Estimation of Private Food Grain Stock
Methodology for Assessing Private Food Grain Stock

Technical Session 4:

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Framework of Agricultural Operations and Private Stock Accumulation at the farm gate

Production frontier

Endowment and access to resources: e.g. land, credit, labour, technology

output

Farmer perception of gain and risk
- Instant grain sale
- Future grain sale for profit
- Grain repurchase

Marketing channels
- Primary such as village market, mandi etc.
- Secondary market
- Pre harvest sale
- Forward market

Marketing frontier

Food security
- Availability
- Access

Post harvest grain stock management frontier

Grain loss
- Quantity
- Quality

Storage
- Treatment
- Processing
Private Food stock at farm gate

Data from Cost of cultivation survey (CSS) (RT-610) shows that Farmer hold significant amount of stock at the end of any agricultural year

<table>
<thead>
<tr>
<th>Crop</th>
<th>2011-12</th>
<th>2012-13</th>
<th>2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>94.9</td>
<td>93.51</td>
<td>95.91</td>
</tr>
<tr>
<td>Rice</td>
<td>105.3</td>
<td>105.2</td>
<td>106.5</td>
</tr>
<tr>
<td>Maize</td>
<td>21.76</td>
<td>22.26</td>
<td>24.35</td>
</tr>
<tr>
<td>Soya bean</td>
<td>12.21</td>
<td>14.67</td>
<td>11.99</td>
</tr>
</tbody>
</table>

Stock of Wheat, Rice, Maize and Soya bean at farm gate (in percent of production)
Present Status of stock estimation and availability of relevant data

• RT 610* collects data on receipt and disposal including ‘opening stock, ‘closing stock’.

• It also collects few information on farmer’s practices.

• However, does not estimate any private farm gate stock.

* RT 610 is one of the schedules of Cost of cultivation study data plan

The reasons ............
Present Status of stock estimation and availability of relevant data in CCS

• CCS focus is on estimation of cost of cultivation
  – not on stock estimation
• Small sample
• Sampling design and crop complex approach
  – Mainly captures principal crops
  – does not necessarily ensure crops with less cultivable area (data on soya bean is of concern) – call it “minor” crops
• Data quality issue
Present Status of stock estimation and availability of relevant data

- Present sampling design-multistage stratified
- In target States

<table>
<thead>
<tr>
<th>Strata</th>
<th>States are divided into homogeneous zones</th>
</tr>
</thead>
</table>
| First stage selection | • Tehsils (sub division) are selected using PPSWOR; size being area under selected crop  
  • One village selected using PPSWOR; size being area under selected crop |
| Second stage selection | • All farm holdings of the selected village listed and classified into five size classes.  
  • Two operational holdings are selected from each size classes using simple random sampling. |
 Nodes of Food Grain stock Accumulation

- Farming Households
- Institutional farms
- Non-farming households
- Institutions (hotel/restaurants etc)
- Millers and Processors
- Wholesalers and Retailers (including Exporters and Importers)

1. The Non-farming is excluded from the study as non-farming Household keep stock for consumption. If household use stock for commercial purpose it becomes an enterprise-captured in the proposed survey.
2. Government Procurement and Stock Excluded
Domains of Private Food Grain Stocks
covered by Indian Statistical System

ON FARM

Farm Gate Stock
- Cost of Cultivation Survey

Indian Statistical System could generate stock data through surveys

OFF FARM

Annual Survey of Industries
- Big gap

Large Processors & Millers
Large Wholesalers & Retailers
Large Hotels and Restaurants
Small Processors & Millers
Small Wholesalers & Retailers
Small Hotels and Restaurants
Exporters and Importers

Through census by regularity body

Enterprise survey for unorganised sector

Through surveys

A fresh look at the Cost of Cultivation Survey

- CCS is an intensive survey for data collection on inputs used for the cultivation of crop.
- Besides, CSS also collects demographic information of the farmers, post harvest transportation cost, production, sale, feed use, seed use and stock etc.

CSS can be viewed as Farm Management Survey having two components

<table>
<thead>
<tr>
<th>Pre harvest Farm Management Survey</th>
<th>Post harvest Farm Management Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome: Cost of cultivation that includes rent, cost of human labour, cost of machine use, cost of animal use, cost of seed, fertiliser and pest control, cost of irrigation etc</td>
<td>Outcome: production, sale, feed use, seed use and stock etc. cost of Marketing, farmer’s practice on storage and protection of the stock, Farmers disposal in the market and farmers awareness about government procurement etc.</td>
</tr>
</tbody>
</table>
• Modified Sampling Design of CSS
  - more elaborate schedule for ‘receipt and disposal’ of agricultural produce suggested
  - In a manner that the cost implication is very small.
Two alternative designs suggested for field testing

Alternative-1

Modify the existing sample design by dividing the Tehsils into two sub-strata.

- Villages where “minor” crops are cultivated last year – sub strata 1
- Rest of the villages - sub strata 2

Thereby increasing the chance of capturing the “minor” crops
• There is no fixed definition of “minor” crops in set of Principal crops However, area under cultivation of crops may be arranged in descending order of magnitude and first few crops may be considered as major crop and rest may be taken as minor crop.

• Decision may be left to the respective state

• In exceptional cases there may not be any villages that did not cultivate any minor crop last year or all the villages in the thesil where farmers did cultivate one or the other minor crops. In such cases the sub statum will not be formed.
Alternative 2

The design is similar to the alternative 1 except for the fact that instead of the formation of sub-stratum at the Tehsil level Second stage Stratification should be done at village level by enumerating holdings used for cultivation of “minor” crops last year.

From each second stage stratum one holding from each size group should be selected.

The best alternative may be decided through a pilot survey
• Revised schedule:

The revised schedule has been extended to capture farmers practice, disposal in the market by the farmers, farmer’s awareness about government procurement.

The [three page](#) schedule can be canvassed with the Cost of cultivation survey or separately surveyed on the operational holdings where cost of cultivation survey was conducted.
Off Farm Private food Stock Estimation and Value Chain Analysis
Value Chain

**Grain milling and processing**
- Rice: Paddy cleaning, husking, parboiling etc.
- Wheat and maize: cleaning and grinding
- Soya bean: milling and oil extraction

**Traders and Wholesale Distribution centre**
- Rice: Paddy parboil, brown white etc.
- Wheat flour: coarse cereal, animal feed
- Soya bean: milled soya oil etc.

- Small retailer
- Big retailer
- Caterer
- Export
- Import
Value Chain

FARMS → Processing and Distributing → Wholesaling and retailing → CONSUMER

Initiator → The Black Box → Final Destination
Various alternatives were thought of

1. Extending Annual Survey of Industry to enumerate stock held by millers and processors

2. NSS like stand alone survey for small enterprises

3. Continuous survey for small enterprises using Rotational panel survey methodology. etc.
Finally it was thought to be logical to go for independent survey using Latest Economic Census Frame.

What is Economic Census?
Off Farm Private food stock Estimation

• Census of all the establishments engaged in any economic activities of either agricultural or non-agricultural sector

• Excludes crop production, plantation, public administration, defence and compulsory social security of the country.
Off Farm Private food stock Estimation

• A list frame and an Area frame survey should done in same reference period.
• Quarterly survey is suggested
• Same samples are to be surveyed for three years aligning with agricultural stock survey.
Off Farm Private food stock Estimation

• Following are the focal industry for stock estimation survey

<table>
<thead>
<tr>
<th>NIC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>manufacture of grain mill products, starches and starch products</td>
</tr>
<tr>
<td>107</td>
<td>manufacture of other food products</td>
</tr>
<tr>
<td>108</td>
<td>manufacture of prepared animal feeds</td>
</tr>
<tr>
<td>462</td>
<td>Wholesale of agricultural raw materials and live animals</td>
</tr>
<tr>
<td>469</td>
<td>non-specialized wholesale trade</td>
</tr>
<tr>
<td>471</td>
<td>retail sale in non-specialized stores</td>
</tr>
<tr>
<td>472</td>
<td>retail sale of food, beverages and tobacco in specialized stores</td>
</tr>
<tr>
<td>479</td>
<td>retail trade not in stores, stalls or markets</td>
</tr>
<tr>
<td>561</td>
<td>restaurants and mobile food service activities</td>
</tr>
<tr>
<td>562</td>
<td>event catering and other food service activities</td>
</tr>
</tbody>
</table>

NIC: National Industrial Classification
Off Farm Private food stock Estimation

• List frame consists of
  List of enterprises having more than 20 or more worker.

• Area Frame- Sample survey to be undertaken.

Methodology ......
Area frame:

• The Sixth Economic Census conducted during 2013-Apr-2014 may be the frame for food grain stock estimation survey.

• A stratified multi-stage design should be adopted for the food stock estimation survey.

• The first stage units (FSU) were the 2011 census villages/EB blocks in the rural sector and Census 2011 Enumeration blocks in the urban sector.
**Stratification:** Within each state of a State/ UT, rural and urban strata may be formed in the following manner:

<table>
<thead>
<tr>
<th>NIC</th>
<th>villages/Ebs having</th>
<th>Strata</th>
<th>NIC</th>
<th>villages/Ebs having</th>
<th>Strata</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>manufacture of grain mill products, starches and starch products</td>
<td>stratum 1</td>
<td>471</td>
<td>retail sale in non-specialized stores</td>
<td>stratum 6</td>
</tr>
<tr>
<td></td>
<td>From remaining Ebs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>107</td>
<td>manufacture of other food products</td>
<td>stratum 2</td>
<td>472</td>
<td>retail sale of food, beverages and tobacco in specialized stores</td>
<td>stratum 7</td>
</tr>
<tr>
<td></td>
<td>From remaining Ebs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>108</td>
<td>manufacture of prepared animal feeds</td>
<td>stratum 3</td>
<td>479</td>
<td>retail trade not in stores, stalls or markets</td>
<td>stratum 8</td>
</tr>
<tr>
<td></td>
<td>From remaining Ebs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>462</td>
<td>Wholesale of agricultural raw materials and live animals</td>
<td>stratum 4</td>
<td>561</td>
<td>restaurants and mobile food service activities</td>
<td>stratum 9</td>
</tr>
<tr>
<td></td>
<td>From remaining Ebs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>469</td>
<td>non-specialized wholesale trade</td>
<td>stratum 5</td>
<td>562</td>
<td>event catering and other food service activities</td>
<td>stratum 10</td>
</tr>
<tr>
<td></td>
<td>From remaining Ebs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Stratification

- Sub Stratification:
  Districts will form sub-strata.

**Total Sample:**

In the absence of any data on stock survey no estimate of number of sample can be determined to ensure the RSE to be $\leq 1$ percent.

However from Enterprise survey, and analyzing the RSE of relevant NIC groups

<table>
<thead>
<tr>
<th>Residual Standard Error</th>
<th>Sample village /EB required</th>
<th>Cost (in million Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 1$ Percent</td>
<td>16000</td>
<td>107.16</td>
</tr>
<tr>
<td>$&lt;5$ Percent</td>
<td>11500</td>
<td>85.21</td>
</tr>
</tbody>
</table>
Stratification

Second Stage Stratification

Segments

Enterprise with no hired worker

Enterprise with at least one hired worker

SSS 1
SSS 2
SSS 3
SSS 4

engaged in milling activity
Wholesaling and Retailing
hotels & Restaurant
Others including online retailing

Sample enterprises

2 2 2 2 2
Selection

• Total Number of sample to be selected from each First Stage Unit- 16

FSUs are to be selected using PPSWOR using number of enterprises of interest as size. Sample enterprises are to be selected using SRSWOR in each SSS.
• Please Click here
## Cost Analysis

**Option-1:** 16000 villages/Ebs: 256000 enterprises  
**Option-2:** 11500 villages/Ebs: 184000 enterprises

<table>
<thead>
<tr>
<th>Item heads</th>
<th>Option 1</th>
<th></th>
<th>Option 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number</td>
<td>First year cost</td>
<td>number</td>
<td>First year cost</td>
</tr>
<tr>
<td>total worker needed</td>
<td>200</td>
<td>60000000</td>
<td>150</td>
<td>45000000</td>
</tr>
<tr>
<td>supervisory worker</td>
<td>20</td>
<td>12000000</td>
<td>15</td>
<td>9000000</td>
</tr>
<tr>
<td>tablet</td>
<td>210</td>
<td>3780000</td>
<td>160</td>
<td>2880000</td>
</tr>
<tr>
<td>Software development</td>
<td>-</td>
<td>3500000</td>
<td>-</td>
<td>3500000</td>
</tr>
<tr>
<td>consultants/researchers</td>
<td>5</td>
<td>10800000</td>
<td>5</td>
<td>10800000</td>
</tr>
<tr>
<td>Manager</td>
<td>2</td>
<td>4800000</td>
<td>2</td>
<td>4800000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>94880000</td>
<td></td>
<td>75980000</td>
</tr>
<tr>
<td>travel</td>
<td></td>
<td>12096000</td>
<td></td>
<td>9046000</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>106976000</td>
<td></td>
<td>85026000</td>
</tr>
</tbody>
</table>
Recommendation

• Separate surveys for farm gate stock measurement and Off farm stock assessment
• Though considerable cost involved in off farm survey, outcome is of great national interest.
• Pilot survey for field testing of alternatives suggested is required
• If implemented many country would follow the Indian method
THANK YOU