Impact of Lot Quality Assurance Sampling (LQAS) For Better Monitoring & Evaluation (M&E) In Agriculture and Rural Development Projects

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Abstract: *Traditional survey methods are generally costly and time consuming, usually provide information at the national and regional level only. The utilization of Lot Quality Assurance Sampling (LQAS) method developed in manufacturing industry as a way to monitor the quality of production. A sample of items was randomly selected from each production lot, examined for any imperfection and to use small sample sizes when conducting surveys in small geographical or population-based areas i.e., Lots. LQAS is used to measure results at a local level, since it requires small random samples and produces results useful to local managers. However, current LQAS method requires all local areas be included in the survey is order to be aggregated to produce point estimates for the nation and states. This paper describes the use of LQAS for conducting agriculture and rural development project surveys to monitor community based interventions at micro level. The promise of monitoring system to enhancing agricultural productivity, competitiveness and rural growth, improving water resources and irrigated agriculture, facilitating agricultural diversification to high-value commodities, promoting high growth commodities, developing markets, credit and public expenditures. The present article explains how to prepare a framework and how to select the sampling unit to monitor the ongoing project implementation and a sample size is given. The interpretation of the survey results is to help for proper planning for subsequent rounds and decision making to help managers and policy makers to achieve project targets.*

Key Words: *Agriculture, data collection method, rapid monitoring & evaluation*

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I.   Introduction:

An effective management of decentralized project management system requires up to date information at the local level where projects are implemented. Information at local level allows project managers to know which project interventions are meeting the particular targets, and which is not reaching to the beneficiary. To help in acquiring this information we turn to Lot Quality Assurance Sampling (LQAS). LQAS are first used in the manufacturing Industry in 1920s. The LQAS was originally developed to use as a quality control method, for improving the quality of materials and to assess quality of batches (Lots). The Lot would either be rejected or passed based on predetermined criteria. LQAS was adapted by public health in mid 1980s (Stroh 1985, Valadez 1986 and 1991, Lwanga, Taber and Lemeshow 1991). But the sampling concepts of the LQAS method have universal applicability. The LQAS concept has been adapted for use in health sector, social sector and has gaining popularity as a way to monitor efficiently health programs over time. More recently, LQAS has been adopted for the use in the education sector and now in agriculture sector. The use of LQAS in monitoring agriculture project to be explained simply and the advancement of LQAS empower local managers by giving them a rapid method for monitoring and evaluating projects, as well as for making project relevant management decisions.

Road to Happy Farmer:
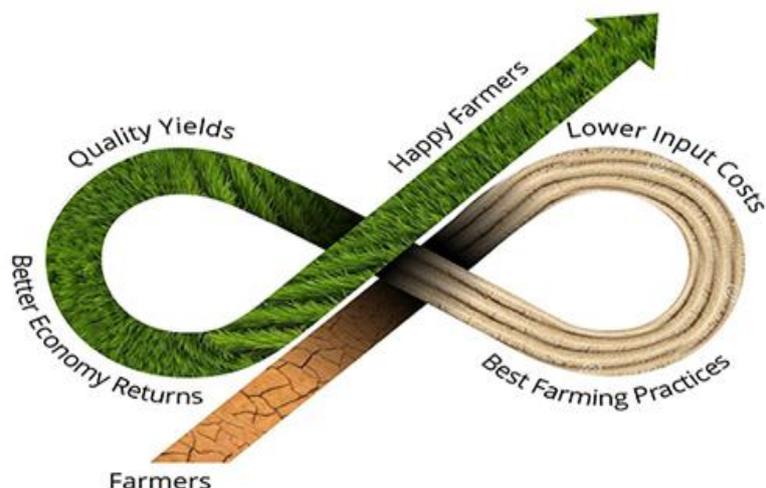
Project Development using LQAS:

Lots Quality Assurance Sampling (LQAS) is a rapid survey method *to assess the quality of services coverage* ensuring is agriculture project development activities in 15 project areas in India such as district/cluster (known as "lot"), using a small sample size. LQAS is a sampling methodology which can be used as a monitoring tool that can: 1. Identify priority areas: which are not reaching an established performance benchmark for an indicator; 2. To measure coverage at an aggregate level (e.g. Project Catchment Area district, block/mandal/village); 3. Useful to generate data to inform management decision making and for sharing information across Supervision Areas (SA); 4. Suitable for reporting purposes.

LQAS can use small random samples: 1. Most frequently used size = 19 per Supervision Area; 2. Larger sizes are rarely needed.

LQAS Standards:
- Project standard = Coverage target for intervention;
- Project areas = Catchment Area (CA) /District (in Agriculture project case, it's a total project or any specific state unit);
- Decision Rule = Area of Performance that Area Manager (AM) wants to know;
- Lot = Supervision Area (SA);
- Supervision Area = Small geographical area;
- In Agriculture project case, each cluster location is a supervision area.

Importance of the LQAS:

LQAS tests whether a given threshold value (goal/target) achieved or not, rather than producing estimates for an indicator (exact value of achieved target). LQAS is a sampling method which helps to understand performance of supervision area (Cluster) on a quality of services delivered. LQAS gives light on "whatever we did at cluster level in a specific period of time, are they giving expected results or not". In Agriculture project it's essential to assess performance of each cluster by the Area Manager himself. Before conducting LQAS survey it's very important that the goal is fixed for each area of performance that what we want to know. It's called as Decision Rule.

Goal achieved or failed:

For a specific indicator, if the cluster has achieved the given decision rule, it is considered as Goal achieved; If Goal is not achieved, it is considered as Goal not achieved.

What can be done with the findings?
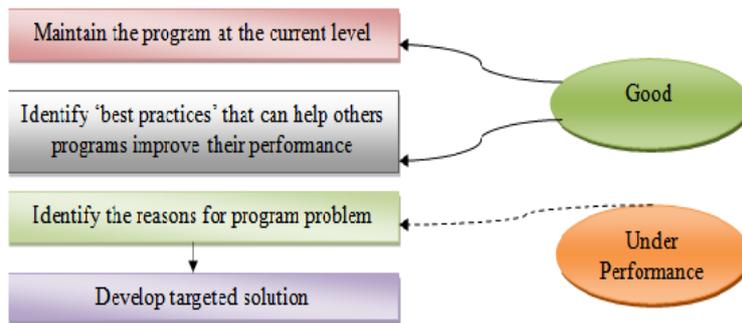
What can a sample of 19 tell us?
*   Good for setting priorities within a Supervisory Area (SA) i.e., (cluster);
*   Good for understanding what are the higher performing supervision areas to learn from;
*   Good for deciding what are the lower performing supervisory areas in which to invest resources.

What a sample size 19 cannot tell us:
*   Not good for calculating exact coverage in a supervision area;
*   Not good for setting priorities among the supervision areas with little difference in performance;

Benefits of LQAS as a sampling method:
*   Low sample size needs (n=19 in most cases);
*   Simple to apply yet has very specific conclusions;
*   Provides high quality information at low & affordable cost;
*   Fast - AMs are able to conduct self-evaluation and obtain results immediately after the survey;
*   Results are locally relevant and can be utilized in cluster level quarterly planning and decision-making.

Why LQAS – How does it help us?

Survey of 19 samples will give you the overall picture of program at the cluster level in terms of quality of service and area of coverage. LQAS is a monitoring tool in supervisor's i.e., (Area Manager) hand to identify where are we going right and where are we going wrong with respect to the key indicators of the program. The survey data can help you to take informed decision on allocating your focus and limited resources as per the requirements of the program management. Area Managers (AMs) and Community Facilitators (CFs) are going to do their own assessment of the work done in the cluster and there by empowers you to take necessary actions in the field as required Hence, it's a tool for you to monitor the program effectively and take corrective actions in a timely manner for the effective program implementation.

4. LQAS survey Process at AM level:
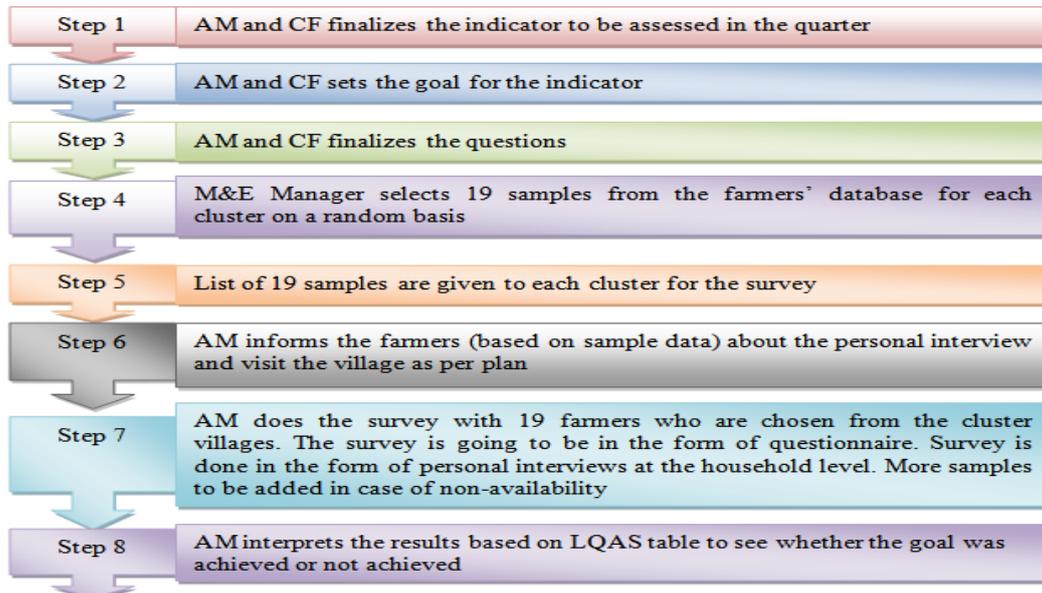
Step 1 & 2: Finalize the Survey objective for the quarter:
- Area Manager needs to finalize the objective or area of performance which he/ she wants to know from the farmers for the quarter.
- Goal for the performance area needs to be finalized based on the objective of the survey.

The Objective/ performance area should be nothing but "whatever we did at cluster level in a specific period of time, were they giving expected results or not".

For Example: "Did we follow the defined process in identification of lead farmer".

Step 3: How to prepare the LQAS questionnaire:
While designing a LQAS questionnaire following points need to be ensured

- Try to keep LQAS questionnaire as simple as possible;
- Do not ask more than one thing in the same question;
- Phrase the questions in an understandable manner so that interviewee would not be confused.
- What you want to know can't be the first question of the survey
- Nothing to be left for assumption for the interviewer or interviewee. Hence all the information need to be taken through a form of questions
- While preparing a questions, always ask yourself the below questions:
- What does this question mean, why it is important?
- Is there a better way to collect the information?
- How will I use this information?

Type of Questions:
1. Questions should be linked with Specific objective, measurable indicator;
2. Responses will be (Yes/No) or multiple options which are more objective;
3. The options for the question need to be as clear and specific as possible.
4. Options can't be left to subjective interpretation.
5. Avoid contrary questions – questions must be indirect, but not obvious and questions would not be subjective, judgmental.

Step 4, 5 & 6: Take 19 samples from M&E manager
If some farmers from 19 samples are not available for the survey, how to handle it?
1. M&E - Manager will generate a list 25 household numbers using random selection from the farmers list of the cluster.
2. First 19 samples list will be shared with respective AM for the LQAS study
3. Based on the list of farmers given, AM need to inform the farmers about his visit to their home one day in advance.
4. In case, AM could not find any of the farmers from first 19 list, AM can request M&E manager to give additional names for the interview process.

Step 7: Execute the survey by doing the personal interviews with sample farmers

Conducting an interview:
- Start with an introduction to the respondent about the purpose of survey and how the survey results will be utilized for the project. Ensure that survey response will not be shared with any third party;
- Always follow a positive approach;
- Whenever necessary stress that the responses would be confidential;
- Questions put forward by the respondents are to be frankly answered;
- Interview the respondent alone, as far as possible.

While conducting an interview:
- Don't be judgmental and be neutral throughout the interview;
- Never suggest answers to the respondent, unless specifically indicated;
- Never change the wording or sequence of the questions;
- Hesitant respondents should be handled tactfully;
- Never form expectations;
- Do not hurry the interview.

Data collection and Data Quality Assurance:

The Area manager needs to interview each farmer personally with the help of LQAS main questionnaire. Data quality assurance is done by the area manager by using two major methods – back check and editing.

Method	Process	How Many	Use
Back Check	Checking the quality of collected data by filling up a back check questionnaire	100% of the sample	It helps to ensure (i) Whether the AM has missed any information about respondent (ii) Whether the responses marked by the AM in the questionnaire matches with the response of the respondent (i.e., farmer) for the same question at the time of back checks.
Editing	Checking all the filled up questionnaire	All filled up questionnaires (100% of editing on total sample)	Editing ensure that (i) Responses are not out of range (ii) Responses are consistent (iii) Whether there are missing information

Step 8:
A. Date Coding in LQAS Summary sheet:
 Once the edited LQAS questionnaire process completed, the data responses will be coded in LQAS summary sheet to make it ready for analysis.
Data Quality Control in LQAS Summery sheet:
1. Check that all the response codes are in same row;
2. Check that there are no blank cells in the column just completed;
3. Be sure that no cells are blank. For any blank cell review the LQAS main questionnaire to see if the response should be coded or not;
Step 8 B. Compiling Summary Table:
1. Count the total number of responses in LQAS summery sheet;
2. Count the total number of positive responses and non-positive responses in the column of total. If the total value is less than the sample size, verify for correctness. Verify for correctness may mean going back to the questionnaire to verify the response for making an appropriate correction entry.
3. In the column of total, "Positive" in each cluster (i.e., Supervision Area), for each respective cluster and corresponding indicator/row, take the total number of positive responses in the result tabulation.
4. Compute the percentage obtained with the cluster. If the value is less than the target, then this indicator is a priority.
5. Get the cluster wise percentage of coverage target and use it to read off the Decision Rule (table. 1) for each cluster.
6. If the cluster has achieved the given decision rule, it is considered as Goal achieved; If Goal is not achieved, it is considered as Goal not achieved.
7. If the number of correct responses in the cluster is less than the Decision Rule value, then that cluster is a priority i.e., the cluster requires an intervention in order to uplift that indicator to the targeted level.
5. Results and LQAS Survey Data Usage:
Usage of the LQAS data can be categorized into two major parts:
A. Use in the Agriculture Project
B. Use in the System
A. Use in the Agriculture Project:
The project uses the LQAS data in the following ways:
1. Understanding and Managing Project Progress
2. Strategize
3. Take Action
4. Reporting

1. Understanding and Managing Project Progress
 As Output and Outcome level indicators are measured through LQAS, it helps us to understand how the Agriculture project is progressing in terms of accomplishments and outcomes in your cluster. The coverage values of the indicators also help to set a target after each round of measurement as reference for next measurement round.

2. Identify Gaps:
 Analysis of the collected data can help to identify the areas of poor performance. This analysis will help to identify gaps and reasons for the same.

3. Strategize:

Identification of the lacuna will help us to decide priorities, prepare new strategies and modify existing strategies at the cluster level. Also, it will help program manager to devise different strategies for different project areas, if needed, based on the performance of the areas on different indicators.

4. Reporting:

The findings are recorded to help the team at different levels for the development of the Agriculture Project.

B. Use in the System

Existing data sources for the system are: 1. Management Information System (MIS) data, 2. The large population survey data. But, the problems with the existing data sources are as follows:

- MIS data is self-reported (meant for upward reporting only) and it is not validated. So, reliability is an issue for it. Besides, the data collection method is not scientific.
- Large scale population survey data are not available concurrently; also data for small geographic region are not available.

LQAS data is an alternative which is scientifically collected, properly validated, available concurrently and for smaller geographical areas (block level) as well. The LQAS data can be useful for the project development:

- Self-monitoring of service providers (both at outreach and facility level);
- Data driven Management by Area Manager and Senior Managers target setting, gap identification, strategize, etc.

6. Practicality of LQAS Survey:

LQAS, is a survey methodology that can be used to accurately classify the supervision area/cluster, this will help the mangers at different levels:

i) Plan based on an informed point;

ii) Allocate resources (financial and human) where the greatest need is required. LQAS survey can help us to identify the level of coverage of the district/Cluster.

Table 1. Instructions for conducting survey using LQAS method

Guidelines
Following are the steps of LQAS survey process
Step 1: Finalise the Performance area to be surveyed along with the goal for the indicator
Step 2: Design the survey form
Step 3: Take the 19 samples list from M&E manager for the survey
Step 4: Execute the survey by doing the personal interviews with sample farmers
Step 5: Enter the details of the survey on the summery sheet
Step 6: Get the results on the survey done
Finalize the Survey objective for the quarter:
AM needs to finalize the objective or area of performance which he/ she wants to know from the farmers for the quarter.
Goal for the performance area needs to be finalized based on the objective of the survey.
The Objective/ performance area should be nothing but "whatever we did at cluster level in a specific period of time, were they giving expected results or not"
Example: "Did we follow the defined process in identification of lead farmer"
How to prepare the LQAS questionnaire:
While designing a LQAS questionnaire following points need to be ensured
Try to keep LQAS questionnaire as simple as possible
Do not ask more than one thing in the same question.
Phrase the questions in an understandable manner so that interviewee would not be confused.
While preparing a questions, always ask yourself the below questions:
(i) What does this question mean, why it is important?
(ii) Is there a better way to collect the information?
(iii) How will I use this information?
Type of Questions:
Questions should be linked with
(i) Specific objective, measurable indicator
(ii) Responses will be (Yes/No) or multiple options which are more objective.
(iii) Avoid contrary questions – questions must be indirect, but not obvious and questions would not be subjective, judgmental.
How to execute the LQAS Survey:
M&E - Manager will generate a list 25 household numbers using random selection from the farmers list of the cluster
First 19 samples list will be shared with respective AM for the LQAS study
Based on the list of farmers given, AM need to inform the farmers about his visit to their home one day in advance.
AM need to interview each farmer personally with the help of LQAS survey form.

In case, AM could not find any of the farmers from first 19 list, AM can request M&E manager to give additional names for the interview process.

Based on the response from the farmer, AM need to fill the survey form

After completion of survey of 19 farmers, the data can be entered in the summery sheet.

Conducting an interview:

Start with an introduction to the respondent about the purpose of survey and how the survey results will be utilized for the project. Ensure that survey response will not be shared with any third party.

Always follow a positive approach;

Whenever necessary stress that the responses would be confidential;

Questions put forward by the respondents are to be frankly answered;

Interview the respondent alone, as far as possible.

While conducting an interview:

Don't be judgmental. Be neutral throughout the interview;

Never suggest answers to the respondent, unless specifically indicated;

Never change the wording or sequence of the questions;

Hesitant respondents should be handled tactfully;

Never form expectations;

Do not hurry the interview.

Conclusion:

LQAS survey classifies Supervision Area as high or low on performance area selected based on the predetermined goal set for the indicator.

Table 2. LQAS Decision Rules:

Sample Size*	Average Coverage (Baselines) / Annual Coverage Target (Monitoring and Evaluation)																	
	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
12	NA	NA	1	1	2	2	3	4	5	5	6	7	7	8	8	9	10	11
13	NA	NA	1	1	2	3	3	4	5	6	6	7	8	8	9	10	11	11
14	NA	NA	1	1	2	3	4	4	5	6	7	8	8	9	10	11	11	12
15	NA	NA	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	13
16	NA	NA	1	2	2	3	4	5	6	7	8	9	9	10	11	12	13	14
17	NA	NA	1	2	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	NA	NA	1	2	2	3	5	6	7	8	9	10	11	11	12	13	14	16
19	NA	NA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20	NA	NA	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17
21	NA	NA	1	2	3	4	5	6	8	9	10	11	12	13	14	16	17	18
22	NA	NA	1	2	3	4	5	7	8	9	10	12	13	14	15	16	18	19
23	NA	NA	1	2	3	4	6	7	8	10	11	12	13	14	16	17	18	20
24	NA	NA	1	2	3	4	6	7	9	10	11	13	14	15	16	18	19	21
25	NA	1	2	2	4	5	6	8	9	10	12	13	14	16	17	18	20	21
26	NA	1	2	3	4	5	6	8	9	11	12	14	15	16	18	19	21	22
27	NA	1	2	3	4	5	7	8	10	11	13	14	15	17	18	20	21	23
28	NA	1	2	3	4	5	7	8	10	12	13	15	16	18	19	21	22	24
29	NA	1	2	3	4	5	7	9	10	12	13	15	17	18	20	21	23	25
30	NA	1	2	3	4	5	7	9	11	12	14	16	17	19	20	22	24	26

NA: Not Applicable, meaning LQAS cannot be used in this assessment because the coverage is either too low or too high to assess an SA. This table assumes the low threshold is 30% points below the upper threshold.

: Light shaded cells indicate where alpha or beta errors are greater than or equal to 10%.

: Dark shaded cells indicate where alpha or beta errors are greater than 15%.

II.   Conclusion:

This paper presents a new protocol for establishing a decentralized monitoring and evaluation system at State, district, mandal, and village level. LQAS helps at different levels in evidence based decision making and periodical planning, it will give disaggregated results to existing administrative structures with in the project area and identify priority areas to focus on project interventions. The real power of LQAS method is in producing measurement results for the supervision area (i.e., the cluster) that were sampled to include in the survey, while simultaneously calculating point estimates for the project catchment area. This best feature allows project managers to direct resources where they are needed at the local level to improve current project, and to decide where new activities could be planned with an additional support and identifying required changes in project design, implementation will work to increase project reliability and effectiveness. Finally, the use of LQAS can help to establish a systematic and sustainable monitoring approach for better implementation of the project that can continue beyond the tenure of a supporter funded project.

References:

[1]. Lemeshow S, Taber S. Lot quality assurance sampling: single and double-sampling plans. World Health Statistics Quarterly 44, 115-132.
[2]. Lemeshow S, & et al. *Adequacy of sample size in health studies.* Chichester, John Wiley & Sons, 1990. (Published on behalf of the World Health Organization).