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Ranks are statistics: some advice for their interpretation

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• Summary

Ranking is commonly used by researchers to obtain farmers' assessments of a project. Ranks can be obtained directly through farmer responses or indirectly by classifying collected data. This article results from examination of a number of training manuals and papers which consider or use ranking methods in PRA. We are concerned that the original use of ranking methods in PRA has become replaced by an increasing reliance upon ranks for decision making. This change in emphasis requires practitioners to be aware of the limitations of ranking so that justifiable decisions can be made. We remind readers of how to rank and give guidelines on interpreting ranks.

• Introduction

There is often pressure on researchers to quantify qualitative data; numbers seem more concrete and easy to manipulate than qualitative opinions generated by social science studies. This seems to have resulted in the increased importance and use of ranks (and scores) for presenting opinions collected from farmers. One consequence of this is that the rankings obtained from PRA studies appear to be increasingly used to justify decisions associated with project design and implementation.

However, it is worth remembering what Ashby wrote in 1990: *"the technique of ranking among alternatives must be used with caution"* and that it is *"useful primarily as a tool for getting farmers to explain their preferences"*. Although Chambers (1988) stressed that ranking should not be *"an end in itself"*, the impression from recent literature is that rankings are considered a very important tool and are frequently used. However, the statistical aspects of ranks seem to have been largely ignored and training manuals on PRA are almost totally devoid of statistical aspects of ranking. This seems to have resulted in rank order being accepted at face value.

How to rank

Irrespective of the method used (direct matrix, preference, wealth ranking etc.), the literature indicates that researchers do not always know what to do when farmers cannot decide which of two items they prefer. If a farmer cannot distinguish between items, they should be given the same rank. If this is not done, some farmers or characteristics may have greater influence on the overall result than others (which we assume is undesirable). If a farmer has to rank six items (vegetables) and s/he can assign a unique order to the set, then six different ranks, for example, 1 to 6 are obtained (see Box 1 Continuous Production as an example). However, if the farmer wishes to give the same rank to two or more items, then these items should be given the same rank. This is the mean of those ranks which would have been assigned to this group of items if the farmer had been able to distinguish between them. If a farmer has a first choice (rank 1) and a second choice (rank 2), and regards the other vegetables as equal, then each of the remaining items gets the same rank of 4.5. 4.5 is the average of 3, 4, 5 and 6, which are the ranks which would have been assigned to the items if the farmer could have distinguished between the vegetables (for example see Production Time).

Source: PLA Notes (1998), Issue 33, pp.35–39, IIED London

Box 1 contains two sets of ranks. The figures outside the brackets are the ranks given in the original published report. These ranks are faulty because some criteria have unintentionally been given more importance than others due to the method of ranking. The total of the ranks for Production/Duration is three, while that for Continuous Production is 21. When the correct scores are used, the figures inside the brackets are obtained. Consequently, quite different totals are obtained (Correct score) compared to the score given in the original table (Original score).

In Box 1 some items are not ranked and a blank is entered. It is important to determine why the item was not ranked. If blanks occur due to faulty data collection, some imputed values may have to be considered, which may not be desirable. If the farmer chose not to rank the item, it could be that the criterion may not be applicable (a tree may not be used for firewood) or the farmer simply may not know if the tree makes good firewood. If the criterion is not applicable, the rank associated with 'worst' should be assigned. The reason for this is that if the tree is not used for firewood, we are probably implicitly being told that it makes such poor firewood nobody burns it. If, for example, the wood is not burnt because it is too valuable to burn, then we would still want to give it a poor rank for burning. If the farmer does not know enough to respond, the researcher should consider why that farmer is being asked to rank the criteria and whether or not another more useful respondent should be chosen.

Box 2 gives some general points which must be remembered when collecting ranks.

BOX 1
HOW TO RANK

When a person gives two items the same preference, the average rank for the two items must be given. Thus if a farmer considers two crops as equal best, they do not get a rank of 1 each, instead they get (1+2)/2 or 1.5 each. This ensures that the sum of the ranks is equal across all criteria. In the example below, taken from a published report, quite different ranks arise when equal preferences are taken into account.

Direct matrix ranking of criteria for vegetables.

	Pepper	Cabbage	Eggplant	Cauliflower	Tomato	Onion
Continuous Production	3	5	1	6	2	4
Production Time	- (4.5)	- (4.5)	2	- (4.5)	1	- (4.5)
Production/ Duration	- (4.5)	- (4.5)	1	- (4.5)	2	- (4.5)
Ease of Marketing	4	5	3	6	1	2
Farmer eats	4	5	3	6	2	1
Ease of transport	4	1 (2)	5	1 (2)	1 (2)	6
Pest Resistance	1	6	2	5	4	3
Nursery size	3 (4.5)	3 (4.5)	1	3 (4.5)	2	3 (4.5)
Transplant Labour	5	2 (3)	1	2 (3)	2 (3)	6
Harvest labour	3 (4)	1 (1.5)	3 (4)	1 (1.5)	3 (4)	6
Original score	27	28	24	30	20	32
Correct score	42.5	41	25	43	23	42.5

- no score given by farmer. Values in brackets show the rankings that should be used where there are equal preferences.

Source: PLA Notes (1998), Issue 33, pp.35–39, IIED London

BOX 2
POINTS FOR RANKING

- A full list of criteria for ranking is essential; choosing preferences from an incomplete list will give faulty information.
- When equal preferences occur, an average score must be given, of the scores which would have been allocated to those items if they had not been considered equal.
- Items not ranked must be considered carefully; were the criteria irrelevant or should the poorest score have been given to that item?
- Although correlation analysis can give information about preferences, farmers MUST always be asked which are the most important criteria and which is the preferred item.
- Ranks are subjective choices and are open to influence by the interview environment and context.
- As a result of (v) and of statistical aspects, ranks may not give an ordering which we are sure is unique, particularly if the sample size is small.
- Statistical methods can provide objective ways of finding groups of farmers with similar preferences.

• Interpretation of ranks

A league table of items, listed according to their ranks can give a misleading impression that the item at the top of the list is *the* most preferred item that could be found and the one at the bottom of the list the least preferred item. This view is probably an extension from football league tables and other sports' rankings.

However, this sense of a clear preference, which ranks give, is misplaced. Even if we accept that the researcher has used a method of obtaining preferences which does indeed reflect the farmer's assessment and farmers can give reliable answers, simple ranking does not account for the level of disagreement between farmers which is 'lost' when individual figures are summed to get the final rank figure. As it is most unlikely that all farmers will assign the same rank to each item, our interpretation must reflect the differences in the farmers' responses.

This variability is important as it can help identify groups of farmers with local needs. The variability may indicate that there are no global needs, only local needs and to pretend otherwise would be to ignore possible recommendation domains.

Table 1, on the following page, is taken from a training manual and the simple interpretation is that Drought and Pests are the main problems. Can this interpretation be justified? Firstly, before we look at the total scores, we need to check that farmers are giving consistent responses; i.e. what is the level of agreement between farmers? In this case, statistical analysis[1] indicates that there is broad agreement between farmers' rankings, so we can now look at the total scores.

Now we need to discover whether given the information we have, we can be sure that the total scores are actually different. Most farmers consider *Labour Shortage* as the least important and most identify *Drought* as the most important. Again, statistical analysis[2] of the total scores helps us to place limits on the justifiable interpretation of the totals. In fact, we could justify projects which address, *Drought*, *Pests* or *Weeds*, as we cannot distinguish *Drought* as being more important than the other two. Likewise we cannot say that *Labour Shortage* is the least important problem as we cannot distinguish between the total scores of *Cost of Inputs* and *Labour Shortage*. Thus the simple interpretation that '*Drought is the major problem*' or '*Labour Shortage is the minor problem*' is not justified by the information in the table.

[1] Using Kendall's coefficient of concordance
[2] Using Friedman's test

Source: PLA Notes (1998), Issue 33, pp.35–39, IIED London

Table 1. Example of preference ranking on constraints to agricultural production

	Farmers							
Problem	A	B	C	D	E	F	Total score	Ranking*
Drought	5	5	3	5	4	5	27	a
Pests	4	3	5	4	5	4	25	ab
Weeds	3	4	4	1	3	3	18	ab
Cost of Inputs	2	1	2	2	2	2	11	bc
Labour Shortage	1	2	1	3	1	1	9	c

* Only scores with different letters are those which we can be sure are really different ('statistically significant').

BOX 3

GUIDELINES

When six items are ranked by varying numbers of farmers the ranks must differ by the value given below for one to be sure that the items have different ranks

No. of farmers in group	4	6	10	15	20
Minimum difference between mean ranks	15.5	19.0	24.5	30.1	34.7

Friedman's test can be used to determine if the ranks really are different.

Table 2: Pairwise ranking of favourite pastimes.

TV	Reading	Sleep	Music	Sport		Score	Rank
TV		TV	MU	TV	TV	3	B
		RE	MU	RE	Reading	2	C
			MU	SP	Sleep	0	E
				MU	Music	4	A
					Sport	1	D

Our ability to distinguish between criteria depends not only upon the number of farmers we interview, but also on the number of criteria. Box 3 offers some guidelines as to the number of farmers who should be questioned if six criteria are to be ranked.

Table 2 gives an example of pairwise ranking, again from a training manual. Casual examination of the scores suggests that Music is the most popular pastime. Although Music is preferred on all four occasions, we have insufficient information to be sure that the preference for Music did not emerge as a result of random choice. In this example we can only be 38%[3] sure that Music really is preferred over other pastimes, and act accordingly. Box 4 overleaf gives guidelines as to the number of preferences which must be observed between pairs before we can start to be sure that real preferences exist.

Wealth ranking poses even more problems of analysis and interpretation than pairwise or preference ranking. As not all those who do the ranking may know all the farmers to be grouped by wealth, gaps in the wealth ranks of individual farmers are to be expected. Also, those who do the ranking are allowed to choose their own number of wealth groups. To overcome the difference in number of wealth groups, researchers are told that the data should be changed to percentages but this can result in the original data being modified in a way which could invalidate the overall ranks. The final division of farmers into wealth groups is a subjective choice of the researcher. Clearly, the objective is to assign farmers to wealth categories which result in distinct groups and the correct allocation of farmers to each group. In Box 5, we urge that great caution be exercised in interpreting wealth ranks.

[3] Using Binomial probabilities.

Source: PLA Notes (1998), Issue 33, pp.35–39, IIED London

BOX 4
NUMBER OF TIMES AN ITEM MUST BE CHOSEN WHEN COMPARED WITH ALL OTHER ITEMS BEFORE WE CAN BE SURE (95% CONFIDENT) THAT IT IS A REAL PREFERENCE

Number of items being compared	5	6	7	8	10
Must be preferred at least:	5	6	7	7	9

The number of times an item needs to be preferred before we can be sure it is **the** preferred item can be obtained using the Binomial test.

BOX 5
OBSERVATIONS ON WEALTH RANKING

- Mean ranks should not be used.
- If the data are incomplete, values must be imputed before obtaining average ranks.
- Split the population into groups so that they contain equal numbers of households.
- Obtain ranks from as many people as possible so that peculiar rankings do not have a great influence on the final groupings.
- Wealth data probably need to be analysed by more powerful statistical methods.

• Conclusions

We have highlighted some limitations which should constrain the interpretation of some commonly used ranking methods in PRA. The correct interpretation of wealth ranking probably requires the assistance of a statistician, but interpretation of other ranking methods is less difficult and methods of statistical analysis can be found in books on statistics for the social sciences. Where ranking is carried out as a method for farmers to explain their preferences, our concerns over interpretation are probably not justified, but when actions are justified by rankings, then we feel that greater objectivity and analysis are required in interpretation.

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NOTE

The methods of statistical analysis mentioned in this article can be found in books on non-parametric statistics: one such book is by Siegel and Castellan (1988).

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