8, was based on yield, local demand, water quality resistance and market price. It was observed that they prefer to grow Rohu and Magur due to their much sought after taste and local demand. Rohu fish species had the highest demand whereas, Magur scored with respect to criteria such as market demand, resistance to water quality and market price. Lac cultivation is an alternative crop which assists the small farmers financially. Similar exercises using matrix ranking have been undertaken by a field based NGO, MYRADA (Mysore resettlement and development agency) wherein matrix ranking was used to study a wide range of subjects such as trees, fodder, types of cattle, breeds and soil types. For in the case of crops, the criteria used was gram yield, straw yield, quality, drought resistance, disease resistance, etc. In the case of animals, the criteria was milk yield, fat percentage, disease resistance, requirement of green fodder, etc., Once the chart is established, scoring is done i.e. points can be given for each item by placing seeds or stones. For eg. if a variety or breeding was extremely disease

Table 5: Matrix ranking of garden pea varieties

	KIs	Arkle		PSM 11		Azad P3		Pusa Pragathi	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	IV	4	I	4	III	2	II	3
	KI-2	IV	4	I	4	III	2	II	3
	KI-3	III	2	I	4	IV	1	II	3
	Sub-Total		**10**		**12**		**5**		**9**
Pod size	KI-1	III	2	I	4	II	3	II	3
	KI-2	IV	1	I	4	II	3	III	2
	KI-3	IV	1	I	4	III	2	II	3
	Sub-Total		**4**		**12**		**8**		**8**
Diseaseresistance	KI-1	IV	1	I	4	III	2	II	3
	KI-2	IV	1	II	3	III	2	I	4
	KI-3	III	2	I	4	IV	1	II	3
	Sub-Total		**4**		**11**		**5**		**10**
Profit	KI-1	IV	1	I	4	II	3	III	2
	KI-2	III	2	I	4	II	3	IV	1
	KI-3	IV	1	II	3	I	4	III	2
	Sub-Total		**4**		**11**		**10**		**5**
FINAL SCORE			22		46		28		32
FINAL RANK			**IV**		**I**		**III**		**II**

Table 6: Matrix ranking of Kusumi Lac hosts

Parameters	KIs	Kusum		Ber		*Flemingia*	
		Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	II	2	I	3	III	1
	KI-2	II	2	I	3	III	1
	KI-3	II	2	I	3	III	1
	Sub-Total		**6**		**9**		**3**
Quality of Resin	KI-1	I	3	II	2	III	1
	KI-2	I	3	II	2	III	1
	KI-3	I	3	II	2	III	1
	Sub-Total		**9**		**6**		**3**
Climae tolerance	KI-1	II	2	I	3	III	1
	KI-2	II	2	I	3	III	1
	KI-3	II	2	I	3	III	1
	Sub-Total		**6**		**9**		**3**
Profit	KI-1	II	2	I	3	III	1
	KI-2	II	2	I	3	III	1
	KI-3	II	2	I	3	III	1
	Sub-Total		**6**		**9**		**3**
FINAL SCORE			27		33		12
FINAL RANK			**II**		**I**		**III**

resistant, the farmer may give it a score of 4 or 5. If it is less resistant 2 or 3 points. If it is disease susceptible it may be given 1 or 0 points and so on. Abeyasekera (2001) used matrix ranking to score several maize varieties on the basis of five criteria, namely high yields, many seeds per cob, speed of maturation, drought resistance and marketability. **Key Informants:** Mr. Balaram Bedia, Mr. Jagarnath Bedia and Mr.Sunva Bedia

CONCLUSION

Arize444 variety of rice was preferred for its higher yield of grain and straw , disease resistance, tillering capacity, quality of grain produced and higher profit margin compared to other prevailing varieties. Similarly, the study revealed that, among mustard crop "*PusaMahak"* scored high by virtue of its higher yield, disease resistance and profitability. In vegetable crops it could be observed that in chili the variety *VNR 305* ranked first over other varieties due to higher yield, pungency and disease resistance. "*Rohu"* variety of fish was preferred due to its higher yield, higher market demand, resistance to water quality and higher market price.

Martix ranking provides a very simple, yet clear method of finding out the reasons for preference of a particular variety over others. These exercises provide the plant breeders and researchers accurate information to improve upon the existing, not so preferred varieties and bring about technological modifications and improvisations for greater adoption in the farmers field and for socio-economic transformation of the rural community.

Table 7: Matrix ranking of rangini Lac hosts

Parameters	KIs	Palas		Ber		*Flemingia semialata*	
		Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	I	3	II	2	III	1
	KI-2	I	3	II	2	III	1
	KI-3	I	3	II	2	III	1
	Sub-Total		**9**		**6**		**3**
Quality of Resin	KI-1	I	3	II	2	III	1
	KI-2	I	3	II	2	III	1
	KI-3	I	3	II	2	III	1
	Sub-Total		**9**		**6**		**3**
Climatic tolerance	KI-1	I	3	II	2	III	1
	KI-2	I	3	II	2	III	1
	KI-3	I	3	II	2	III	1
	Sub-Total		**9**		**6**		**3**
Profit	KI-1	I	3	II	2	III	1
	KI-2	I	3	II	2	III	1
	KI-3	I	3	II	2	III	1
	Sub-Total		**9**		**6**		**3**
FINAL SCORE			36		24		12
FINAL RANK			**I**		**II**		**III**

Table 8: Matrix ranking for fish

Parameters	KIs	Catla		Rohu		Mrigal		Magur	
		Rank	Point	Rank	Point	Rank	Point	Rank	Point
Yield	KI-1	I	4	II	3	IV	1	III	2
	KI-2	I	4	II	3	IV	1	III	2
	KI-3	II	3	I	4	III	2	IV	1
	Sub-Total		**11**		**10**		**4**		**5**
Demand	KI-1	III	2	II	3	IV	1	I	4
	KI-2	III	2	I	4	III	2	II	3
	KI-3	III	2	I	4	III	2	II	3
	Sub-Total		**6**		**11**		**5**		**10**
Water quality resistance	KI-1	IV	1	II	3	III	2	I	4
	KI-2	III	2	II	3	III	2	I	4
	KI-3	IV	1	II	3	III	2	I	4
	Sub-Total		**4**		**9**		**6**		**12**
Market price	KI-1	III	2	II	3	III	2	I	4
	KI-2	III	2	II	3	III	2	I	4
	KI-3	III	2	II	3	III	2	I	4
	Sub-Total		**6**		**9**		**6**		**12**
FINAL SCORE			27		39		21		39
FINAL RANK			**II**		**I**		**III**		**I**

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