Development of Software for Digitization of Collected Data under a Pilot Study to Estimate Crop Area and Production based on the Sample Sizes Recommended by Professor Vaidyanathan Committee Report

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SUMMARY

To draw inference from the collected data under the pilot study was taken up to examine the reliability of estimates of crop area and crop production at state and national level on the basis of sample sizes recommended by the Prof. Vaidyanathan committee report, a paper based survey was conducted in five states, namely, Assam, Uttar Pradesh, Karnataka, Gujarat and Odisha. Under this survey in all this 5 states all the districts were enumerated with total sample size of 4700 villages and to digitize the huge data collected under this project, there is a need to develop a data entry software for digitization of the primary data. This paper deals with the development and implementation of the data entry software under this project. To make the software user friendly the software was developed using .Net Technology. The software was implemented in all the 5 states under the survey and it was found performing properly.

Keywords: Data entry software; .Net technology; Pilot study; Sample size; Vaidyanathan committee.

1. INTRODUCTION

The data collected and analyzed in an objective manner and presented suitably serve as basis for taking policy decisions in different fields of daily life. The important users of statistical data, among others, include Government, Industry, Business, Research Institution, Public Organizations, and International Organizations. The inferences drawn from the data help in determining future needs of the nation and also in tackling social and economic problems of people. For instance, the information on cost of living for different categories of people, living in various parts of the country, is of importance in shaping its policies in respect of wages and price levels. Agricultural production data are of immense use to the states for planning to feed the nation. The data are used by public organizations to assess the state policies, and to point it out to the administration if these are not up to the expectations of the people. Surveys are mostly important in forming policies in developing

countries and in most of the developing countries Agriculture plays a vital role, like in India over 50 per cent of the rural households depend on agriculture as their principal means of livelihood. Agriculture along with fisheries and forestry accounts for one-third of the nation's Gross Domestic Product (GDP) and is its single largest contributor. Agricultural exports constitute a fifth of the total exports of the country. In view of the predominant position of the Agricultural Sector, collection and maintenance of Agricultural Statistics assume great importance. In India, estimates of yield rates of principal food and non-food crops are obtained on the basis of crop cutting experiments conducted in majority of States/Union Territory (UTs) under the National Programme of Crop Estimation Survey (CES). At present, over 95 per cent of the production of food grains is estimated on the basis of yield rates obtained from the crop cutting experiments conducted on scientific basis spread over 29 States / UTs. The Directorate of Economics and Statistics (DES), Ministry of Agriculture and Farmers Welfare,

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Govt. of India releases estimates of area, production and yield in respect of principal crops of food grains, oilseeds, sugarcane, fibers and important commercial and horticulture crops. These crops all together account for nearly 87 per cent of agriculture output.

The need for timely, reliable and comprehensive statistics on area and crop production assumes special significance in view of the vital role played by the Agricultural Sector in the Indian Economy. The primary responsibility for collection of statistics of land use and area under crops following prescribed procedures rests with the various State authorities. The yield rates of principal crops are estimated through General Crop Estimation Survey (GCES) conducted by State agencies following scientific techniques of random sampling. During past few agricultural years, a total number of 9,00,000 (approx) crop cutting experiments covering 52 food and 16 non-food crops were planned in different States/UTs as compared to 1,73,097 CCEs planned during 1973-74. The number of crop cutting experiment is on the rise and as such different types of non-sampling errors etc. have affected the data quality. In order to overcome this problem, Improvement in Crop Statistics (ICS) scheme has been in operation but desired improvement in data quality is not forthcoming. Hence, the Govt. of India felt necessity to reevaluate the system and to modify the system so that the problems encountered in the survey can be reduced.

1.1 Background

Under General Crop Estimation Survey (GCES) about 9 Lakh crop cutting experiment are being conducted to provide estimates of yield rates of principal crops at state and National Level. It was felt that this number is too large and needs relook and re-examination. Accordingly, a committee was set up under Prof. A. Vaidyanathan on Improvement of Agricultural statistics to deliberate on the issue. The report of the Professor Vaidyanathan committee has suggested that a sample of 90 Thousand crop cutting experiments (from 15,000 Villages) would be adequate for estimation of crop area and yield at state and national level. Accordingly, ICAR-IASRI has under taken a pilot study with the objective of examining the reliability of estimates of crop area and yield rate at state and national level for different crops based on the sample sizes recommended in the Prof

Vaidyanathan Committee report. The pilot study has covered 5 states namely Assam, Gujarat, Karnataka, Odisha and Uttar Pradesh.

1.2 Sampling Design

Under this pilot study we are considering 5 states, preferably one each from Northern, Southern, Eastern, Western and Central region of the country which was Assam, Uttar Pradesh, Karnataka, Gujarat and Odisha. Among the states selected 4 states falls under the TRS scheme and one state under EARAS Scheme and the hilly districts of Assam corresponds to "No Land Record" states. In this study our aim is to produce estimates of crop area at district, state and national level. For crop area estimation, a stratified three stage sampling design was proposed to be employed and for the estimation of average yield, a stratified four stage random sampling design will be used (Singh *et al.,* 1996, Sarandal *et al.,* 1992). Under this sampling design, within each State, district wise list of Tehsils/ Taluks/RI Circles/CD Blocks/Anchals etc. (sampling frame) was prepared. Out of this frame, a random sample of Tehsils/Taluks/RI Circles/CD Blocks/ Anchals etc. was selected at the first stage with Simple Random Sampling without Replacement in proportion to gross cropped area of Tehsils/Taluks/RI Circles/ CD Blocks/Anchals etc.. At the second stage, list of villages among the selected Tehsils/Taluks/RI Circles/ CD Blocks/Anchals etc. was prepared and a sample of revenue villages was selected with equal probability without replacement sampling design. From each selected village, 100 survey numbers was selected randomly using equal probability without replacement sampling design in the form of clusters of 5 survey numbers and enumerated completely to estimate the crop area. The selected 100 survey numbers constitutes the crop wise frame for selection of plots for conduct of the crop cutting experiments. From the crop wise list of survey numbers 2 Survey numbers were randomly selected for the purpose of crop cutting experiment for each crop. In each selected village, 6 Crop Cutting Experiments (CCE) - 2 CCEs each on 3 major food grain crops (cereals, pulses and oilseed crops only) was conducted in Agricultural year 2015-16 for the states Assam, Odisha, Uttar Pradesh and Karnataka and in Gujarat in Agricultural year 2016-17 in both Kharif and the Rabi season. As the survey is proposed to be conducted in 5 States, namely, Assam, Gujarat, Karnataka, Orissa and Uttar Pradesh and the

recommended a sample size as per recommendations of Prof. Vaidyanathan committee report is of 15,000 villages throughout India, accordingly, on the basis of states gross cropped area, a sample of size 4,700 villages were allocated to these 5 States i.e. Assam (300 village), Gujarat (900 village), Karnataka (1000 village), Orissa (500 village) and Uttar Pradesh (2000 village). Accordingly, for area estimation 470000 Survey Numbers/Fields (=4700 V x 100 Survey Numbers/Fields) was randomly selected and their area under crop recorded. For yield estimation, a total of 4,700 V x 6 CCEs = 28,200 (approx.) CCEs was conducted in these 5 States.

For data collection work paper based schedules/ questionnaire were formulated to take into account the proposed methodology. Three schedules were developed. There are total three schedules developed under the project and the schedules are as following,

1.2.1 Enumeration Schedule

This schedule was prepared for collection of data on crop area for selection of crop area data for the randomly selected 100 survey numbers in each village under the pilot survey. Through this schedule a crop wise frame of the survey numbers was prepared by the field enumerators. The schedule has three parts. The first part contains information about the selected village within a district of a state. The second part contains the information about the selected village like the net crop area, total geographical area, total survey number, total number of household in the village, crop season, irrigation status etc. The third part of the schedule contains questions regarding the selected 100 survey numbers in the form of clusters of 5 survey numbers. It contains information regarding the selected survey number, area of the survey number, name of the farmer, name of the crops cultivated and the corresponding area under each crop.

1.2.2 CCE Schedule–I: Particulars of Parcels Selected for Crop Cutting Experiments

This schedule is to be filled the day of selection of parcel/survey number at least one month before start of crop harvest. This questionnaire contains 5 parts. The first part contains information about the particulars of the village i.e. district, tehsil, agricultural season, name of the village, name of the crop, total/highest survey number in the village, total survey number selected

under the crop out of 100. The second part of the questionnaire contains information about the selection of two survey numbers out of the frame of the survey numbers under a crop within the village randomly. The third part of the questionnaire contains the information about the selection of CCE plots for the crops Paddy, Jowar, Bajra, Ragi, Maize, Groundnut, Sesamum and other crops when they are not sown in rows, when sown in rows in one direction and for cash crops. The fourth part of the schedule contains questions for mixed cropping and the fifth part, Rough Sketch of the selected field and south west corner of CCE plot.

1.2.3 CCE Schedule–II: Details of Produce (wet and dry) obtained from CCE Plots

This questionnaire contains questions for recording the yield of the crop from the CCE plot after harvesting and threshing. It has four parts. The first part contains the particulars of the village where the CCE will take place, the second part is for Particulars of selection of experimental plots for CCE; in this part we gather information about finally selected survey number, area of the field, crop sown, seed rate of the crop and method of sowing. In the next part of the schedule, information of inputs applied to the experimental crop after filling CCE Schedule-1 was collected. In this part we collect the farmer's eye estimate of the crop yield (in Quintal/hectre). In the fourth part of the schedule we collect information regarding Results of harvesting and threshing. In this portion we record the green and dry weight of the crop harvested from the CCE plot along with the date of harvesting and threshing and information about the driage experiment.

1.3 Need and Importance of Data Entry Software

After collection of the data using the paper based schedules, there is a need for analysis of the data for drawing conclusion from the collected data. But for analysis there of the data collected through the paper based questionnaires, there is a need for digitization of the huge amount of the data to a specific format so that the scrutiny and cleaning of the data can be done easily and it can be processed for analysis. To perform this digitization of data, this data analysis software was prepared at the ICAR-Indian Agricultural Statistics Research Institute, New Delhi and implemented in the state head quarters of the five states under the pilot study namely, Assam, Uttar Pradesh, Karnataka, Gujarat and Odisha. There are some checks and conditions

are kept inbuilt within this software like the village, tehsil, district name, age of the farmer, area unit etc. so that few non-sampling errors that are very commonly found in the data can be eradicated. The software is based on .net platform and it is standalone software which works offline. After the data entry operation is complete the software produce a MS-Excel file of the entered data as per our required format for analysis. To make the software user friendly the software was developed using .Net Technology. ASP.net window forms of visual C# were used for designing of the user interface and coding of business logics in the system. The database of this system contains information about each and every schedule developed under this project. SQL server 2008 has been used for database management system.

2. TECHNOLOGY & METHODOLOGY USED FOR DEVELOPMENT OF DATA ENTRY SOFTWARE FOR DIGITIZATION OF QUESTIONNAIRES

The data collection work was initiated in the states and filled in schedules were obtained at the state headquarters. To draw inference from the collected data from the paper based survey conducted in the proposed states, we felt a need to develop data entry software to digitize the huge amount of primary data collected from the field. The following sections describes about the technology and methodologies used to develop the data entry software under this project. For transferring data from filled-in schedules into digital form, a standalone software has been developed. The data already filled in the hard copies of the Schedules are to be entered or transferred to this software manually. The data would be entered by the data entry operators, who will enter each record and will also make sure that the entries made are correct. There are some validating conditions in the software that resist the entry of erroneous information in to the database. Thus, data entry and reconciliation can be combined in this software.

2.1 Technology Used

The goal in application development is to create the best possible software in the least amount of time. Yet the bar is continually raised, as demands from users increase. This software is developed using .Net Technology. The .NET framework consists of the common language runtime and the .NET framework

class library (Rongge, 2002). The common language runtime is the foundation of .NET framework. ASP.net following Rongge (2002) and Qiang (2004) windows forms in visual C# have been used for designing of the user interface and coding of business logics in the system. It is a platform that provides tools and technologies to develop Windows, Web and Enterprise applications.

- Common Language Runtime (CLR)
- Net Framework Class Library.
- Common Type System (CTS)
- Common Language Specification (CLS)

2.1.1 Common Language Runtime (CLR)

Qiang (2004) .Net framework provides runtime environment called Common Language Runtime (CLR). It provides an environment to run all the .Net Programs. The code which runs under the CLR is called as Managed Code. Programmers need not to worry on managing the memory if the programs are running under the CLR as it provides memory management and thread management. Programmatically, when our program needs memory, CLR allocates the memory for scope and de-allocates the memory if the scope is completed. Language Compilers (e.g. C#, VB.Net, J#) will convert the Code/Program to Microsoft Intermediate Language (MSIL) intern this will be converted to Native Code by CLR. See the below Fig.
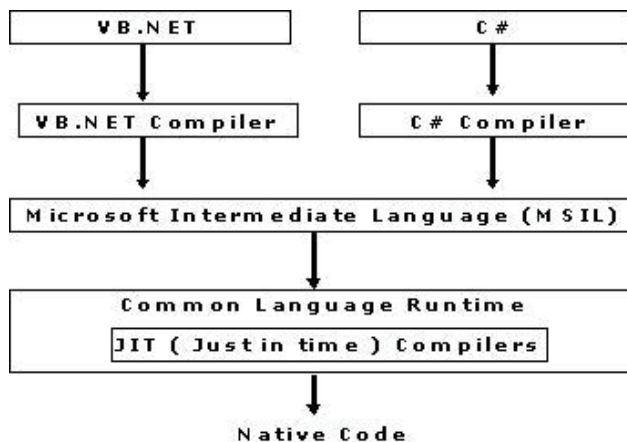
There are currently over 15 language compilers being built by Microsoft and other companies also producing the code that will execute under CLR.

2.1.2 .Net Framework Class Library (FCL)

This is also called as Base Class Library (BCL) and it is common for all types of applications i.e. the

way you access the Library Classes and Methods in VB.NET will be the same in C#, and it is common for all other languages in .NET.

The following are different types of applications that can make use of .Net class library.

- Windows Application.
- Console Application
- Web Application.
- XML Web Services.
- Windows Services.

In short, developers just need to import the BCL in their language code and use its predefined methods and properties to implement common and complex functions like reading and writing to file, graphic rendering, database interaction, and XML document manipulation.

2.1.3 Common Type System (CTS)

It describes set of data types that can be used in different .Net languages in common. (i.e.), CTS ensures that objects written in different .Net languages can interact with each other. For Communicating between programs written in any (Blakeley *et al.,* 2008) .NET complaint language, the types have to be compatible on the basic level. The common type system supports two general categories of types: Value types: Value types directly contain their data, and instances of value types are either allocated on the stack or allocated inline in a structure. Value types can be built-in (implemented by the runtime), user-defined, or enumerations. Reference types: Reference types store a reference to the value's memory address, and are allocated on the heap. Reference types can be self-describing types, pointer types, or interface types. The type of a reference type can be determined from values of self-describing types. Self-describing types are further split into arrays and class types. The class types are user-defined classes, boxed value types, and delegates.

2.1.4 Common Language Specification (CLS)

It is a sub set of CTS and it specifies a set of rules that needs to be adhered or satisfied by all language compilers targeting CLR. It helps in cross language inheritance and cross language debugging. Common language specification Rules: It describes the minimal

and complete set of features to produce code that can be hosted by CLR. It ensures that products of compilers will work properly in .NET environment.

Sample Rules:

- Representation of text strings
- Internal representation of enumerations
- Definition of static members and this is a subset of the CTS which all .NET languages are expected to support.
- Microsoft has defined CLS which are nothing but guidelines that language to follow so that it can communicate with other .NET languages in a seamless manner.

2.1.5 Microsoft SQL Server

Microsoft SQL Server is an application used to create computer databases for the Microsoft Windows family of server operating systems. Microsoft SQL (Nielsen and Parui, 2011) Server provides an environment used to generate databases that can be accessed from workstations, the Internet, or other media such as a personal digital assistant (PDA).The database of this system contains information about each and every schedule. SQL server 2008 has been used for database management. A primary key has been defined for unique identification of the records. Similarly, foreign keys are used to set relationship with the tables. The requirements to install the data entry software are: operating system- Windows 7 and above equipped with Microsoft .NET framework and SQL Server 2008. The database named as 'sample', it has five tables named State, District, village, Farmer, schedule 2 and schedule 3. Each table has some fields which stores the records entered by user. Records in the table are populated with random values.

Table 1. Design of one table used in the software where StateId column is defined as primary key

S.No	Column Name	Data Type
1	StateId	int
2	State	Varchar(50)
3	District	Varchar(max)
4	Tehsil	Varchar(50)
5	CD_Block	Varchar(max)
6	Village	Varchar(max)

2.2 Salient Features of the Data Entry Software

Some screenshot of the developed software is as follows:-

The homepage of the software is given below in Fig. 4.1.

The homepage describes the project in brief and has the link for entering in the software. On entering the software, the page given in Fig. 4.2 opens. Here, the user can choose the schedule which has to be filled in.

The software contains the provision and capability of entering the data in three Schedules, Enumeration Schedule, Schedule-I and Schedule-II. Enumeration Schedule is Enumeration of 100 household/survey number in the selected village. In this Schedule, the basic details of the selected village and farmers are entered. The user can also update the village and farmers details, if necessary. This functionality is available in the software. Data once entered has to be submitted so that it gets saved in the database. Once the entered data is submitted, user can view the data which is entered by him/her. The user can also generate an

Figure 4.1

Fig. 4.2

excel sheet of the data which is entered and submitted using the tab "Create Excel".

In Enumeration Schedule user has to enter the village's identification particulars and general information. Fig. 4.4 shows the basic information of selected village.

Once the village information has entered into the software, user can now enter the details of 100 pacels selected under village (Fig. 4.5).

After entering all the required information user cen view the entered data into the software and can generate the excel file (Fig. 4.6).

Data entry for crop cutting experiments (CCEs) is done in phases in specially designed Schedules. Enumeration Schedule includes the basic details about the farmer, village and the field /parcel selected for the CCE. Once the Enumeration Schedule is filled up, Schedule-I is to be filled in. Schedule I is filled only
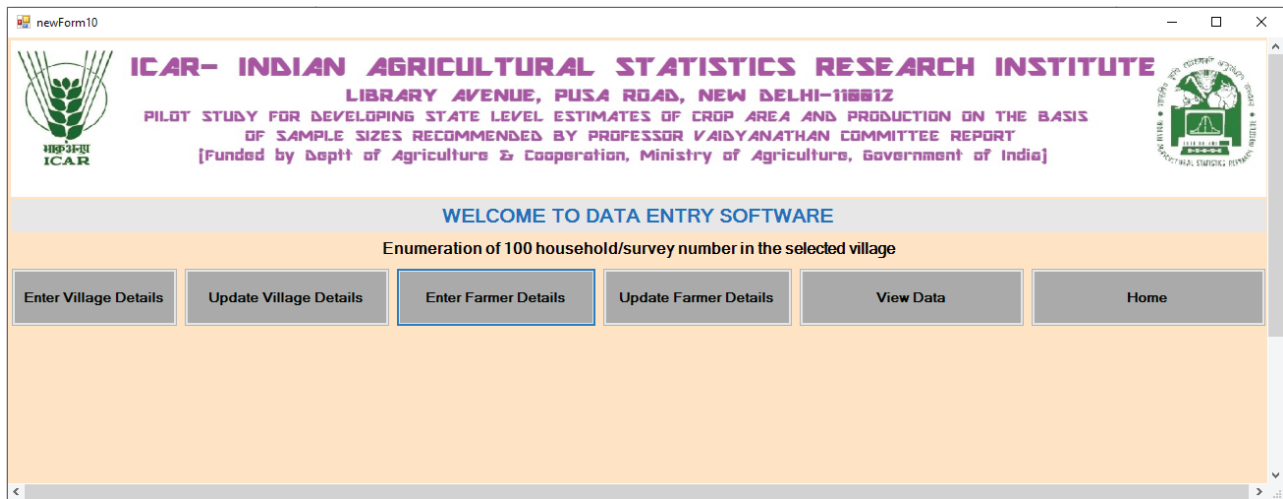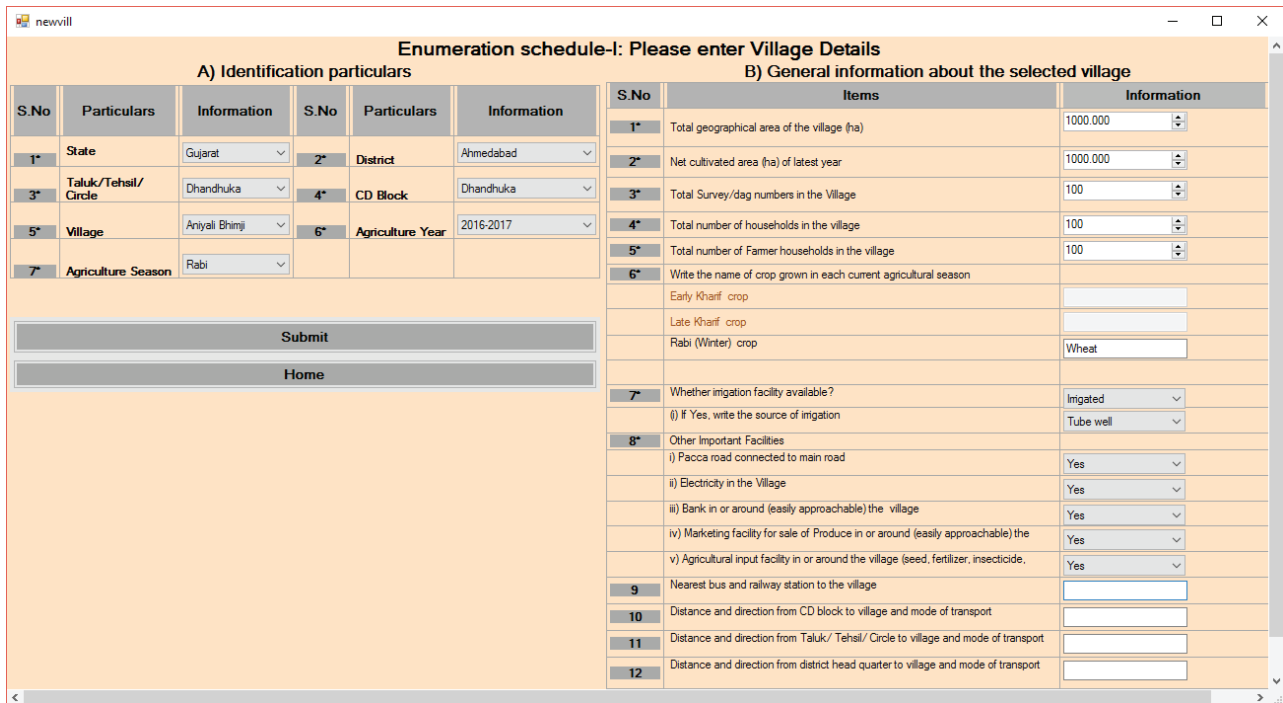

Fig. 4.3

Fig. 4.4

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CCE Schedule-I: Particulars of parcels selected for crop cutting
1.0 Particulars of the village

S.No	Items	Information
1.1	Agricultural Year	2016-2017
1.2	Agricultural Season	Rabi
1.3	District	Ahmedabad
1.4	Taluka/ Tehsil/ Circle	Dhandhuka
1.5	CD Block	Dhandhuka
1.6	Village	Aniyali Bhimji
1.7	Name of the Crop	Wheat
1.8	Date of visit to the village	ednesday, March
1.9	Highest survey/ dag number or total farmer households (HH) in the village	100
1.10	Total number of survey/ dags or farmer households selected out of hundred growing the particular crop under this study	50

Save Data   **Home**

Notes:
1. Fill up the schedule on the day of selection of parcel/ survey number at least one month before start of the crop harvest.
2. Respond to every item, if any information is not available,
3. Fill seperate schedule for each crop write 'not available'. Tick appropriate item where choices are provided.

2.0 Selection of Fields

S.No	Items	Experiment-I	Experiment-II
2.1	Random Number selected for selection of survey/ dag/ HH for CCE	1	2
2.2	Number of survey/ dag/ HH corresponding to selected random number	1	2
2.3	reason for rejection of the survey number, if any	NA	NA
2.4	If rejected, new random number for selection of survey/ dag/ HH for CCE	1	2
2.5	Number of survey/ dag/ HH corresponding to newly selected random number	1	2
2.6	Survey/ dag/ HH Number finally selected	1	2
2.7	Number of fields in the selcted survey/ dag number	2	1
2.8	Field number nearest to South west Corner of the selected survey/ Dag Number	5	2
2.9	Area of finally selected field nearest to South West Corner of the selected Survey/	10.000	10.000
2.10	Name of the farmer of the selected field	Ram	Shyam
2.11	Name of the farmer's father of the selected field	Hariya	Kishore
2.12	Age of the farmer	30	35
2.13	Sex of the farmer	Male	Male
2.14	Education level of the farmer	Literate	Matric
2.15	Soil type of the selected field	Sandy	Sandy
2.16	Approximate date and month of sowing or transplanting	ednesday, March	ednesday, March
2.17	Method of sowing (Broadcasting/ line sowing)	Broadcasting	Line Sowing
2.18	Seed sown (kg in the area sown under the crop)	100.0	50.0
2.19	Whether local or improved or high yielding variety?	Improved Variety	Local Variety
2.20	Whether irrigated or un-irrigated?	Irrigated	Irrigated
2.21	If irrigated, write the source of irrigation (Canal/ tenk/ well/ other (specify))	Tank	Well
2.22	Whether the crop is affected by abnormal seasonal condition? (excess rain/ flood,	No	No
2.23	Whether the crop affected by insects?	No	No
2.24	If yes, whether control measure applied?		
2.25	Whether the crop affected by diseases?	No	No
2.26	If yes, whether control measure applied?		
2.27	Whether the crop affected by weed?	No	No
2.28	If yes, whether control measure applied?		
2.29	Whether chemical fertilizer applied?	Yes	Yes
2.30	Whether green farmyard manure applied?	Yes	Yes
2.31	Farmer eye estimate of the yield in quintal per ha of the experimental crop	20.0	20.0
2.32	Date fixed for harvesting	Wednesday, March	Wednesday, March

Fig. 4.7

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3.0 Selection of experimental plots

3.1 Paddy, Jowar, Bajra, Ragi,Maiz, Groundnut, Sesamum and other crops when they are not sown in rows

S.No	Items	Experiment I	Experiment II
3.1	Length of the selected field in steps from the S.W. Corner	0.0	0.0
3.2	Breadth of the selected field in steps from the S.W.	0.0	0.0
3.3	Length minus steps as per in lenght of experimental plot	0.0	0.0
3.4	Breadth minus steps as per in breath of experimental plot	0.0	0.0
3.5	Random numbers selected (Random step) for location of SW Corner of experimental plot	0.0	0.0
	Breadth	0.0	0.0

3.2 Red gram, Castor, Sugarcane, Cotton and other crops when the crop is sown in one direction

S.No	Items	Experiment I	Experiment I
3.1	Total number of rows in the selected field (consider as breadth of the field)	0.0	0.0
3.2	Average number of rows in the distance of 10 meter for red gram, Castor and Cotton and 5 meter for Sugarcane or as the case may be. (On the bases of three random observation in the selected field)	0.0	0.0
3.3	Total number of rows minus average number of rows in 10 meter/ 5meter plus one	0.0	0.0
3.4	Random number selected (random row)	0.0	0.0
3.5	Length in steps of the longest row	0.0	0.0
3.6	Lenght of minus 13 steps(10 meter) for Red gram, Caster and Cotton, or lenght minus 7 steps(5 meter) for Sugarcane or as the case may be	0.0	0.0
3.7	Random number selected (random step)	0.0	0.0

3.3 Tobacco and other crops when the crop is sown in rows in both directions

S.No	Items	Experiment I L	Experiment I B	Expertiment II L	Expertiment II B
3.1	Total number of rows along the length and breadth of the selected field	0.0	0.0	0.0	0.0
3.2	Average number of rows in the distance of 5 meters seperately for lenght and breadth side (on the bases of three random observation in the selected field)	0.0	0.0	0.0	0.0
3.3	Total number of rows along the length and breadth minus average number of rows in 5 meter seperately in both the directions lus one	0.0	0.0	0.0	0.0
3.4	Number of random row selected for lenght and breadth (Random row)	0.0	0.0	0.0	0.0

4.0 Information on the proportion of the constituent crops if sown as mixed in the selcetd fields

S.No	Items	Experiment I	Experiment II
4.1	Whether the experimental crop is sown exclusively in separate rows (without any other crop in the same row)?	No	No
4.2	If yes:	Crop / Rows	Crop / Rows
	i) Average number of rows of each crop in the distance of 10 meters/ 5 meters (equal to side of CCE) (based on observations at three different random places)		
	ii) Normal distance between two rows of experimental crop sown as pure crop.		
4.3	Whether the experimental crop is swon mixed with other crop by mixing the seed toghter (either in rows or otherwise)?	No	No
4.4	If yes:	Crop / Seed (Kg)	Crop / Seed (Kg)
	i) seed actually used in the selected field in Kg		
	ii) Seed rate in Kg/ha for raising as pure crop (should be given crop-wise as above for all crops in the mixture)		

Details of the Primary Worker

Name: Himashu
Designation: Field Officer
Date: Wednesday, March 15, 2017

View

Remarks of the Inspecting Officer
Testing the Software

Submit Information

Details of the Inspecting Officer
Name: Rahul
Designation: Senior Field Officer
Date: Wednesday, March 15, 2017

Fig. 4.8

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CCE Schedule-II: Details of produce (wet and dry) obtained from CCE plots

1.0 Particulars of the village

Sr.No.	Items	Information
1.	Agril. Year	2016-2017
2.	Agril. Season	Rabi
3.	District	Ahmedabad
4.	Taluk/tehsil/circle	Dhandhuka
5.	Block	Dhandhuka
6.	Village	Aniyali Bhimji
7.	Name of crop	Wheat
8.	Date of visit to the village	Wednesday, March

2.0 Particulars of selection of experimental plots

S.No	Items	Experiment I	Experiment II
2.1	Survey/ dag/ field number finally selected for experiment	1	2
2.2	Area of finally selected field	10.000	10.000
2.3	Name of the farmer of the selected field	Ram	Shyam
2.4	Farmer's Father name	Hariya	Kishore
2.5	Date and month of sowing or transplanting	Wednesday, March 15, 2	Wednesday, March 15
2.6	Method of sowing (Broadcasting, line sowing etc.)	Broadcasting	Line Sowing
2.7	Seed sown (Kgs in the area sown under the crop)	100.0	50.0
2.8	Whether local or improved or high yielding variety? Yes/No	Improved Variety	Local Variety

3.0 Information of inputs applied to the experimental crop after filling schedule-I

S.No	Items	Experiment I	Experiment II
3.1	Whether irrigated/un-irrigated?	Yes	Yes
3.2	If yes, whether irrigation applied or not	Yes	Yes
3.3	If applied write the source of irrigation	Tank	Tank
3.4	Whether the crop is affected by abnormal seasonal conditions (excess rain/flood, drought,frost,hailstorm, other-specify)	No	No
3.5	Whether the crop is affected by insects?(yes/no)	No	No
3.6	If yes, whether control measure applied?(yes/no)	No	No
3.7	Whether the crop affected by diseases?	No	No
3.8	If yes, whether control measure applied?	No	No
3.9	Whether the crop affected by weed?	No	No
3.1	If yes, whether control measure applied?	No	No
3.1	Whether chemical fertilizer applied?	Yes	Yes
3.1	Farmer eye estimate of the yield in quintal per ha of the	20.0	20.0

Save Data

Fig. 4.9

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4.0 Results of Harvesting and Threshing

S.No	Items	Experiment I	Experiment II
4.1	Shape and Area (Square meter) of experimental plot	0.0	0.0
4.2	Random number used for making the experimental plot	0.0	0.0
	Breadth	0.0	0.0
4.3	Date fixed for harvesting as per CCE shedule-II	Wednesday, March	Wednesday, March
4.4	State of crop maturity on the day of harvesting (under ripen, normal, over ripen)	Normal	Normal
4.5	Did the farmer harvest any part of the field prior to the harvest of the plot (Yes/No)	Yes	Yes
4.6	If the did, was the position of the experimental plot affected?	No	No
4.7	If yes, write new pair of random number for making the experimental plot		
	Breadth		
4.8	Actual date of harvesting	Wednesday, March	Wednesday, March
4.9	Weight of grains/produce soon after harvest on the date of harvesting	0.0	0.0
4.10	Weight of number of bundles of harvested plants(Paddy, Wheat, Barley, Gram, Oilseeds) if not threshed on the day of harvesting due to excess moisture in harvested plants	0.0	0.0
4.11	Date of threshing	Wednesday, March	Wednesday, March
4.12	Date of weighment of dry grains/pods soon after threshing	Wednesday, March	Wednesday, March
4.13	Weight of grains/produce if threshed soon after drying the harvested plants/cobs/bundles	0.0	0.0
4.14	Whether drying/rotting or both is required?	No	No

S.No	Items	Experiment I	Experiment II
4.15	If yes, whether this village is selected for driage experiment?		
4.16	If yes, quantity of produce drawn and kept for drying		
4.17	Date of completion of driage/curing/rotting and both	Wednesday, Mar	Wednesday, Mar
4.18	Date of weighment of dry produce/jute fibre	Wednesday, Mar	Wednesday, Mar
4.19	Dry weight of the produce/jute fibre	0.0	0.0
4.20	Weight of the kernal obtained from one Kg of dried pods of groundnut or other similar crops	0.0	0.0
4.21	Precentage reduction in weight due to drying	0.0	0.0
4.22	Whether sugarcane taken for making the gur?(Yes/No)	No	No
4.23	If Yes, weight of sugarcane taken for making the gur		
4.24	Weight of sugarcane juice		
4.25	Weight of Gur		
4.26	(a) Normal yeild for the village (q/ha)	0.0	0.0
4.27	(b) Reasons for significant increase or decrease in the actual yields compared to the normal yield		
4.28	Remarks regarding quality of tobacco other similar crops (effect of seasonal conditions of quality)		

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Fig. 4.10

Form22 — □ ×

CCE Schedule-II: Details of produce (wet and dry) obtained from CCE plots

1.0 Particulars of the village

Sr.	Items	Information
1.	Agril. Year	2016-2017
2.	Agril. Season	Rabi
3.	District	Ahmedabad
4.	Taluk/tehsil/circle	Dhandhuka
5.	Block	Dhandhuka
6.	Village	Aniyali Bhimji
7.	Name of crop	Wheat
8.	Date of visit to the village	Wednesday, March

2.0 Particulars of selection of experimental plots

S.No	Items	Experiment I	Experiment II
2.1	Survey / dag / field number finally selected for experiment	1	2
2.2	Area of finally selected field	10.000	10.000
2.3	Name of the farmer of the selected field	Ram	Shyam
2.4	Farmer's Father name	Hariya	Kishore
2.5	Date and month of sowing or transplanting	Wednesday, March 1!	Wednesday, March 1!
2.6	Method of sowing (Broadcasting, line sowing etc.)	Broadcasting	Line Sowing
2.7	Seed sown (Kgs in the area sown under the crop)	100.0	50.0
2.8	Whether local or improved or high yielding variety? Yes/No	Improved Variety	Local Variety

3.0 Information of inputs applied to the experimental crop after filling schedule-I

S.No	Items	Experiment I	Experiment II
3.1	Whether irrigated/un-irrigated?		
3.2	If yes, whether irrigation applied or not		
3.3	If applied write the source of irrigation (canal/tank/well/other-specify)		
3.4	Whether the crop is affected by abnormal seasonal conditions (excess rain/flood, drought,frost,hailstorm, other-specify)	No	No
3.5	Whether the crop is affected by insects?(yes/no)	No	No
3.6	If yes, whether control measure applied?(yes/no)	No	No
3.7	Whether the crop affected by diseases?	No	No
3.8	If yes, whether control measure applied?	No	No
3.9	Whether the crop affected by weed?	No	No
3.10	If yes, whether control measure applied?	No	No
3.11	Whether chemical fertilizer applied?	Yes	Yes
3.12	Farmer eye estimate of the yield in quintal per ha of the experimental crop	20.0	20.0

4.0 Results of Harvesting and Threshing

S.No	Items	Experiment I	Experiment II
4.1	Shape and Area (Square meter) of experimental plot	0.0	0.0
4.2	Random number used for making the experimental plot Length	0.0	0.0
	Breadth	0.0	0.0
4.3	Date fixed for harvesting as per CCE shedule-II	Wednesday, March 1!	Wednesday, March 1!
4.4	State of crop maturity on the day of harvesting (under ripen, normal,	Normal	Normal
4.5	Did the farmer harvest any part of the field prior to the harvest of the plot (Yes/No)	Yes	Yes
4.6	If the did, was the position of the experimental plot affected?	No	No
4.7	If yes, write new pair of random number for making the experimental plot	0.0	0.0
	Breadth	0.0	0.0
4.8	Actual date of harvesting	Wednesday, March 1!	Wednesday, March 1!
4.9	Weight of grains/produce soon after harvest on the date of	0.0	0.0
4.10	Weight of number of bundles of harvested plants(Paddy, Wheat, Barley, Gram, Oilseeds) if not threshed on the day of harvesting	0.0	0.0
4.11	Date of threshing	Wednesday, March 1!	Wednesday, March 1!
4.12	Date of weighment of dry grains/pods soon after threshing	Wednesday, March 1!	Wednesday, March 1!
4.13	Weight of grains/produce if threshed soon after drying the harvested plants/cobs/bundles	0.0	0.0
4.14	Whether drying/rotting or both is required?	No	No

S.No	Items	Experiment I	Experiment II
4.15	If yes, whether this village is selected for driage experiment?		
4.16	If yes, quantity of produce drawn and kept for drying	0.0	0.0
4.17	Date of completion of driage/curing/rotting and both	Wednesday, March 1!	Wednesday, March 1
4.18	Date of weighment of dry produce/jute fibre	Wednesday, March 1!	Wednesday, March 1
4.19	Dry weight of the produce/jute fibre	0.0	0.0
4.20	Weight of the kernal obtained from one Kg of dried pods of groundnut or other similar crops	0.0	0.0
4.21	Precentage reduction in weight due to drying	0.0	0.0
4.22	Whether sugarcane taken for making the gur?(Yes/No)	No	No
4.23	If Yes, weight of sugarcane taken for making the gur	0.0	0.0
4.24	Weight of sugarcane juice	0.0	0.0
4.25	Weight of Gur	0.0	0.0
4.26	(a) Normal yeild for the village (q/ha)	0.0	0.0
4.27	(b) Reasons for significant increase or decrease in the actual yields compared to the normal yield		
4.28	Remarks regarding quality of tobacco other similar crops (effect of seasonal conditions of quality)		

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Fig. 4.11

3. PROBLEMS ENCOUNTERED AND EXTENT OF UTILIZATION OF SOFTWARE

After development of the software, it was implemented in 5 states namely, Assam, Odisha, Gujarat, Karnataka and Uttar Pradesh. The software was installed in various computers at the state headquarters and all the data entry operators are given proper training for entering the data using the data entry software. Not much problems are encountered while few problems regarding the data entry operation are as follows,

- The Amount of data that was collected through the paper based questionnaires under the pilot project was huge and due to this fact the data entry operation took a lot of time more than what is expected.

- In few state headquarters (i.e. Uttar Pradesh and Karnataka) the data entry operation was hampered due to corrupt operation system and computer memory crash. The problems were resolved by recovering the data from those systems and fresh installation.

- The developed software has a facility that it can generate MS-Excel file directly. But in the state of Karnataka there was some problems were encountered while creating the MS-Excel file from the entered data. After investigation, it was found that the error caused solely due to the fault of the data entry operators whereas the software is working properly.

The developed software was installed in around 25-30 systems in each state headquarters and we received the data in proper format after data entry operation was completed and we received the data from the states in MS-Excel format.

4. CONCLUSIONS

Software is generally made to reduce the quantum of work. The data entry software developed under this study has reduced the paper work and increased reliability of the collected data. The data validation

functionality is given on each and every form to validate the data entered as per user requirements. Statistical analysis can easily be performed on the data as it has MS-Excel file creation functionality. The expected digitization of data with reliability can be achieved with this data entry software. The software was found to be very efficient than the other usual data entry operations done manually in various real life surveys.

REFERENCES

Rongge, M.D.L., (2002). "A Three-tier Design Model for ASP. Net-based Web Applications [J]". Microcomputh Applications, **3**, p.007.

Qiang, Z. H.L., (2004). "Realize General Data-Tier Component Based on ADO.NET Technology [J]." Computer Engineering and Applications, **1**, p. 058.

Nielsen, P. and Parui, U., (2011). Microsoft SQL server 2008 bible (Vol. 607). John Wiley & Sons.

Blakeley, José A., *et al.* (2008) ".NET database programmability and extensibility in Microsoft SQL server".

Singh, R., and Mangat, N.P.S. (1996). *Elements of Survey Sampling*. Kluwer Academic publishers.

Sarndal, C.E., Swensson, B., and Wretman, J. (1992). *Model Assisted Survey Sampling*, Springer-Verlag, New York.